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ECOLABELS AND THE GREENING OF THE FOOD MARKET

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ECOLABELS AND THE GREENING OF THE FOOD MARKET

William Lockeretz, editor

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Preface

In recent years there has been a proliferation of labels that are intended to convey that foods have been produced in an environmentally and socially preferable way. These "ecolabels" variously apply to areas such as consumption of renewable resources; soil, air and water pollution; biodiversity and wildlife; farm animal welfare; and social justice and equity. Some are bestowed by existing organizations, others by organizations created just for the purpose. Most are private, but one especially important one ("organic") has been regulated by the US Department of Agriculture since 2002 and by the European Union since the 1990s. Many involve independent third-party certification to enhance consumers' confidence, but others don't.

The rationale behind ecolabels is admirable. However, with their rapid growth have come several important questions: How credible are they? Do consumers understand what they do and do not mean, or are they imposing "information overload" on consumers? Which ones are most successful in gaining consumers' confidence and support, and why? How much of a marketing advantage do they give to a product in the market? Do they reinforce each other in "greening" the food market, or are they in competition, with the more valuable and legitimate ones at risk of losing out to the more dubious ones? Can small-volume ecolabeled products survive in today's food retailing environment, which favors larger suppliers?

Because ecolabels are a rapidly growing part of today's food market, with different kinds emerging all the time, it seemed appropriate to bring together all segments of the food production and marketing sector in a conference that would give us a better of idea of where this segment of the market stands today and what the future holds. The conference was intended to serve three purposes:

- to provide a comprehensive picture of the current state of ecolabels
- to review what we do and do not know about how they affect food marketing, and to identify key areas where research is needed
- to provide a forum for discussing the controversies that surround ecolabels.

The bulk of the conference consisted of oral presentations and posters submitted in response to a call for abstracts. Because interesting ecolabel activities are going on in many countries, it was very gratifying that the call elicited a strong international response, with over a dozen countries represented among the presenters; almost half the papers in this volume are from outside the US.

Submission of a full paper for inclusion in the proceedings was optional, so that only a portion of the entire program is represented in this volume. (Abstracts of all the presentations, as well as slide presentations when the speakers chose to use them, may be found on the conference web site: *http://nutrition.tufts.edu/conted/ecolabels,* under "Detailed Program.")

The conference organizers are extremely grateful to the US Department of Agriculture's Economic Research Service and Agricultural Marketing Service for generous financial support that made the conference possible.

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Evolving EU Food Production Policy: Implications for Ecolabeling

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For over four decades, the Common Agricultural Policy (CAP) of the European Union has been the major factor influencing both food supply and production methods in Western Europe. The economic and policy environment in the EU is now very different from that which prevailed in earlier decades. Further change is anticipated as the economic, social and geographic diversity of the EU continues to increase through periodic enlargements incorporating new Member States. The CAP itself is now undergoing a rapid evolution to reflect these changes. As this paper demonstrates, these transformations greatly alter the provenance of food production and the scope for ecolabeling in the EU.

For most of its existence the primary function of the CAP was to increase food supply, and farmers responded accordingly. Over the last decade the CAP has been reshaped, its objectives have been broadened, and policy has shifted to encourage more eco-friendly farming and food production methods. This noticeable shift in emphasis has provided added scope for differentiation of food products and the use of ecolabels.

Food Security

When the CAP was conceived and developed in the post-war period, the primary objective was to increase food supply and thereby increase food security. The main policy instrument used to increase food supply was high product prices. High prices in turn encouraged scientific advances and the application of new technology to intensify production. This policy structure gave individual farmers a direct economic incentive to use this new technology and incorporate only costs that are directly related to the profitability and long-term sustainability of production systems or the need to comply with regulatory standards. As we discuss later, this is now considered a rather traditional "productionist" view of farming. Its objective was the optimum consumption of natural resources to supply food and fiber for consumers at the lowest cost, with the process largely regulated through the medium of product price.

Farmers, like all members of society, continuously strive to increase their income. With the high product prices prevailing during this period, farmers focused almost exclusively on their farming activities and food output as the solution to their income problem. This focus was based on a combination of personal choice and circumstances, both on-farm and in the wider economy.

Their solutions included the following:

- switching to farm enterprises with higher margins per hectare
- increasing the intensity of all enterprises
- enlarging the farm by either buying or renting land.

For many years this policy did maintain and support farm incomes and also increased food supply. However, the eventual outcome of the intensification and specialization in EU agriculture was severe structural surpluses of most farm commodities. Because of structural surpluses, increasing volumes of the main farm products had to be removed from the market through intervention purchases to maintain producer prices. By the late 1980s, intervention purchases accounted for a significant proportion of sales.

Throughout this period farmers in the EU were, in essence, in a volume business. By the end of the period some farmers were essentially producing for intervention and to meet quality standards for intervention purchasing, which significantly impacted on the prices received by farmers. (Current intervention standards for cereals, dairy products and beef are

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summarized in Annex 1.) Further information on how changes in EU intervention and labeling regulations for beef have differentially impacted on cattle prices in a number of Member States is available in O'Connell et al. (1999).

In the process they also were becoming increasingly isolated from consumers' demands. In such circumstances, ecofarming and ecolabeling had only a secondary role.

Further policy complications were developing. To sustain the internal producer prices, most surplus production had to be exported outside the EU (third countries). Eventually, the increasing requirement for export refunds (subsidies) to promote exports raised the budgetary cost of the CAP. Also, the escalating scale of the exports created severe international trade difficulties for the EU. By the early 1990s, all these factors had combined to precipitate a major revamping of the CAP itself.

Public Costs

The productionist perception of farming takes into account only private costs to the farmer and the private gains or value that the consumer of the food ultimately derives from the natural resources used to produce that food. The policy of high product prices and the unrelenting drive to improve technical and economic efficiency in food production in the EU did solve the food security objective, but it had a number of indirect impacts and costs.

The intensification of farming activities increased pressures on livestock, on the plants used to feed them, and on the overall biological diversity of the region where the production occurs. The exploitation of economies of scale has had both direct and indirect impacts on the environmental landscape, nutrient balances, and water quality of the region (Baldock et al., 2002). All these changes have significantly affected the rural population and society in general, who also consume these public goods to varying degrees. Ethical issues also arise about the inputs and production techniques used in farming and their possible effects on product safety, animal welfare, and the environment. Included here are issues such as the use of recycled animal products, feed additives, hormones and growth promoters, as well as livestock housing conditions.

These negative impacts on the environment, animal welfare, food safety and even ethical issues are normally referred to as "public costs," since they do not directly affect the farmer. These costs accrue to society as a whole and arise from the deterioration or even loss of the "public value" placed on these goods by society. But while food supply remained the primary EU priority, these external costs were undervalued or even ignored. In this policy and market context, ecofriendly farming and ecolabeling essentially remained non-issues.

Public Goods

The inherent nature of public goods is that they are very diffuse and their costs and benefits are difficult to quantify. Hence they are difficult to control and regulate. Their value depends on prevailing economic, social and cultural conditions, and consequently varies greatly with the circumstances of the individual and region. Socio-economic and cultural values vary greatly across the EU. They also are constantly changing because of the added diversity introduced at each enlargement, which incorporates new and more ethnically diverse Member States.

Over the years, various societies have tended to define acceptable standards and practices within a regulatory framework. The framework is usually defined in technical terms with advice from a combination of animal, food, public health and environmental scientists. The standards may be derived from experiments that directly or indirectly measure the biological response of animals and plants to varying degrees of stress. They may measure the probability of loss of performance or death of the animal or, in the more extreme situation, the consumer of the food product. Normally they are focused on the human as either the consumer or producer, but seldom on the welfare of the animal or the environment.

The regulation can vary from outright prohibition to establishing minimum acceptable standards for a range of inputs and management practices. There is extensive and increasing legislation that either prohibits or defines the conditions for use of inputs like land, feeds, feed additives and hormones. A similar situation exists for management practices such as nutrient balances, stocking densities, housing and transport conditions, castration and slaughter.

Economic instruments can also be used by the regulatory authorities to alter the balance between public costs and benefits. Taxes or subsidies on either inputs or outputs could significantly affect the optimum intensity of crop and animal production and therefore affect the balance between the private and public costs and the overall benefits. Institutional subsidization of both inputs and outputs is quite common in agriculture, especially for livestock production in many countries. But public goods generally receive a low priority from policymakers, as the aim is usually some mix of protecting farm incomes, increasing food security, and encouraging exports.

The economic literature contains an increasing number of studies that have attempted to measure public preferences in relation to environmental amenities, animal welfare and food safety (Kline and Wichelns, 1996; Bennett and Larson, 1996; McInerney, 1996; Henson, 1996). These studies are probably a response to a growing awareness of public goods and the need to preserve, value, and even "market" them. The studies attempt to use a "willingness to pay" concept as a measure of the value the individual consumer places on the preservation or incremental improvement of a specific public good. Further examples of these methods are presented in this volume (Conner, 2003; VanWechel and Wachenheim, 2003).

The methods used involve revealed and expressed preference. Revealed preference attempts to derive a value for non-market goods based upon actual choices among alternative market goods containing different levels of the desired public good attribute. The expressed preference method, usually contingent valuation, asks individuals directly about the value they place on non-market goods. The findings from these studies indicate that there is a great diversity in the "willingness to pay" for non-market goods. These research methods need further development before they could form the basis for the valuation of public goods, especially where a number of public good issues are involved, as in reversing the public costs of the CAP as outlined above.

Private Benefits and Public Costs

As affluence increases, society becomes more aware of the external costs involved, but it also can afford to place a higher value on public goods like food safety, animal welfare, and environmental and ethical issues. This intensifies the potential conflict between the degradation of such public goods that are of increasing value, and the technical objective of increasing efficiency and productivity in farming and the lowering of unit costs.

As food surpluses in the EU began to accumulate, this potential conflict became a reality, and in conjunction with international trade difficulties and escalating budgetary costs, it was responsible for a significant change in EU policy in 1992. By the turn of the century, EU food production policy had shifted to placing a declining value on extra units of food production, but an increasing value on any public goods consumed in the production process. The cost-benefit mix had finally progressed to the stage where it was probable that the sum of the private and public costs was greater than the sum of the private and public gains. It is scarcely surprising that this occurred in an affluent region of the world where both the human and the animal population densities are relatively high.

CAP Reform

In response to the developing internal and external market situation, a major reform of the CAP was introduced for cereals and beef under Commissioner MacSharry in 1992. Official support prices were reduced by 30% to enable beef to better compete with other meats and to facilitate exports of cereals and meats to third countries.

To compensate producers for the planned lower product prices for cereals and beef, farmers received direct payments (DPs) or "cheques in the post" to maintain their incomes. But for supply control purposes, these payments were restricted to area-based quotas for cereals and specific animal-based quotas for beef. In the 1992 CAP reform, several "accompanying measures" were agreed upon and implemented under the Rural Development program. The main measures provided direct financial aid for:

- land conversion to forestry and alternative enterprises, including organic farming
- protecting the agricultural environment
- a farm retirement scheme for older farmers.

From an ecofarming perspective, these policy shifts had several interesting implications. First, the lowering of product prices would inevitably shift the optimum economic production towards lower levels of intensity. Second, production was further constrained by a combination of quotas for products and quotas for direct payments for specific products. Third, the direct payments for cattle farmers were and are based on the possession of certain types of animals rather than their performance, and the animals had to be "farmed" within specified stocking density limits. Fourth, an additional payment was made available for more extensive systems, again defined by a limit on stocking density, and for organic production systems. Fifth, and possibly the most important, the concept of "cross compliance" was introduced whereby the direct payments were made conditional on farming methods conforming to various other EU measures and regulations, for example animal welfare and animal traceability.

The overall impact was that the DPs were unlikely to fully compensate the very intensive producers who have the greatest impact on the degradation of the value of public goods. However, when the price and the DP effects are combined, there was likely to be an overall gain in the public cost-benefit balance, but the extent of this is difficult to quantify.

To illustrate the scale of the shift in thinking regarding ecofriendly farming that has occurred in Ireland and the EU, we outline here just one example taken from a recent report on "Eco-Friendly Farming" published by the Irish Department of Agriculture, Food and Rural Development (DAFRD, 2002). Under the accompanying measures of the 1992 reform of the CAP,

> Member States could implement their own agri-environmental schemes within the discretion allowed in the relevant EU legislation. The stated objectives of the Irish scheme – the Rural Environment Protection Scheme (REPS) which operated from 1994 to 1999 are:
>
> - the establishment of farming practices and production methods which reflect the need for environmental conservation and protection;
> - the protection of wildlife habitats and endangered species of flora and fauna; and
> - the production of quality food in an environmentally friendly manner.

According to this report, "some 46,000 farmers participated in the first REPS with approximately one third of agricultural land farmed in accordance with REPS rules." This was an excellent response by commercial farmers to a voluntary environmental scheme, and it clearly shows that farmers will respond to financial incentives to provide "public goods."

For a number of years, policymakers have also encouraged and supported the development of organic farming at both the EU and individual Member State level. A critique of the existing certification and accreditation procedures for organic farming in Austria is given in this volume by Darnhofer and Vogl (2003). Girardin and Sardet (2003, this volume) have also prepared an environmental assessment of specifications and schemes in operation for arable farms in a number of European countries.

Under the more recent Agenda 2000 agreement, the CAP reform was further deepened for beef and cereals and tentatively extended to include milk. As in 1992, this involved lower product prices and increases in the value for DPs. Also under the Agenda 2000 agreement, the existing less-favored area (LFA) or "headage" payments were decoupled from animals and linked to land management to prevent environmental degradation. The new land-based payments were also linked via a minimum stocking density requirement to continued use of the land for agricultural production, although at a very low level. In Finland, as in Ireland and many other members of the EU, these LFA allowances are considered central in maintaining viable rural communities in sparsely populated regions of the EU (Laurila, 2000). However, even as the Agenda 2000 agreement was being implemented, additional reform seemed inevitable.

DPs for Public Goods

Adjusting to the reformed CAP structures over the last decade has provided a major challenge for EU farmers, input suppliers and output processors. For beef, the adjustment process was seriously compounded by the continuing fallout from the BSE crises of 1996 and 2000. The eventual consequences of BSE for farming in the EU are only now beginning to emerge. We believe that this will eventually lead to a much wider redefinition of acceptable food production practices and the role of farming in the EU.

EU policymakers in the 21st century are in a unique position in that the DPs are an identified pool of money that could be reoriented to reward farmers for providing public goods. As a consequence of the reforms to date, the annual value of EU commodity-based direct payments to farmers has rapidly increased from a low base to almost 30 billion euro**.** An expenditure this large will ultimately change the way farmers undertake their activities. But the transparency of the expenditure is bound to raise questions about its current and future function and its value to society.

A direct link between the use of DPs and the provision of public goods was proposed by Dunne (1996). This proposal suggested that switching a significant proportion of farm income support from product prices to DPs would provide an ideal opportunity to influence private behavior to voluntarily incorporate the external costs of public goods into production technology. Under this proposal, the societal value of the DPs could be enhanced significantly if the payments were made conditional on supplying public goods. This would have the added advantages of increasing the economic justification for the large expenditure on the DPs themselves, the acceptability of the DPs to EU taxpayers, and the justification for the DPs under WTO rules.

Dunne (1996) also suggested that decoupling the DPs from eligible animals and land would have several added benefits. The production costs for cattle farmers could then be reduced to reflect the declining value of the carcass, cattle numbers could reflect market balance for beef independent of their ability to collect DPs, and the DPs themselves could be used to provide a more targeted method of income support. A more generalized form and further refinement of this proposal for all land-using farming activities was developed and published by Dunne and O’Connell (1998; 2000a,b; 2002) and by Dunne et al. (1999).

This integrated proposal for all commodities involves full decoupling of the DPs from eligible animals and partial decoupling from the land. The proposal also recognizes the diversity of production conditions within the EU by providing for both common EU and optional national compliance criteria.

For each commodity, the proposal envisaged three tiers of strategic decisions in relation to the overall income support system. These are:

- the ratio of price to direct payments at the EU and world market interface
- the DP (revenue) allocation mechanism among Member States within the EU
- the distribution criteria among farmers within the Member States.

In devising this proposal it was assumed that the EU would have to further reduce border protection and its internal support prices for the next WTO trade round. The value of the DPs could then be increased to compensate for the price reduction.

This pool of DP revenue could be distributed among Member States based on the Utilisable Agricultural Area (UAA) devoted to the individual crop and livestock enterprises. The size of the DP per hectare for each individual commodity or enterprise would depend on the mix of price support and DPs that the EU considered desirable to support farm incomes. An additional payment, like an extensification premium or a premium for organic production, could be used to encourage even more extensive production methods and to assist the poorer and more remote regions of the EU. The revenue accruing to each Member State would be the product of the mix of land uses (UAA) and the payment rate per hectare for each commodity. These “national envelopes” could then be disbursed to reflect the diversity of economic, social, and environmental conditions. Alternatively, the revenue distribution among Member States could be based on the value of the existing DPs for the commodities that have already been reformed under the MacSharry and Agenda 2000 agreements.

The individual Member State could simply distribute the “envelope” on a per hectare basis for each commodity like the “new disadvantaged areas” payment. We suggest that it might be preferable and more equitable to use a mix of a payment per farmer or per household and a reduced payment per hectare. This latter approach would reduce the capitalization of DPs into assets and would thereby decrease future production costs. This would provide for a stronger public good and social dimension to meet local needs, especially in the poorer regions of the Union.

Compliance Criteria for DPs

The primary DP per hectare at the EU level would be made conditional on a range of compliance criteria for the operation of the *entire farm*. This would incorporate public good and consumer values in relation to food safety, traceability, inputs used, production practices, and impacts on the landscape, environment, and animal welfare. The criteria would be common across the EU and therefore compatible with the single market requirements.

In addition to the common EU compliance criteria, further specifications could be implemented by National governments to address local weaknesses, exploit strengths, and encourage product differentiation and competitive marketing strategies, but within an overall EU single market system. Provided this latter component was suitably structured it could provide financial incentives to reward ecofriendly and localized food production. With appropriate controls and labeling, this localized product could then be differentially marketed.

A more comprehensive review of the likely implications of these proposals for farmers, farm structures, administrative requirements, farm inputs, outputs and product markets is given in Dunne and O'Connell (2002). From an ecolabeling perspective, a policy framework of this type would clearly facilitate diverse production methods and ecofriendly farming. The resulting products would be very suitable for ecolabeling to ensure the maximum economic exploitation of their inherent attributes.

An EU Vision for Agriculture

In policy formation in a modern economy, many aspects of the production and trade role of agriculture have to be considered. Apart from changes in product support prices and DPs, the EU Agenda 2000 proposals of 1999 outlined a number of non-price issues in relation to general competitiveness, the multifunctional nature of EU agriculture, and the CAP. While most of these multi-functional aspects of the CAP were not explicitly incorporated into the final Agenda 2000 agreement, they will likely shape the role of EU farming in the future.

The following is a summary of the most important issues affecting the future CAP objectives that were discussed and outlined in the Agenda 2000 proposals but were not explicitly carried through into the agreement. These were:

- food safety and product quality, which consumers often link to specific production methods or geographic regions
- animal welfare considerations
- environmental friendliness of production methods
- integration of environmental goals into the CAP
- further developing the role of farmers in the management of natural resources and landscape conservation
- preservation of sustainable farming and social cohesion
- maintaining a fair standard of living for the agricultural community and stability of farm incomes
- creation of complementary or alternative income and employment opportunities in rural areas for farmers and their families.

A more complete description and discussion of the multifunctional role of farming, including the EU model of agriculture and its significance in rural development, can be obtained elsewhere (Blandford, 2001; Cahill, 2001; Harvey, 2001; Latacz-Lohmann and Hodge, 2001; Laurila, 2001; Mahe, 2001; OECD, 2001; Tarditi, 2001; Thomson, 2001). A contrast between the US and the EU perspective on multifunctionality has been outlined by Freshwater (2002). Daily and Ellison (2002) discuss an even wider vision of the role of farming in the economy of nature and in nature conservation.

Mid-Term Review

In July 2002, the EU Commission published a report entitled a "Mid-Term Review of the Common Agricultural Policy." Against expectations, this report proposed decoupling direct payments from animals and a shift to a single income payment per farm for all the relevant land-using enterprises. According to the proposals:

> Farms under this scheme will have complete farming flexibility increasing market orientation, but payments will be conditional on compliance with statutory environmental, food safety, and animal health and welfare standards (Cross compliance). (Commission of the European Communities, 2002)

The stated ultimate aim is to include all crop and animal regimes within this type of framework. It proposed that farm audits be introduced to ensure that the compliance criteria are met. In contrast to the current DP system, this mechanism would also be much more compatible with the EU vision of agriculture and rural areas outlined earlier. The proposals also identify funds for financial support for voluntary schemes, which will include:

> encouraging farmers to participate in quality assurance and certification schemes recognized by Member States or the EU including geographic indications and designation of origin and organic farming. (Commission of the European Communities, 2002)

Although the future direction of EU agricultural policy is now becoming clearer, several serious operational aspects of the policy have yet to be resolved. Probably the most important in relation to the future shape of EU farming is the degree to which the DPs are linked to land use and its stewardship versus land ownership. The legal texts, published in January 2003, further clarify the EU Commissions preferred options on the payment mechanism, eligibility criteria, and the related compliance conditions (Commission of the European Communities, 2003). These legal texts will then form the basis for negotiations and may lead to a new agreement for EU agriculture that will operate for a number of years.

The justification and the compliance criteria for the DPs contained in the Mid-Term Review are very similar to the policy framework developed and published by Dunne and O'Connell (1998; 2000a,b; 2002). The major difference between the two proposals is in the details on how the DPs will be administered to the farmers. The Commission's proposal relies exclusively on an area-based payment on historical land use as against our preference for a combination of a payment per farmer or per household and a reduced payment per hectare on current land use. As noted earlier, we suggested including a farmer/household component to reduce the capitalization of DPs into assets, which would otherwise increase future production costs. Our proposal would also provide for a stronger public good and social dimension to meet local needs, especially in the poorer regions of the Union. Table 1 summarizes the likely impact of each payment option on the future structure of farms, farm enterprises and the general rural area.

This re-orientation of the DPs has been described by Dunne et al. (1999) as "using a [payments] schedule similar to the [EU] Farm Retirement Scheme but with REPS type requirements." Irrespective of the method used, decoupling of the current DPs would introduce a whole new dynamic into the entire EU policy, farming and market interface. As the "center of gravity" of mainstream EU agriculture moves closer to ecofriendly farming, the contrast between mainstream farming and organic farming is reduced. This may narrow the market scope and share for organic products, possibly confining it to a type of niche market.

The re-orientation of the DPs towards a payment system for public goods will affect both the supply of and demand for food within the EU. This will affect the overall market balance and the need for subsidized food exports. Once DPs are decoupled from the animals, it is difficult to predict the actual scale of the decline in animal numbers and prices, and the knock-on effects on the farm enterprise mix. But the expenditure on concentrate feed and fertilizers will decrease to reflect these changes. Preliminary estimates for Ireland suggest that compared to 1999, the expenditure reductions on purchased feeds and fertilizers could be of the order of 20%, valued at approximately 190 and 65 million euro respectively. This would be the equivalent of about one million tonnes of concentrates and about 300,000 tonnes of fertilizers (Dunne and O'Connell, 2000b). A more comprehensive discussion of some of the direct and indirect implications of decoupling the DPs from individual animals is given in Dunne and O'Connell (2002).

Summary

In the past, agricultural policy in the EU was primarily driven by the need for a secure food supply and the objective of sustaining the economic and social well-being of farmers. For farmers this was essentially a volume business, which offered very limited scope for ecofarming and ecolabeling.

In the affluent EU society of the 21st century, with its abundance of food, agriculture and food policy will mainly be driven by the economic and social goals of this new society. In this society the value placed on an extra unit of food production is declining and possibly negative, but the value placed on any public goods consumed in food production is increasing. As a consequence, the mix of agricultural production and public goods that this society is prepared to support financially is changing rapidly.

The level and components of farm incomes in Ireland and the EU in the 21st century will then reflect these value changes. Farm revenue will consist of a mix of payments for conventional agricultural commodities or products and public goods. The public good payments will be conditional on the level and type of inputs used, farming practices, types of products, and conformance to a societal vision of the role of farming. This will affect future production costs, scale of operation and the overall configuration of agriculture and rural society.

In comparison with the earlier years of the CAP, this is a far more fertile territory for ecofriendly farming practices, food production and ecolabeling of food. The shift towards ecofriendly farming does, however, reduce the contrast between mainstream farming and organic farming, which will narrow the market scope and share for organic products.

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Table 1. The impact of the structure of the DP mix on farming and rural areas (Dunne and O'Connell, 2002)

A ***straight area*** payment would:	A payment with a ***high farmer/household component*** would:
• Favor the larger farmers • Encourage restructuring of holdings • Facilitate the exploitation of economies of scale • Reduce the unit costs of production • Be quickly capitalized into land values • Encourage out-migration of people	• Favor smaller farms • Transfer almost directly into farmer or household income • Reduce the mobility of land use and ownership • Increase the likelihood of part-time farming • Increase the incentive to engage in farm enterprises and production practices that are compatible with part-time farming

Annex 1: Criteria for EU intervention purchases[a]

Common wheat	• A specific weight of 73 kg/hl and a penalty of 0.5 euro per kg below 76 kg/hl • The ability to pass the EU's dough machinability test (below 30) • Moisture content of 14.5%, a discount of 0.2 euro per 0.1% moisture applied between 14% and 14.5% • A Hagberg falling number of at least 220 seconds including a preparation-agitation time of 60 seconds • A Zelany index of at least 22 • A protein content (dry matter basis) of at least 11.5%. Penalties exist for protein content below 11.5% and a minimum acceptable level of 10.5%
Beef	• Adult bovine animals are categorized on the basis of an EU classification grid of carcass conformation and fat cover (Council Regulation 1208/81) • Member States are required to report each week the deadweight prices using the EU classification grid for specific categories for steers, bulls, heifers and cows • Intervention buying in prices are fixed by the EU Beef Management Committee on the basis of tenders received • Only beef from male animals is eligible for intervention • Intervention will be opened if for two consecutive weeks the average market price in a Member State recorded on the basis of the EU carcass classification scale falls below 1,560 euro per tonne • Accepted tenders must be equal to or less than the average market price recorded in a Member State • Intervention buying-in will close when, during one week, the average market price in a Member State is no longer less than 1,560 euro per tonne
Skim milk powder (spray process)	• Intervention does not operate during the winter months • Minimum protein (dry matter basis) of 35.6% in the non-fat dry matter • Agencies can purchase powder down to a minimum of 31.4% with the price reduced pro rata • Product must have been manufactured within 30 days before being offered to intervention • Payment is made 120 to 140 days after the powder has entered storage • Further details on quality and packaging are specified in EU regulation 214/2001
Butter	• Made from pasteurized cream, a minimum fat content of 82% and a maximum water content of 16% • Payment is made between 45 and 65 days after being taken into store • Intervention arrangements are specified in Article 6 of EU Regulation 1255/1999 • Procedures for tendering and measuring market prices and quality checks and specifications are outlined in EU Regulation 2771/1999

[a] Compiled from information in CAP Monitor, published by Agra Europe (London) Ltd, Tunbridge Wells, UK.

Certification and Accreditation of Organics in Austria: Implementation, Strengths and Weaknesses

Ika Darnhofer[1] *and Christian R. Vogl*[2]

Over the past few years, policy makers have supported the development of organic farming at the European and national level as a process that contributes to environmentally sound farming practices. In Austria, about 9% of farms are currently under certified organic management, the highest percentage in the European Union (EU). Several factors have contributed to this: the activities of organic farmers' associations; the early inclusion of guidelines for organic crop production and animal husbandry in the Austrian Codex Alimentarius; government support through direct payments for organic farms during and after conversion; the early commitment of supermarket chains; and the establishment of a private organic marketing company (Vogl and Hess, 1999).

Within the EU, the ongoing changes in the Common Agricultural Policy have shifted farm income support from product price intervention to direct payments not linked to production (Dunne and O'Connell, 2003). However, if direct payments for organic farming are seen by European governments as a necessary tool to reward farmers for the preservation of public goods, they are at the same time the subject of critical discussions. As a result, market instruments that support demand, such as labels for organic products and the marketing of these products, are gaining importance. Because organic farming currently is the only farming approach that is supported by an explicit legal definition and international agreements, it has an edge over other ecolabels. The defined standards are intended to promote consumer confidence and prevent an undermining of the market through fraudulent trading.

Structure of Certification in Austria

EU regulations

With the European Council Regulation (EEC) Nr. 2092/91 and its amendments (henceforth called the "EU Regulation") the EU has created the regulatory framework for the organic farming sector in Europe (Lampkin et al., 1999). The EU Regulation identifies the production methods that are permitted as well as those that are prohibited, and lists all the inputs that may be used. It also includes processing rules that must be satisfied for a product to be labeled "organic."

The EU Regulation also specifies the inspection and certification regime that is obligatory for operators involved in putting organic products on the market. It requires that all operators involved in the production, processing, packaging and labeling of organic products be officially registered, inspected and certified. Member States must establish an inspection system operated either by private certification bodies satisfying the quality standard EN 45011 (the European version of ISO Guide 65), or by public certification authorities. These certification bodies must be supervised and a system of information exchange between the certification bodies and the public authorities must be set up to communicate irregularities and infringements found during inspections. Given the differences in conditions and traditions within Europe, some issues within the EU Regulation may be decided at national level.

The EU Regulation, which was passed in June 1991 and implemented as of January 1, 1993, is legally binding in all Member States and must be fulfilled by any imported product. So far, it has been amended more than 40 times in an effort to increase the specificity of the regulations and close loopholes, thus reducing the room for interpretation. One of the major amendments to date (EEC 1804/99) covers production, labeling and inspection of the most relevant livestock species (cattle, sheep, goats, horses and poultry), as the original EU Regulation covered

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only products of plant origin. The amendment also explicitly excludes genetically modified organisms (GMOs) and products derived from them from organic production.

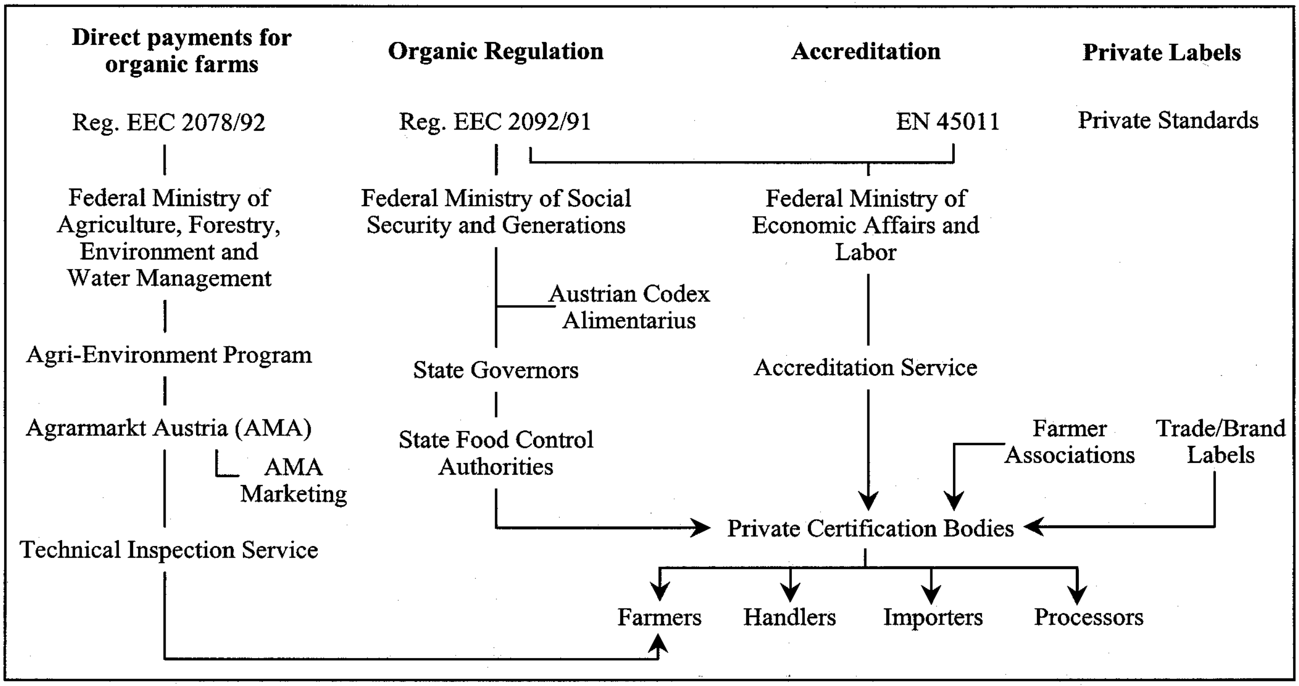
Organic food products can be imported from non-EU countries when it can be ascertained that the production rules and the inspection measures for organic foods comply with or are equivalent to the EU Regulation. This can be ensured by access to the "List of Third Countries." To be included in this list, the applicant country must already have enacted organic farming legislation and have a fully functional system of inspection and monitoring. By the end of 2002 the list comprised Argentina, Australia, the Czech Republic, Hungary, Israel, New Zealand, and Switzerland. Exporters from countries not on this list need an import permit. To be granted such a permit, exporters apply for inspection of the operators by an EU-inspection body or an EU-assessed national body (Kilcher et al., 2001).

Implementation in Austria

Since 1983 Austria has had a national legal definition of organic farming that covers both plants and livestock within Chapter A.8. of the Austrian Codex Alimentarius. In preparation for the accession to the EU in 1995, the EU Regulation was implemented on July 1, 1994. Whenever an amendment of the EU Regulation is published, it replaces the respective Austrian Codex Standards, as was the case when animal production was regulated by the EU in 1999.

The control and certification process for farms, products and processors and the accreditation process for certification bodies is characterized by a tripartite approach (Figure 1), where each ministry focuses on a specific agenda. First, the Federal Ministry of Social Security, as the central Competent Authority, implements the EU Regulation and focuses on its main goal of protecting consumers from fraud and producers from unfair competition. Second, the Federal Ministry for Economic Affairs and Labor ensures that inspection and certification activities comply with EN 45011. Third, the Federal Ministry for Agriculture, Forestry, Environment and Water Management focuses on environmental conservation. It administers the Agri-Environment Program of the EU (EEC 2078/92), offering direct payments to certified organic farmers participating in the program.

Figure 1. Overview of bodies involved in control, certification and standards for organic farms and products in Austria.


Direct payments for organic farms
Organic Regulation
Accreditation
Private Labels
Reg. EEC 2078/92
Reg. EEC 2092/91
EN 45011
Private Standards
Federal Ministry of Agriculture, Forestry, Environment and Water Management
Federal Ministry of Social Security and Generations
Federal Ministry of Economic Affairs and Labor
Austrian Codex Alimentarius
Agri-Environment Program
State Governors
Accreditation Service
Agrarmarkt Austria (AMA)
AMA Marketing
State Food Control Authorities
Farmer Associations
Trade/Brand Labels
Private Certification Bodies
Technical Inspection Service
Farmers
Handlers
Importers
Processors

The **Ministry of Social Security** has a coordinating role with regard to the EU Regulation, including limited administrative and legislative powers. Actual implementation is devolved by the Austrian Food Act to the nine State Governors, acting through their respective State Food Authorities. A State Food Authority issues a provisional approval pending accreditation of the certification body. When accreditation is achieved, the certification body receives final approval from the state where its head office is located and further approvals from the other states where it intends to operate and has submitted an application. In Austria all certification bodies operate in more than one state. Supervision of the private certification bodies is carried out by each state, with the supervision of administration and documentation taking place in the state where the certification body has its head office. There is no cross-supervision between states and the intensity and approach to supervision differs from state to state (European Commission, 2001). Supervision only covers the certification of legal requirements, as private standards are not within the supervisory role of state authorities.

The State Food Authorities, as well as the Federal Agencies for the Surveillance of Food Safety, are also in charge or analyzing food samples for residues, levels of contamination, nitrate content, etc., within their food monitoring programs. These programs are not specific to organic products but may include them in their sampling procedures.

The Subcommittee for Organic Farming of the Austrian Codex Alimentarius Committee, which is located within the Federal Ministry of Social Security, plays an important role as it is the forum to discuss rules and criteria on aspects not yet covered by the EU Regulation. Its bi-monthly meetings are attended by officials from all involved authorities as well as representatives of all stakeholders (e.g., consumers, producers, and retail interest groups). The wide membership ensures that the decision process is transparent and decisions have broad support. Once consensus is reached, the Subcommittee advises the Plenary of the Austrian Codex Alimentarius Committee. This Plenary has the power to decide which standards are to be published in the Codex. These standards do not have the status of a law, but are an objective professional expert statement. The Subcommittee also advises the representatives of the Federal Ministry of Social Security in their negotiations on the EU Regulation in Brussels.

An amendment of the EU Regulation (EEC 1935/95), which took effect in 1998, was interpreted in Austria as requiring certification bodies to be accredited. Therefore the Austrian Accreditation Service, which is part of the **Ministry of Economic Affairs**, grants accreditation following an assessment of the certification body's quality management manual, a two-day office audit, and a one-day witnessed inspection, i.e., an on-the-spot inspection of an operator. The purpose of accreditation, which is granted for five years, is to confirm that the certification body has established a quality management system according to EN 45011, as well as qualified staff and the necessary resources. As part of its supervision duties, the Accreditation Service audits the certification bodies annually, which can include witnessed inspections or re-inspection of a sample of operators.

Accreditation led to a harmonization of the certifiers' operation procedures, such as the content of contracts with clients, information policy towards clients, education and training of staff and inspectors, separation between inspection and the certification decision, handling of complaints by organic farmers, and documentation requirements (Vogl, 2000).

The **Ministry of Agriculture** is in charge of implementing the Agri-Environment Program (based on EEC 2078/92), which in Austria encompasses 31 schemes, including organic farming. Farmers can take part in the program through a voluntary five-year contract. The program is administered on behalf of the Ministry by Agrarmarkt Austria (AMA), which also administers other direct payments to farmers within the Common Agricultural Policy. The Technical Inspection Service of AMA controls the proper application of the schemes, for which farmers receive direct payments. Within these controls, 5% of farmers participating in the scheme "organic farming" will be inspected each year, with farms selected according to a risk assessment system.

A subsidiary of AMA is AMA Marketing, which, among other things, licenses the AMA organic logo, administers the AMA quality seal (not organic), and is in charge of ad campaigns in support of Austrian agriculture. The AMA organic logo exists in two versions: one is colored red, white and black and indicates that the majority of its ingredients are of Austrian origin. The other is black and white and indicates that the ingredients originate mainly from foreign countries.

There are seven accredited **certification bodies** operating in Austria, which are either non-profit or for-profit private organizations. Shares are held by private citizens, by enterprises that work in the inspection business at large, or by organic farmers' associations. The inspectors visit farms annually and processors several times per year, mostly unannounced. Inspection and certification may be performed by the same body, but within the body these two steps have to be administered by two different people (inspector, certifier) in two distinct steps. A certificate is granted by the certification body only if the inspection report is complete and plausible, and fulfills all legal requirements. Farmers must have such a certificate to receive direct payments for organic farming and to be allowed to label produce as organic.

Besides the legal regulations, **private standards**, e.g. those of an organic farmer association or a private label, also are certified. The private standards reflect specific concerns and interests of the respective group. For example, farmers highly concerned with animal welfare join an organic farmers' association with regulations on animal keeping, breeding, feeding and veterinary medicine that are stricter than the EU Regulation. These farmers and their association advertise their approach to organic farming to gain a comparative advantage, for example biodynamic farmers, organic farmers of certain regions, and certain processors and retailers.

Bio Ernte Austria is the most powerful organic farmers' association, with about 50% of all Austrian organic farmers as members. Its standards are stricter than those of the Austrian Codex. As early as the 1960s, the association started to establish an inspection system and to advertise their organic brand.

'Ja! Natürlich' is the best known trade label in Austria and belongs to the supermarket chain Rewe (Billa, Merkur). Most of the products of Austrian origin sold under this label are produced by farmers belonging to Bio Ernte Austria. All organic farmers delivering to this and to other labels (e.g. 'Natur pur' of Spar) have to fulfill additional requirements that go beyond the EU Regulation, Austrian Codex standards and farmer associations' standards. Conversely, the retailers also are bound by a contract with farmer associations to purchase organic products from Austrian farmers first, and foreign products only if domestic ones are not available.

Appraisal of the Austrian Implementation

Over the four years since accreditation was implemented, inspection and certification of organics in Austria have evolved into a highly professional and transparent system, not least because of the accreditation requirement and its accompanying supervision. However, although the first steps for harmonization of the work of the certification bodies were successfully implemented, several areas of the certifying system still have potential for improvement. These include: harmonization of certifiers' internal guidelines and procedures for sanctions; improved information exchange between state and federal authorities; and tighter supervision in certain areas.

Harmonization

Although certification bodies do not define their own set of standards, there can be differences in the interpretation of the EU Regulation because of several imprecisely worded passages, resulting in internal guidelines drafted by the certifiers. These are cleared with the State Authority, but might not be shared with other certification bodies, leading to differences in interpretation and application of the regulations. However, standardized certification requirements based upon harmonized guidelines and sanctions are necessary, given that the certifiers are in competition with each other. This competition can result in a pressure to take advantage of the latitude left in the EU Regulation and lead to a customer-friendly interpretation and leniency. This is particularly tempting when the customer is not a small family farm, but a large operation or retailer, as inspection fees are based on the size of the operation. It therefore is important that supervision also ensures that the certification bodies are economically independent so as to be able to exclude a large customer (Vogl, 1998).

Communication

Currently there is limited communication, coordination and data exchange between state and federal authorities involved in supervising certification bodies or analyzing food along the food chain. This not only inhibits the prompt tracing of irregularities, it also impairs the forwarding of relevant information to concerned authorities and agencies. An example is that according to EN 45011 a list of certified products must be published, but because of data privacy concerns, these lists are not made public in their entirety in a timely fashion. Another example is that currently each certification body provides the State Authority with a confidential list of all operators it certified. The data regarding termination of a certification contract is thus kept up to date by the State Authority, but not publicized or communicated to relevant bodies (e.g., AMA, as farms are only eligible for direct payments for organic farming if they have a valid contract with a certifying body). A major impediment to the free flow of data are the strict provisions of data privacy protection; currently there is no consensus on how they should be interpreted in the context of organic certification.

Supervision

Two authorities are currently in charge of supervising certification bodies: the Accreditation Service and the State Authorities. Based on a supervision plan and using a specially trained team, the Accreditation Service audits certification bodies every year to ensure they comply with EN 45011. Although this supervision focuses primarily on issues of quality management and documentation, two technical experts for organic farming ensure that quality management and operation procedures reflect and respect the EU Regulation and Austrian Codex Standards.

Supervision by the State Authorities does not have such clearly defined procedures. For example, an EU evaluation mission noted that there were no written supervision plans for 2001 (European Commission, 2001). Also, the State Authorities barely challenge or assess the quality of the technical work of the certification bodies, either through evaluation of operators' files or certification decisions or through witnessed inspections or re-inspection of a sample of operators.

However, given several potential conflicts of interest involving certification bodies, there is a need for tight supervision. For example, because some farmers' associations hold shares of certification bodies, there can be a perception that organic farmers inspect themselves. This would contradict the requirement that certification bodies be independent, that is, that they cannot be influenced by the interests of farmers, associations, traders, processors or retailers, even if these are their customers. Indeed, unless close contacts between certifiers and processors or retailers are avoided or supervised, it is conceivable that a potential problem is covered up by quietly withdrawing the products from the shelves to avoid negative publicity. These issues currently are partially addressed through the supervision by the Accreditation Service, which includes procedures to assess the independence of certification bodies and their employees from farmer associations, institutions, and dealers in organic products or inputs for organic farms (Vogl, 1998).

Regulations

Some of the problems in the certification of organic products are due not to flaws in the organization of accreditation, certification and supervision, but to loopholes left in the EU Regulations or the methods of inspection defined there. Indeed, not all organizations involved in the market for organic foods are included in the certification system, particularly the trade, which does not yet fall under the scope of the EU Regulation as long as it does not produce, pack, process or label organic products (The Organic Standard, Nov. 2001, p. 8). Also, the EU Regulation does not include specific statements regarding the inspection procedures to be followed with regard to trade and processing of animal feed (KdK, 2002).

The EU Regulation, acknowledging the possibility of supply shortages in the still-developing organic market, includes the provision that to some extent conventional products can be used in feedstuffs until December 2003. This provision creates a gray zone that can lead to errors and even entice fraudulent behavior, as recent incidents in Austria have shown (Purkarthofer, 2002)

The methods of inspection stipulated in the EU Regulations, such as the requirement that each operator be visited once a year, have also been criticized. The current system can mean that too much time is spent inspecting production that is fully compliant, while too little is spent on cases with real problems (Rundgren, 1999). It might be more efficient to visit some operators frequently, but others only every 18 months. This could go hand-in-hand with the introduction of a risk-oriented system such as the HACCP principle (Hazard Analyses Critical Control Point), that is, points where there is a high probability that improper inspection may allow or contribute to a loss of organic integrity (Heinonen, 2001).

Another aspect that could be considered is the internal quality management of operators (Rundgren, 1999). Indeed, if operators implement regular internal sampling and analysis as well as complete traceability of products, the burden of inspection costs could be reduced. Inspections at enterprises that are certified according to a quality management norm, such as the ISO family, already offer certification bodies a deeper and more detailed insight into the flow of organic goods through the enterprise. Operators might prefer such cooperation to complete legal regulation (Browne et al., 2000).

However, while including quality management systems at the trader and processor level are a promising approach, similar calls at the farm level (Bradley and van Houten, 2000) do not seem helpful in Austria. Indeed, because most organic farms are family farms, the farmer has limited time and training. Also, the farmer's management decisions are highly dependent on unpredictable external factors such as the weather or market developments, making it unlikely that a farm plan spanning several years and covering both general management practices as well as planting patterns and animal husbandry can be adhered to. Thus, the AMA presently requires crop plans only for the current year, since these are necessary to calculate various direct payments.

Consumers' and Farmers' Perspectives

Limits of certification in ensuring consumer confidence

Because consumers may be buying organic products for reasons of health as well as environmental concerns, high profile news stories of contaminated or unsafe conventional food increase the demand for them. It is then crucial to preserve the credibility of organic labels so as not to undermine consumers' trust in organic products. Certification has a key role to play in ensuring that incidents similar to those reported from conventional foods do not occur in the organic food chain.

At the same time, the limits of certification as a way to prevent loss of consumer confidence must also be clear. Indeed, several legal provisions made to accommodate industry needs and interests in a still-developing market are a potential source of consumer disillusionment. For example the AMA Marketing organic logo, in accordance with the EU Regulation, allows up to 5% of selected ingredients to originate from conventional production, although the logo can be perceived as implying 100% organic. Also, if the product contains raw ingredients that cannot be produced in Austria, up to 30% of foreign organic ingredients can be used, although the logo implies an organic product of Austrian origin. Although these provisions are necessary to allow some leeway for processors as long as the market cannot ensure a continuous supply of organic products of the required origin and quality, most consumers are not aware of them and may feel cheated. In addition, AMA Marketing was heavily criticized by environmental organizations and the organic movement for its choice of advertisements promoting regional and national labels that could be perceived by consumers as being organic although they are not.

A similar unresolved issue is the fact that the EU Regulation stipulates that organic products must be GMO-free. However what "GMO free" means has not been clearly defined in many European countries, leaving room for interpretation. In Austria the limit for "GMO free" is 0.1 % of the total DNA within the framework of "inevitable contamination," which is not the zero-tolerance policy that consumers might expect.

Another potential source of consumer insecurity are organic products revealing traces of prohibited chemicals. Because organic products are routinely stored next to conventional products, cross contamination is bound to occur, as is commingling when the two kinds are processed in the same plant.

Besides these issues based on legal tolerance margins and poor practices by processors and retailers, another source of confusion is misleading labeling. The EU Regulation states that words like "organic," "ecological," "biological," and shortened forms like "bio" and "eco" must refer to organic production methods; if that is not the case, the matter might be handled as fraud. This also includes all terms that might be understood by consumers as similar to the above mentioned terms, e.g. "controlled," "integrated" or "natural." This has led to a significant reduction of misleading and fraudulent advertising on the Austrian market. Nevertheless, several companies try to use the positive image of organic farming by designing labels positioning their products close to the organics.

This is especially true for companies with a trademark that contain the terms "bio" or "öko" and that was registered before January 1, 1995. They can use this trademark until 2006, although it must be clearly mentioned on the product that it originated from conventional farming. However this is not always enforced (Mergili, 2002). The likelihood of consumer confusion is particularly high if the brand sells both conventional and organic foods with little difference in package design.

Finally, confusing labeling also occurs because several product groups, such as flowers, wine, textiles, wild fish, and wild animals, are not included in the

EU Regulation, so that organic claims can be made with impunity. As a response, the Austrian Codex Alimentarius Committee started to regulate these sectors through national standards, as is the case for the organic production of deer and fish.

Farmers' need for clarity

Several farmers' associations, although appreciating the need for inspection and thorough documentation as part of the special status of organic farming, have criticized the lack of harmonization in the documentation requirements and the farm inspection methods. Indeed, the criteria used and the sanctions imposed by the Ministry of Agriculture differ in several points from those of the Ministry of Social Security. The differences are mainly due to the fact that the Ministry of Agriculture focuses on environmental protection, whereas the Ministry of Social Security focuses on consumer protection. The situation is worsened by the poor communication policy of AMA, because the AMA Technical Inspection Service does not have to follow EN 45011 and keeps its criteria for sanctions confidential.

The AMA is thus often perceived by farmers as a kind of "black box," since they do not understand the reasons for the differences in sanctions by AMA and by certification bodies for the same facts (Vogl, 1998). It would be advantageous to design one uniform structure and harmonize the required records that farmers must keep. Inspection procedures of organic certification and Agri-Environment Program controls also could be harmonized. This would increase the efficiency and effectiveness of inspections and ease farmers' administrative burden.

The multiple inspection of farms can also be a burden. Each organic farm is inspected at least once per year by a certification body. In addition it may be sampled and controlled by AMA or by inspection services of brand labels. Finally, it may be sampled for inspection as part of the supervisory activities of various authorities. Overall it has been estimated that an organic farm could be inspected up to 11 times in a year (Vogl, 1998). And that does not include inspections in the framework of regulations that are separate from organic farming, such as water laws, food safety, hygiene standards, veterinary medicine, and taxes. The possibility of coordinating such inspections should be investigated.

Insufficient extension services are also a pressing issue in light of the ongoing updates of the EU Regulation as well as the Austrian specifications within the Agri-Environment Program. Although these updates lead to a sustained improvement of regulations, they also create a constant source of uncertainty over whether a specific standard has been changed, whether that change has taken effect, and whether the farmer is risking sanctions. To secure objectivity, independence, and the quality of decisions, EN 45011 mandates that the certification bodies cannot be involved in advisory services. The need to inform organic farmers of regulations, standards and their amendments is thus primarily covered by employees of the organic farmers' associations and by the District Authorities for Agriculture. The District Authorities especially may have a very varied understanding and interest in organic farming, resulting in an uneven level of information made available to farmers.

Discussion and Conclusion

In Austria, the densely woven web of inspection, certification, accreditation and supervision ensures that legal and private standards are adhered to. However, it must be recognized that certification is no guarantee in itself and that ultimately its role is to reconfirm that the producers and the processors are keeping their guarantees (Rundgren, 1999). Certification is thus no panacea, but only one part of a quality assurance system ensuring the smooth functioning of the organic market. This is all the more true when considering that certification can only be as good as the standards it is based on. The standards, however, are only compromises between aims and their technically and economically sound implementation (Heinonen, 2001). At the same time, it is not possible to develop standards to cover all situations, nor to standardize the handling of all possible violations (Rundgren, 1999).

The question, then, is how to ensure appropriate inspection and certification while considering the costs and administration involved. Indeed, consumers will not continue to pay a premium if the certification of organic products primarily ends up feeding a growing bureaucracy and producing excess paper (Baummann, 2001).

The regulations, both at the EU and the Austrian level, have so far focused on regulating production at the farm level. However, most of the publicized irregularities have involved organic products after they left the farm. The initial focus on the production aspect can be seen as a response to an image where organic farming was primarily made up of family farms engaged in on-farm processing and direct selling. However, this image is being overrun by reality: as the market for organic products grows, industries and supermarkets get involved and the volume of organic products being transported, stored, and industrially processed and retailed grows considerably.

Thus the instruments needed to ensure organic quality have changed; in particular, the need for a centralized database has been voiced (KdK, 2002). Such a database would combine the piecemeal information that is available at various authorities and agencies. The goal is to improve transparency and allow a comprehensive analysis of the flow of organic goods, which could then be traced along the complete food chain, from farm inputs and production, through traders and storage, to processing and retail. This would allow plausibility, product integrity and traceability to be checked more easily and would dramatically increase the efficiency of inspections.

To accommodate concerns about privacy of data, the access to the database could be restricted to a limited number of federal agents. A database alone cannot be sufficient to address the issue. It is indispensable to have dedicated government employees whose objective is not only to analyze the data but also to inquire in cases of suspected irregularities as well as routine tracing of product flows along the food chain. Such an authority would address the weakest point of the current certification system, namely organic product flows across boundaries: between states, operators, certification bodies, etc.

This authority should be at the federal level, as only a government entity has the necessary legal authority to enforce minimum standards (Lohr, 1998) as well as the independence to ensure objectivity and uniformity. Also, volume flow controls are about baseline requirements, thus there is no need to adjust to regional and local circumstances, which could be a challenge to a central authority.

Despite some flaws in overall coordination, the current system of private certification bodies has proven robust. Indeed, as found in Sweden (Baummann, 2001), a private certification body has advantages over a state one. First, in Austria most certification bodies were created by organic farmers' associations or organizations rooted in the organic movement. They therefore tend to be committed to the values of organic farming. This is a benefit compared to certification by public authorities, who tend to focus on administrative matters rather than the correspondence of values and regulation, as reported from Denmark (Michelsen, 2001). Second, private certifiers in Austria also tend to have employees residing in their assigned region. This allows them a more accurate assessment of a specific situation, such as a drought that reduces seed availability. It also allows certifiers to deal with the need to develop different solutions to similar problems in different environments, which is an integral part of organic farming (Michelsen, 2001).

Local roots also ensure certifiers a better level of information through their involvement in both formal and informal communication networks. Thus operator peer-control can play a role in identifying potential problems, and not limit control of an organic farm or processor to the yearly visit(s). As long as supervision ensures impartiality of the certifiers, these are valuable features of a certification system that aims at doing justice to the needs of organic farming.

For it must be acknowledged that organic farming cannot be reduced to checklists, since it is also a social and ecological movement. Standardized production method and regulations have difficulties coping with such a phenomenon (Rundgren, 1997). Thus there is a great need for clarity and simplification in our understanding of what organic farming really stands for, so that it to stands out as a real production alternative and not simply as a production method that complies with a set of more or less transparent regulations (DARCOF, 2000).

In the present situation, where consumers in increasing numbers are concerned about degradation of standards, food quality, and so forth, it is easy to ask for strict rules, high standards, and efficient inspection in organic agriculture. But often what consumers expect is a higher moral standard: just as the organic farmer should not exploit the soil or the livestock, so, too, the consumers hope that they are not exploited when buying organically produced food (Kettlitz, 2002). Indeed, even if organic growth is based on short-term concerns about health and food security, it also responds to long-term concerns about our society, a quest for old and new values, a search for the truth behind notions such as "natural" (Haest, 2000), and a need for authentic products (Kelterborn, 2000). Therefore if standards, regulations and certification procedures betray the core of what organic farming stands for, it might well also betray the expectation of consumers who are searching for an alternative.

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Going National: Potentials and Pitfalls of Introducing a National Organic Label in Germany

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The Background

Ecolabeling schemes are expected to simultaneously provide incentives for more environmental friendly production methods and the conservation of natural resources while being an important signaling device for consumers interested in ecologically intelligent products. From a consumer policy point of view, ecolabels are crucial in empowering consumers to evaluate their options and "vote with their pocketbooks."

From a theoretical perspective, ecolabeling is an important instrument to signal superior ecological quality in markets characterized by credence goods and asymmetrical information. Credence goods are characterized by the fact that consumers are not able to judge significant quality dimensions of the good (such as organic food production methods) – neither through search nor via experience (Darby and Karni, 1973). Asymmetrical information means that the sellers have more relevant information regarding the quality of a credence good than buyers have (Akerlof, 1970). In such "lemon" markets, buyers use some market statistic to judge the quality of prospective purchases. There is an incentive for sellers to market poor quality merchandise, since the returns for good quality accrue mainly to the entire group whose statistic is affected, rather than to the individual seller. As a result there tends to be a reduction in the average quality of goods and in the size of the market (Akerlof, 1970). To avoid these effects, reliable signals of quality have to be actively sent out by the sellers ("signaling"). Food quality can be portrayed as a "magical hexagon" of the credence characteristics food safety, variety of taste, safe origin, ecological regionality, species-appropriate livestock farming, and high quality ingredients.

Within the EU, labeling of food products is strictly regulated. Labels are required to be informative in that they must provide the consumer with useful and correct descriptions of the characteristics of the products and its production process. To be most useful for the consumer, this information must be relevant, concise, understandable, and credible. In contrast, the real information environment today is characterized by a rapid increase in the number of labeling programs offered by individual producers, regions, associations, and government entities, each with its own set of criteria and often with no third-party verification. The widespread consumer confusion triggered by this information overload over what really qualifies as "organic" food prompted the German Department of Consumer Protection, Food, and Agriculture to issue a national label for the production, handling, and processing of organically grown agricultural products in 2001.

Ecolabeling programs usually fall into one of the following categories: self-declaration labels by individual companies; labels established by industry associations for their members' products; and labels established by private initiators independent of market agents, e.g., private or state-run certification bodies. Increasingly, a fourth category – state-controlled ecolabels issued by a governmental agency – is gaining ground (Golan et al., 2001). Aspects of ecolabeling that usually provoke concern include: the scientific basis of the criteria proposed for the various labeling schemes; the attitude of consumers toward such schemes in general and in specific (e.g., towards store brands); and the potential impact of such schemes on international trade, especially discrimination within the WTO.

The Political Situation in Germany

By the end of 2000, the BSE crisis had hit the German meat market harshly and had profoundly diminished consumers' trust in suppliers' quality promises, in state-run quality control, and in governmental consumer policy. When the Social Democrat-Green government finally reacted to reported BSE cases in Germany, the major political goal was to restore consumers' confidence in both markets and politics. The minister of health and the minister of agriculture were the first victims: they were dismissed by Chancellor Schröder after the scale of the crisis had become obvious. From a consumer policy point of view, the most important change produced by the BSE crisis was the decision to restructure the former Ministry of Agriculture and to transform it into a Ministry of Consumer Protection, Food, and Agriculture (Bundesministerium für Verbraucherschutz, Ernährung und Landwirtschaft, BMVEL).

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When the new consumer protection minister Renate Künast gave her inaugural speech in January 2001, she called for a fundamental reorientation in agricultural production from a "strategy of quantity" to a "strategy of quality" and maximum transparency. One key instrument to implement this turnaround in agriculture was a government-controlled but voluntary national food label program. This program would feature both a common label for organic food (*Bio-Siegel*) as well as a national label for high quality conventional foods that fulfilled higher quality standards than were legally prescribed. The goal of the Bio-Siegel was to reduce uncertainty, improve visibility, and increase the credibility of and finally the purchase of organic food. Some months later, an ordinance regarding the new labeling scheme was passed and a state-controlled national label for organic food was introduced.

The Market Situation

While some European countries such as Denmark, Austria, and Sweden introduced state-controlled national labels for organic food years ago, Germany is a latecomer. This might come as a surprise, since Germany became the first country with a government-sponsored ecolabeling program when it started its Blue Angel program in 1977, a label that has been awarded to 4,350 products from different categories.

In spite of this success story, consumers in Germany hardly make use of ecolabeling information in their daily purchases. Until very recently, they were confronted with a cornucopia of about 120 different ecolabels for textiles, furniture, services, and food. Surveys regularly find that only a small percentage of knowledgeable and eco-sensitive consumers know and make use of the dozen organic food labels issued and monitored by private certification bodies such as *Naturland*, *Bioland* and *Demeter*. Paying attention to labeling schemes in decision-making depends mostly on the belief in considerate buying as a means of protecting the environment. Consumers trust labels issued and controlled by a public or independent authority more than they do producers' private environmental claims (i.e., first party and second party schemes) (Thøgersen, 2000a).

For products containing GMOs, for instance, there is experimental evidence that customers do not notice the labeling at all (Noussair et al., 2002). Yet, as shown in the same study, becoming aware of the fact that a food product contained GMOs had a considerable impact on consumers' behavior, which led the authors to call for a standardized logo. Indeed, a great many studies have pointed to the lack of a single well-known and reliable ecolabel for organic food that can be communicated, recognized, and trusted.

Consumers in Germany in general are highly environmentally concerned and believe organic agriculture to be an environmentally and socially superior production system. Yet consumers act ambivalently. For instance, 80% are against caging of hens, but only 20% buy free-range eggs; 70% are interested in organic food and think that it is healthier, and 40% find it tastier, but only 14% buy it regularly. A large market research study conducted in December 2001 (ZMP, 2002) revealed some aspects that help explain the gap between buying intentions and actual purchases, apart from the well-known attitude-behavior gap. First, many consumers believe that what they buy *is* organic food while in reality it is not; they are confused by the many labels and logos on the market. Second, the most influential source of information and influence regarding food purchases is the consumers' peer group – not the family and not information campaigns or educational programs. Since most consumers perceive their peers to have less positive attitudes towards organic agriculture, their own purchase is inhibited by these believes. Here, the image problem of organic food takes its toll.

German consumers are used to comparatively low food prices and are highly price conscious. Whereas in 1950, 45% of the private consumption budget was spent for food, in 2001 the figure was only 14%. Based on a model of consumption of organic food, Wier and Smed (2000) predicted that if the relative organic price decreased by 20%, consumption would grow considerably. Because of to the recent BSE crisis, consumers accept price premiums up to 50%

for specific food items such as meat. In general, the cost-effectiveness of organic food is accepted if the price premium does not exceed 20% (ZMP, 2002).

Market research has identified the group of "infrequent buyers of organics in supermarkets" as the most promising target group. To date, German consumers are reluctant to buy organic food in the supermarket. Only 26% of organic food items are sold through conventional retail outlets, whereas in Denmark about 90% are sold this way, and in Austria about 70%. The bulk is sold in whole food or health food stores, which are rather expensive and often not easily accessible.

The organic market represents 1.8% of the overall food market, with a yearly turnover of about 2.0 billion euro. Health food retailing has three typical organizational forms: the small corner health food shop, the specialized health food store, and the health food supermarket. While health food supermarkets are still confined to the metropolitan areas, the number of shops and turnover per shop are rapidly increasing (Braun, 2000). Whole food supermarkets are planning on a 50% increase of "organic" consumers and a 100% increase of turnover by 2005 (to 50 euro per person per year).

In spite of its long history (the Demeter label goes back to the 1920s), organic agriculture has gained prominence only in the past two years, due to both increasing political support through the EU and national governments ("push") and growing consumer interest ("pull"). The German market for organic food is currently growing at 5% annually; today, 2.1% of German agricultural land is organically farmed – still a low share compared with Austria, Switzerland, France, Sweden, Denmark, and Italy (Michelsen et al., 1999).

The Green minister Künast has set an ambitious target: by the year 2010, 20% of all food should be organically produced (Ministry of Consumer Protection, Food, and Agriculture, 2001). This can be achieved, if at all, only if the consumer group of irregular buyers of organics in the supermarket can be won over (Richter et al., 2000). This strategy is backed by the experience of other countries, e.g., Austria, where the growing market share for organic produce is attributed in part to the creation of private, store-backed labels for organic foods in major hypermarket chains (Payer et al., 2000).

Most of the big retail chains in Europe have ambitious plans for expanding their organic assortment over the next few years (Schmid and Richter, 2000). However, the supply of some organic products has reached its limit and experts predict a serious lack of supply in the coming years. Even though the governmental "push" strategy is accompanied by systematic support of organic farming, expansion plans might well be halted by natural limits on the production of high quality organic food because of lower productivity in organic farming. The latter is due to a production philosophy that accepts natural growth rates and ripening times. This translates into forms of extensive livestock farming without the use of pharmaceutical growth promoters and into longer ripening times of produce without artificial lighting and chemical fertilizer regimes.

Earlier Experiences – Avoidable Pitfalls

Shortly before the current state-initiated ecolabel program was launched, producers and certification bodies had tried to introduce a voluntary national eco-food label. After almost a decade of debate between the different private certification bodies and the German Agricultural Marketing Board (CMA) (the marketing association of conventional farmers) the first national ecolabel for food, the *Ökoprüfzeichen* (ÖPZ), was launched in 2000. A major motivation was to support the sale of organic food in conventional retail outlets, mostly supermarkets.

The ÖPZ was meant to bring together the dozen existing ecolabels in way that would appeal to supermarkets as potential outlets. The scheme was organized as a collaboration of the nine major organic farming associations (organized in the Association of Organic Farming Organizations, AGÖL), representing 71% of organic farmers, and the CMA. The owner of the logo was the *Öko-Prüfzeichen GmbH*, a company owned by AGÖL and CMA. Certification and signing of the contracts with operators was delegated to members of AGÖL. The license fee amounted to 0.2% of the product price (Huber, 2000b).

However, while hopes for the common label were high, the project turned out to be flop. Even before the planned communication campaign took off, conflicts among members escalated and the project was stopped. Lessons to be learnt from this unsuccessful attempt can be summarized as follows (Reisch, 2001):

- *Get all stakeholders in the same boat before you start to row*: the feed industry, organic and conventional farmer lobby groups, the food industry and retailers, consumer organizations, environmental and animal rights organizations, certification bodies, and policy-makers must be partners from the outset. If one stakeholder dominates, sooner or later others will leave. In Germany, Demeter and Bioland, representing 60% of AGÖL members, left the agreement midway because standards were seen as “diluted” and not serving everyone’s interests.

- *Buy locally - label globally*: One reason for the failure of the German national label was that it was confined to German products. To increase acceptance and knowledge and to facilitate international trade with organic products it should have included at least European products; the “world” trade of agro-products is mostly (65%) within Europe. An international label would best serve today’s global trade and would support the harmonization of standards and insure the quality of organic food. As part of the EU-Regulation 2092/91, a European label for organic food was introduced in February 2000 (Huber, 2000a). The label can be used without certification fees; 95% of the product contents have to be of organic origin. Even though the label is hardly known by consumers and producers, it should have been incorporated in the strategy.
- *Keep certification non-profit*: Private for-profit certification bodies might dilute the certification process and endanger the credibility of the label.
- *Be aware of consumers*: If standards are too low, consumers are lulled into a false sense of security. Consumer organizations will certainly point to that and the important target group of well-informed consumers can easily be lost.
- *Do not make the fox guard the chicken coop*: The label should not be handled by the farmers’ associations; they will make decisions in their members’ interests.
- *Do not stint on advertising and communication*: A national label represents a market innovation. Its introduction has to be supported with a reasonable budget for communication campaigns to break through the noise barrier of other (in-store) product information. The size of the budget should correspond to an average budget needed for the introduction of a new product (i.e., 15 million euro instead of the 2.5 million euro actually allocated). 70% of German consumers value health claims as “important,” 20% as “very important.” Hence, successful motives in communication strategies promoting organic food are – in this order – pleasure and taste, health, and quality of life, whereas environmental concern is a motivation that is confined to a small group of activists (ZMP, 2002).
- *Serve different consumer demands for different qualities*: Bioland and Demeter, the largest and the oldest organic farming associations, are pleading for a two-level labeling scheme: the EU label should be used to signal basic organic quality as defined by EU guidelines, while the existing German ecolabels should be used as trademarks to signal higher organic quality and to position organic products as premium goods.

The New National Eco-Food Label

As mentioned above, a new national eco-food label, the *Bio-Siegel* (Figure 1), was launched only one year later. The initiators had obviously learned some lessons from the failure of the ÖPZ and could avoid several pitfalls. First, the label was developed and supported by a large alliance of the food industry, organic farming associations, the farmers’ union, and politicians. This process was facilitated by the immense public pressure after the BSE crisis had peaked and by the organic farming policy that was vigorously pushed by the new Green minister.

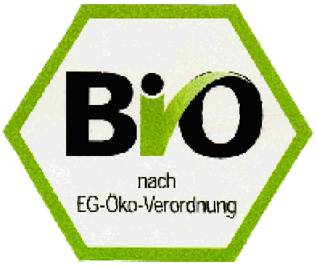

Figure 1. The new German eco-food label.

Second, the criteria for the ecolabel are geared to the current provisions of the EC Ecolabeling Regulation and relate to the basic guidelines of the International Federation of Organic Agricultural Movements (IFOAM), a respected umbrella organization that represents about 700 associations from 100 countries. Hence, a relatively high standard is assured.

The EC Ecolabeling Regulation lays down in detail the methods and materials that are permitted in organic food production. Organic farms keep precise records of their processes and products as well as of the distribution channels. The goal is to be able to trace any product from the store back to the producer ("transparent production"). Inspection bodies authorized by the states inspect these farms at least once a year, often twice. The *Bio-Siegel* is the only label in Germany protected by criminal law.

After less than one year, more than 8.000 food products from 588 companies carry the ecolabel. This success is also due to the smartly designed and generously financed communication campaign that launched the label in the market (for examples see *www.bio-siegel.de*).

Finally, to serve different consumer demands for different qualities, the ministry has decided on a labeling solution with two voluntary state-controlled national labels: one for products of organic farming (complying with the EU guidelines for organic farming) and one for products of high quality conventional farming (i.e., feeding without prophylactic antibiotics and animal meal, no GMOs, species-appropriate livestock husbandry).

Potentials and Limits

From the perspective of a sustainable consumption policy (OECD, 2001; Reisch and Scherhorn, 1999), well-introduced ecolabels are seen as instruments to promote sustainable consumption decisions. In the case of the new *Bio-Siegel* one can see a serious potential to

- increase transparency and credibility of supply, since it is established by an initiator who is independent of producers, distributors, and sellers ("third party scheme")
- provide information on the production and consumption chain, and link products to their production process (life-cycle assessment, chain of custody), which meets consumers' "right to be informed"
- increase awareness of personal risks and social costs (external effects)
- provide consumers with the opportunity to express their ecological concerns through their purchasing behavior and market mechanism ("right to be heard")
- highlight *sustainable* product alternatives through "cross-labeling" with social labels (e.g., the Transfair seal; see Meier, 2000) ("right to choose")
- have indirect macro effects on the sustainability of the food supply, raising environmental and social standards in the production process and the market.

Last but not least, voluntary ecolabels are an attractive instrument for both environmental and consumer policy since voluntary schemes do not conflict with WTO and Technical Barriers to Trade free trade policies.

Still, one should not overestimate the overall environmental effect of labeling. First, organic food production still represents only a marginal portion of agricultural production; second, it is difficult to make a general statement about the superiority of organic production versus other agricultural techniques (Jungbluth and Frischknecht, 2000).

Conclusions

Research reveals that among other factors such as strong consumer demand, a high degree of support by the food industry, a high fraction of sales through conventional supermarkets, and price premiums not exceeding 50%, the labeling and promotion of organic food is seen as important factors for the growth of a national organic food market (Michelsen et al., 1999; Hamm and Michelsen, 2000). At the same time, proper education of consumers about ecolabels depends most of all on increasing the prevalence of ecolabeled products in the shops (Nilsson et al., 1999). Hence, once the market has been developed and a trustworthy standard symbolized by a well-known label is established, a positive reinforcement process might take place, further strengthening the organic food market.

In countries where there is no generic label for organic products or where such a label is not known to large parts of the population, consumers have problems in distinguishing organic food from other food, so that the full potential demand for organic products cannot develop (Hamm and Michelsen, 2000, p. 510). If the mistakes listed above are avoided, the Bio-Siegel is a win-win game for consumers: directly via improved individual consumption decisions (better quality, less time) and indirectly via an average quality increase in the market from the increased market share of organic food and stimulated competition.

The new label with a government-mandated certification process behind it can be expected to be effective in reducing transaction costs between farmers and food manufacturers and in facilitating consumer decisionmaking. The two-standard label program responds to an information gap in the market place, allowing preferences and purchases to be more closely matched while recognizing that consumer preferences and quality expectations vary. If the traditional AGÖL labels are still valid and provided on the packaging, no information is lost.

To summarize: Ecolabeling may not be the best tool for promoting environmental change in general – other governmental tools such as bans, quotas, or eco-taxes may be more effective. However, it is still a good second-best policy when it is difficult to achieve political and regulatory consensus (Golan et al., 2001). Of utmost importance seem to be the views of the public and political support of organic farming, which in Germany have only recently changed from skeptical distance to active support.

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Managing the Confusion over Labels in the Emerging Organic Food Market in Bosnia and Herzegovina

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Post-war Bosnia and Herzegovina (B&H), an unstable, natural resource-based economy, is facing the challenges of development, alleviating poverty and dealing with returning refugees. It is obvious that neither the national government nor the representatives of the international community have a well-defined vision for responding to these challenges. Therefore, many options are being promoted as "the most suitable solution" or "the magic answer." Among these, organic agriculture is becoming very attractive for projects financed by different programs of the international community (Stability Pact, refugee returnee programs, poverty alleviation, etc.). The main stakeholders in B&H society are very positive and enthusiastic regarding organic agriculture as a development tool. This attitude is built upon the market signals coming from the EU and some neighboring countries.

B&H farmers have been familiarized with the idea that a successful economic survival strategy is "to target production to specific value-added markets and … change their product from a faceless, low value item to a differentiated product that carries its identity all the way to a consumer who sees special value in it and is willing to pay more for it" (Granatstein, 2001). The B&H government and the international development organizations have recognized the signals from the EU spreading the message that "the growing demand for quality food could be used to sustain the traditional way of life and landscape of Europe's marginal farming areas and reduce the need for public subsidies to keep those marginal areas going" (Gilg and Battershill, 1998). At the same time there are many signals from the EU and CEE markets pointing out the intensive growth of organic consumption and production as well as the change in consumers' preferences and attitudes regarding the level of food safety and quality (Klonsky, 2000). These signals, which have been recognized by the main actors of B&H society, describe the development state of the foreign markets. This could be used as a starting point to raise a commitment to organic agriculture as a developmental option for B&H's rural communities. But to support an entrepreneurial spirit that will induce an effective and long-term development of the organic sector, it is necessary to define the potentials and characteristics of the B&H organic market. The research presented here can be seen as a useful contribution in this context, providing insight into the B&H organic market that could be used for crafting an appropriate marketing strategy. Therefore, the objectives of this paper are: 1) to underscore the confusion over ecolabels in the emerging organic food market in B&H as the main constraint for its efficient development; and 2) to point out the roots of B&H consumers' misconception of organic labels as a first step in resolving the confusion.

Research Methods

The marketing study was a part of the project "Integrated rural development in the Stolac region," implemented by Malteser Hilfsdientst e.V. in cooperation with CEFA (Italy), the farmers' cooperative Agroplod (Stolac) and the Bosnian Environmental Technologies Association (Sarajevo), and funded by the German Ministry BMZ. In accordance with the project proposal and available resources, an exploratory marketing study was implemented. In general, an exploratory marketing study is an appropriate method for clarifying and defining the nature of the problems.

The sample consisted of 400 respondents in the three B&H regions Sarajevo, Mostar, and Medjugorje. Keeping in mind the EU market experience suggesting that "market actors in the form of general food retailing chains or processing companies are keen to

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develop the organic food market, because they realize that there is growing consumers demand for organic food and they are convinced that their efforts to increase the supply of organic products will improve their competitiveness" (Hamm et al., 2002, p. 1), the sample was divided into two major consumer groups: 1) individual consumers; and 2) major market actors, such as supermarkets, caterers, restaurants, and small neighborhood food shops.

Two different types of questionnaires were developed and administered by a team of young researchers. Data were collected by personal interviews.

Research Results

The detailed presentation and explanation of the marketing study's findings are beyond the scope of this paper. Therefore, only the findings relevant to the focus and objectives of this paper will be presented briefly.

From the study findings it is obvious that most consumers (about 90%) are optimistic and enthusiastic regarding the future success of the organic market in B&H. The typical organic customer is female, between 25 and 55 years old, with a secondary school education, with children, and with a monthly budget per family member of 200 to 350 Konvertible Marks (US$100 to $170).

It is obvious that B&H consumers (both groups) perceive organic foods as high quality foods that are worth higher prices (acceptable premium level is 10 to 30% for both groups). The main reason for buying organics is health (85%). For the market actors the main motives for including organic foods in their offerings are to satisfy all consumers and to profile its business in this area (31% and 21% respectively). These findings suggest a promising future for the organic producers and a willingness on the part of the market actors to take an active part in development of the organic market in B&H.

But the findings also point to some obstacles to increasing the demand for organic products, such as consumers' lack of information, poor understanding of the organic food concept and confusion regarding organic labeling. The same market obstacles have been identified in the Italian organic market by Pinot (2001). The information asymmetry is one of the main obstacles preventing high-quality products from commanding higher prices. The poor information and understanding of the organic food concept decrease buyers' willingness to pay premium prices (Loader and Hobbs, 1999). The research findings that point to information asymmetry and consumer confusion are as follows:

- Most consumers defined organic food as "food produced without chemicals" or as "traditional, healthy food". No consumer stated that it was food with higher quality assured through third-party certification. This indicates both poor understanding of the organic food concept and consumers' inexperience with voluntary certification schemes assuring quality in ways that go beyond the material specifications of the product.
- Most individual consumers (80%) reported that in their opinion, organic and health foods were the same products with different names.
- In spite of consumers' understanding that higher food quality must be paid for and assured, consumers are not familiar with the voluntary system of organic quality assurance and labeling. Most individual consumers stated that the producer or government must insure the higher quality of food (see Figure 1). This leads to the conclusion that the consumer defines quality in terms of the product specifications. The B&H consumers are not familiar with a value-laden quality concept, which is the heart of the whole organic food concept.
- The fact that only 20% of the market actors who reported organic trade offer foods with the official organic label highlights their extremely poor knowledge and misconception about the organic food concept and organic quality.

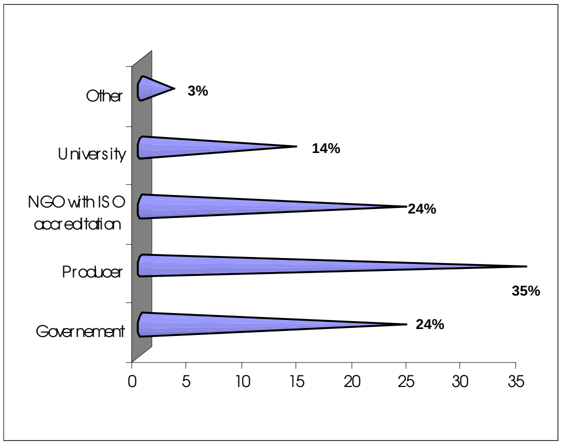

Figure 1. Consumers' opinions regarding who should insure organic quality (Nikolic, 2002).

- The fact that 50% of the market actors who reported organic trade pointed to the B&H processing industry as the main supplier of organic food once again confirms their confusion. In B&H there was no certified processing capacity at the time of the research. This means that market actors are mixing up organic products with "natural", "low-input" or even "whole grain" and "macrobiotic" products, contributing to market information asymmetry.
- The evident asymmetry regarding information is in line with the reported level of willingness to pay premium prices (Figure 2). Only 57% of the market actors are willing to pay premium prices.

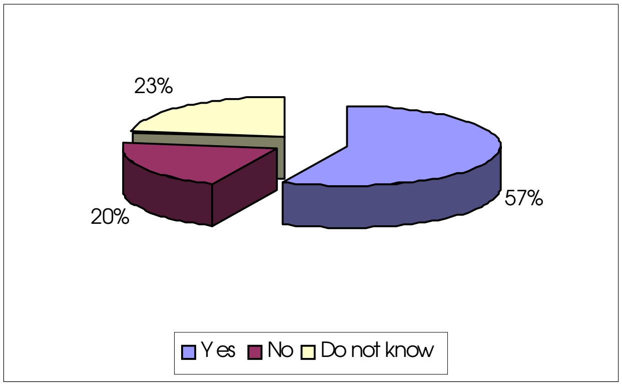

Figure 2. Market actors' willingness to pay premium price for organic products (Nikolic, 2002).

The research findings suggest that B&H consumers care about food quality and recognize organic food as high quality food that could be beneficial to their health. They are also aware that the high quality must be paid for and assured. But the quality concept and its assurance based on trust and voluntary labeling schemes obviously are not understood by B&H consumers (both groups). Research by Baker (1998) found that certification, as a food product attribute that drives consumers' purchases, was scored low in importance (10%). Baker (1998) also suggests that "food markets have not yet developed the right product that is properly priced, adequately promoted and conveniently available to most consumers." This means that informational asymmetry is a common problem for all products with a value-laden quality concept, especially in emerging markets such as the organic market in B&H.

All entrepreneurs who are eager to start an organic business must answer the major question: Can my organic product satisfy the needs of B&H consumers regarding price, promotion strategy and convenience? It is not the aim of the paper to provide the full answer. The focus is on part of that question: Can the organic label communicate the value-laden quality concept in the B&H food market in order to provide premium prices?

The answer suggested by the research findings is that it can, but the marketing strategy for such products must include measures to mitigate the negative impacts of consumers' poor understanding of organic food quality as communicated by organic labels. In order to resolve the proven confusion regarding the organic label we must determine its origin.

Origin of Confusion over the Organic Label

The organic food market, like any other market, is "a socially structured institution infused by cultural norms and meaning" (Hinrich, 2000). The "heart" of organic agriculture is the value-laden concept of food quality and its voluntary and market-driven quality assurance system, corresponding to consumers' beliefs, ethical values and lifestyle. Therefore the socio-cultural context in which the organic market is emerging has a high impact on the effectiveness of organic labels in communicating a concept of food quality that is based not only on product specification, but also on the socio-economic context within which the product is produced (Ilbery and Kneafsey, 2000). Some characteristics of the B&H socio-cultural context tailor customers' attitude towards organic food products.

For 50 years B&H was a socialist country in which the state played a significant role in economic life. Issues of food quality and safety were strictly defined by the law and guaranteed by the state. At that time the concept of quality focused only on the material side of the product, which was described on the label as the product specification. The relatively low number of food scandals was taken as an indication that the food quality assurance scheme was effective. Present consumers' understanding that quality is represented only by the products' specifications, the material aspect of the products, has been formed by the former quality assurance scheme, stipulated by law. No other food quality assurance systems were offered. Therefore, the food quality system relying on a voluntary labeling scheme communicating social or value-laden aspects of products is totally new for B&H consumers. That is why organic labels as "a voluntary and market-driven practice of providing information to consumers about production processes' and products' impact on environment" (Grote and Volkgenannt, 2002) were not known or utilized.

As a result it is not clear what organic labels imply regarding food quality. That means that B&H consumers are not familiar with the concept that defines quality in terms of the production process or socio-cultural context within which the products are produced. Therefore, the organic label of a third party that assures organic quality is not enough to establish trust in the marketplace. This is the main reason for consumers' confusion regarding organic food. The marketing strategy must take into account consumers' understanding of quality and must select proper tools to provide critical information needed to explain and tailor consumers' new food quality perceptions.

Second, the power of the mechanisms that allow consumers to rule the market and determine who will be successful and who will fail is not fully recognized in B&H. This is also one of the consequences of the post-war, transitional socio-cultural environment. The market mechanisms (supply and demand) supported by the value-laden concept of quality and voluntary labeling make it possible for consumers to affect the production processes or norms implemented by food businesses. This enables green consumers to strongly influence businesses' environmental performance and the process of "industry greening" (Allen and Kovach, 2000).

Still, because of the socialist history and state control over the economy, B&H consumers are not aware of their market power. It is not clearly recognized that business success depends on how the market votes – the number of consumers' purchases and their commitment to the producers. This is an important part of the puzzle of consumers' misconception of organic food, which could be a very serious obstacle to the growth of the organic market. Therefore, any communication strategy aiming to resolve consumers' confusion must send a clear message that consumers are able to affect production processes and have a responsibility to "vote" for the business that successfully addresses all the issues that are the most important to them, such as health, animal welfare, the environment, and safety.

The third aspect of consumers' misconception of organic food is the evident information asymmetry in the marketplace. This is caused by producers' poor grasp of marketing skills that are necessary to introduce new products in niche markets such as the organic market in B&H. The research findings indicate that the producers are not using the power of direct marketing. The concept of direct marketing – "shopping with a human face" (Adam et al., 1999) – could be a powerful tool to spread information about the new products – organic foods – and the new value-laden concept of food quality. Direct marketing relies on social interaction and therefore is an excellent way to link the two aspects of food quality – material and social.

Conclusions

It is obvious that organic agriculture is becoming an attractive business area offering many possibilities for B&H entrepreneurs. The findings of this exploratory market study suggest that the organic market could be successfully developed, thereby providing reasonable premium prices for producers. But there are some important limitations to its growth that must be taken into account. The most important limitation is consumers' misconceptions and confusion, which are decreasing the ability of the organic label to communicate its specific value-laden quality concept and to establish trust as a key mechanism of organic agriculture.

The main reasons for this are found in the specific socio-cultural context in B&H that have tailored consumers' understanding of quality as a simple product specification. The two aspects of organic food quality, the material and the social, are not linked in consumers' perception of quality, making organic labels meaningless. On the other hand, B&H consumers are not aware of their power in the market. The concept of "market voting" that defines business success is not recognized. Also, information about the new organic products and the new value-laden concept are not being spread efficiently within the B&H food market. This all contributes to informational asymmetry that could be the main reason for the organic market's failure.

The marketing strategy must be crafted in the way that solves the problem of information asymmetry. The solution must start with understanding the specificity of the socio-cultural context of the B&H organic market. The priority of any marketing strategy must be to explain the new, voluntary quality assurance system, its benefits and its differences compared to the old materialistic understanding of quality. It must be supported by information explaining consumers' great power to insure success for a business that successfully addresses health or other issues important to them. Direct marketing could be a powerful tool in eliminating consumers' misconceptions about organic food labels. The influence of new technology must be taken into account: “In particular, the advent of interactive digital television and explosive expansion of the Internet will allow consumers and farmers to be much more linked” (Gill and Battershill, 1998).

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The Organic Label: Does the USDA Definition Conform to Consumer Preferences?

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The organic label is perhaps the most prominent example of an ecolabel. Organic food, being a credence good (Darby and Karni, 1973), requires third-party verification. Prior to 2002, this function was performed by a series of independent agencies, each with a potentially different definition of what organic means. Lohr (1998) argues that a universal set of standards decreases transaction costs and facilitates commerce in organic food. The USDA's National Organic Program's (NOP) Final Rule has created this unified standard, detailing a list of inputs and practices permitted under organic production and processing. Since October 2002, all food labeled organic has had to conform to the Rule.

The initial Draft Rule, released in 1997, was widely criticized by consumer and producer groups as too lenient. These groups were particularly vocal in their opposition to the inclusion of what became known as the "Big 3": genetically modified organisms (GMOs), biosolids, and irradiation. Use of the Big 3 is prohibited under the Final Rule.

The goals of the organic label – to provide information to decrease transaction costs (time and effort to discover how it was produced) and to facilitate commerce – are best accomplished when the label's meaning is well understood by consumers and reflects their preferences.

This paper reports on the findings of a survey and experimental auction, targeted at current consumers of organic food in Ithaca, NY. The major question addressed was: do consumers get what they want or expect from organic food? Specifically, does the Final Rule, with its list of acceptable and banned practices, conform to consumers' preferences for what should be allowed? Does the label address consumers' stated reasons for buying organic? Do consumers really understand the label's meaning? Implications for public policy and private firm strategy will be discussed.

Methods

A survey of current consumers of organic food was conducted in Ithaca, NY, in fall 2000. Questions focused on reasons for buying organic, preferences for what should and should not be included in the definition of organic, and willingness to pay (WTP) to have or avoid the Big 3 in organic food. An experimental English (second price) auction (see Davis and Holt, 1993) in February 2002 attempted to validate the WTP figures by measuring them by another method. The two methods complement each other: surveys collect data from a larger sample and allow for a broader array of questions (attitudes, etc.). Auctions impose a budget constraint and real tradeoffs not present in hypothetical survey questions.

The survey was administered to a group of current consumers of organic food in Ithaca, NY. (The first question of the survey asked respondents if they currently buy organic food. If they said no, the survey was discarded.) Ithaca is a town known for its knowledge and activism in food issues. The surveys were completed at the two locations where organic food is most prominently sold: the local farmers' market and cooperative "health food" market. The major supermarket in the area with a significant organic produce section declined to participate. Historically, most organic food has been bought in health food stores, not in supermarkets (Reicks et al., 1997). There are a large number of organic growers who sell at the farmers' market, so patrons at these two locations are likely to consist of typical consumers of organic food in Ithaca.

The target population of this research is current consumers of organic food. The problem is that the demographic and socio-economic traits of this population are unknown. No claims can be made that the sample represents the general populations of Ithaca, of New York State or of the nation as a whole. How-

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ever, the fact that Ithaca has a thriving organic market (located primarily at these two locations) makes the survey respondents an interesting study group for this issue. These people actively seek out organic food by shopping at these markets, suggesting they belong to the market segment The Hartman Group (1996) calls “True Naturals,” the “core purchasers” of organic food.

The surveys were administered over several sessions in fall 2000, before the Final Rule was published. The farmers’ market operates on Saturdays and Sundays; because of space constraints, the board of directors granted permission to collect data only on Sundays. Data were collected on September 30 and October 7, 2000. The surveying sessions at the cooperative market were conducted on several days and times to reach people with a variety of shopping habits. Only people who currently buy organic food were included.

The surveys had three main components:

1. a section on attitudes and shopping habits, including why they buy organic and what they believe ought to be included in the definition of organic
2. a Contingent Valuation (CV) component measuring their WTP to have or avoid each of the Big 3 included in the definition
3. demographic traits, such as age, gender, education and income.

A total of 123 (80%) out of 154 surveys were usable. Surveys were rejected if they did not give a number in the WTP section (they stated “more” or wrote an angry essay on why it should not cost more). Two respondents’ surveys were discarded when they responded to the first question by stating they did not buy organic food, resulting in a 79% response rate if these two people are included. It was not practical to count how many people passed by, choosing not to fill out a survey: a response rate on this basis is impossible.

The CV portion elicited open-ended responses to the three WTP questions. The baseline was a food item that they normally buy organic and that costs $1. It is certified organic, but by a (hypothetical) agency that allows the use of GMOs, biosolids, and irradiation, respectively. Respondents were asked how much they would pay for a bag of the same item, identical in appearance, nutrition, freshness, etc., but that is certified by an agency that does not allow the use of each of the Big 3, singly. The three WTP questions were in an open-ended format that tends to produce less biased estimates than those from dichotomous choice questions (Balistreri et al., 2001).

The experimental English (second price) auction was conducted on a different group of organic consumers (recruited via posters and email announcements) in the Economics Experiment Lab at Cornell University. The English auction was chosen because of its simplicity and demand-revealing properties (Davis and Holt, 1993). Participants were given an allotment of $20, from which they paid for any item they won in the auction. The unspent portion was theirs to keep and also served as an incentive to participate.

WTP was determined by auctioning two items: a baseline item, a bag of organic blue corn chips that makes no claims about its GMO content; and a bag of organic blue corn chips with a seal stating it is GMO-free. The original packages of the chips were just as described to the participants; they were shown a blown-up image of the actual GM-free label. (Note: “GM-free” or “GMO-free”, in this paper, implies that no GM ingredients were used in production. The actual label used in the auction says “No GM Ingredients.” Pollen drift makes the literal claim of GM-free a different matter.) The chips were removed from the original packaging and placed in identical plastic bags so that the participants were not influenced by brand recognition, logos, or other packaging features. Items were auctioned in random order and in three rounds to control for order and wealth effects.

Participants were also given an exit survey, asking for demographic information closely matching the 2000 survey, and a question gauging their understanding of organic labels. They were asked whether each of several practices is allowed under the definition of organic. The intent of this question was to see if they were aware that GMOs are not allowed in organic production. The other components in the question (including, e.g., manure from non-organic farms, botanical pesticides and mined rock powders) were included because asking only about GMOs would have put too much attention on that component and possibly biased the responses.

Results

Survey respondents broadly agree with the Final Rule on what should or should not be allowed in organic production and processing. When asked if each of the Big 3 ought to be allowed, 85, 80 and 76% said that GMOs, biosolids and irradiation, respectively should not be allowed; the others replied that it should be allowed, or had no opinion, or didn't know. Similarly, 63, 80, 95 and 76% say that manure from non-organic farms, antibiotics, growth regulators and confinement of animals, respectively, should not be allowed. All these practices (except manure from non-organic farms) are banned by the Final Rule.

The respondents were are willing to pay to avoid the Big 3 in organic foods. The mean and median premiums they said they would pay for GMO-free organic food were $0.75 and $.50. For biosolid-free, the mean was $0.78 and the median $0.50; for irradiation-free, the mean was $0.75 and the median $0.50.

The auction also demonstrates a WTP to avoid GMOs in organic food. The bids (both for the third round, and the average bids over all three rounds) for the (GMO-free) labeled and non-labeled chips were significantly different at the 95% confidence level; consumers bid more for the labeled chips. The mean difference for both the third round and average round was $0.40. Expressed as a percent premium (and excluding one extreme outlier observation), consumers would pay an average of 95% more in the third round and 15% more in the average round.

Data from the surveys and experiment point to a lack of understanding of exactly what consumers are getting from organic food. Only 53% of auction participants knew that GMOs are prohibited in organic production. Furthermore, some organic corn chip manufacturers have placed "GMO-free" labels on their packages along with the organic label, despite the fact that the "GMO-free" information is redundant. They clearly believe that the cost of this redundant label is justified by the increased sales it brings. Perhaps the GMO-free label provides a psychological incentive to buy the product among consumers who already understand the organic label's meaning, as one auction participant mentioned after the experiment.

The survey shows another area in which consumers may not fully understand the label's meaning. The Final Rule fails to provide a means of expressing in the marketplace certain values associated with organic agriculture. When asked why they buy organic, respondents commonly stated reasons such as concern about pesticide residues, the environment, and farm worker safety. Buying organic certainly contributes positively to these issues. However many respondents also mentioned reasons such as support for sustainable agriculture and local food systems, and opposition to the "corporate" food system. The label, which is based on a list of permitted practices, does not necessarily facilitate purchases reflecting these values.

Conclusions and Implications

If the purpose of the organic label is strictly to list practices that are or are not permissible, the Final Rule is broadly in accord with these consumers' preferences. These results suggest that none of the practices banned in the Final Rule (especially the Big 3) ought to be reinstated.

However, consumer misunderstanding of the label's meaning points to a need for better communication if the label is to function optimally. With all the effort and resources devoted to the NOP, it is important that the label receive the necessary institutional support if the current market and policy environment fails to provide consumers with the correct information. The label could state the information itself, or refer to consumer-friendly web pages, toll free numbers, etc. Fees from grower certification could be used to fund advertisements that promote organic, explain its benefits and clarify the label's meaning. Otherwise, firms themselves may place additional explanations of the label's meaning and the benefits of organic on their package, as many now do.

Firms can use consumer aversion to the Big 3 as a promotional tool. Both the survey and auction indicate that consumers will pay to avoid GMOs. In a sense, consumers are getting this GMO-free trait "free" when buying organic food, even though they are willing to pay extra for it. Promotions should highlight the GMO, biosolid and irradiation-free traits and emphasize that buying organic is the best way to avoid the Big 3.

The mismatch between the label's meaning and consumers' use of it as a means to express sustainable agriculture values in the marketplace is more troublesome. Organic does not necessarily mean sustainable. Sustainable agriculture aims to address both the ecological and social problems associated with modern industrialized agriculture. But the organic label provides, at best, information on the environmental impacts at the production site. It does nothing to address issues such as pollution from transporting food over great distances, let alone social justice issues. (See Pirog and Schuh [2003] and Sligh and Mandelbaum [2003], both in this volume, for proposals regarding labels that respectively reflect these two issues.) Furthermore, with the entry into the organic market (and acquisition of once small independent organic firms) by large agri-business corporations, it is clear that buying organic does not necessarily imply supporting small family farms or a local sustainable food system, as many surveyed consumers stated.

One option is to incorporate social and broader environmental values into organic certification requirements (an idea advocated by many in the organic movement), although they would be difficult to quantify and implement. The USDA organic program is probably not the best way to accomplish this, especially in light of the difficulties involved in developing the current standard.

The USDA label could be a “floor” (rather than being both a floor and ceiling, as is the current policy), with individual certifying agencies requiring adherence to these higher standards. The disadvantage of this approach is that it would undo the goal of a unified definition of organic that was a large motivation for the NOP in the first place.

Many activists argue that another word is needed, one that incorporates the list of allowed practices along with the values associated with the origins of the organic movement. Such a new word could address the broader issues not covered by USDA organic, but would have to start from scratch to gain the public recognition, prestige and understanding currently enjoyed by the word organic.

Qualifying firms could take greater advantage of existing labels and programs, such as local, Fair Trade, “green,” etc. Activist, consumer and producer groups should cooperate to promote products with these labels.

In general, steps are needed to allow consumers to access information that allows them to make purchasing decisions that reflect their values and use the marketplace to shape the world as consumers as well as citizens. Both the public and private sectors have key roles to play in this endeavor.

Limitations of the Research and Future Directions

The sampling for the survey and experimental auction was non-random and restricted to a single region. No claims can be made that the samples of participants in the survey or auction are representative of organic consumers in general. However, the lack of understanding of the label’s meaning and function by these people suggests that further study on larger random samples is needed to determine if this problem is widespread.

It is also not clear to what extent the premiums expressed in the survey and auction for small purchases will carry over to larger expenditures. A 40% or 75% premium on a $1 or $20 purchase is very different from that size premium on one’s entire grocery bill.

Also unknown is the effect that the publicity surrounding the full implementation of the NOP will have on consumer understanding of the label. Post-tests would shed light on this question.

In a larger sense, more research is needed to determine how voluntary labeling like the organic and other ecolabels can best provide information for consumers to express their values in the marketplace, and whether other policy interventions might be needed. “Knowing where your food comes from” is a growing issue in consumer food demand. The organic label and other ecolabels will play increasingly important roles in the future.

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Organic and Origin-Labeled Food Products in Europe: Labels for Consumers or from Producers?

Georges Giraud[1]

Consumers' fears, triggered by food scares and technological developments such as GMOs, have been translated into serious concern about food safety, ever-increasing demands for quality assurance, and more information about product origin. Moreover, public awareness of the irreversible damage done to the environment by practices that lead to soil and water pollution, the depletion of natural resources and the destruction of delicate ecosystems has led to calls for a more responsible attitude towards our natural heritage. Against this background, extensive agriculture such as organic farming and on-farm processing, once seen merely as a fringe interest serving a niche market, has come to the fore as an agricultural approach that not only can produce safe foods with a distinctive native character, but also is environmentally friendly.

Organically produced foods and foods typical of a region have always commanded a higher price than conventional products. This has previously hindered the expansion of these two sectors, which are still considered niche markets. Now, however, one sees more consumers declaring a positive willingness to pay higher prices in return for guarantees relating to food safety and quality. Organically produced foods once were difficult to obtain other than in specialized outlets and local markets, but now are much more readily available on the shelves of the major supermarket chains across Europe. Nowadays we can also find private-brand origin-labeled or organic food products in most supermarkets. The transition from scarcity to ready availability seems very quick.

This paper focuses on the place of these kinds of products within European food consumption. It examines in turn the market share of food labels, consumers' perceptions of such products, and their purchasing behavior in different sales channels. It concludes with consideration of the methodology of consumer surveys to improve our knowledge of food consumers' actual behavior.

Food Labels in Europe

Quality products and European food labels

There is an enormous range of branded foods throughout Europe. However, when a product acquires a reputation that spreads beyond national borders, it can find itself in competition with products that pass themselves off as the genuine article and take the same name. This unfair competition not only discourages producers but also misleads consumers. That is why the European Union has created labels known as PDO (Protected Designation of Origin) and PGI (Protected Geographical Indication) to promote and protect traditional food products (Table 1). These directives (2081/92 and 2082/92) complement the directive on organic farming (2092/91).

The factors contributing to the birth of these new labels are well known. The European Community has developed such systems for several reasons:

- to encourage diverse agricultural production
- to protect product names from misuse and imitation
- to help consumers by giving them information about the products' specific characteristics.

It is easy for the consumer to perceive the taste, smell, appearance and consistency of food, but wholesomeness and safety are often difficult or impossible to identify. Food labels are used as quality cues. Consumer responses throughout Europe vary with region, but seem to be generally congruent.

Food labels' share of European consumption

PDO-PGI food products' market share is not well known, but most estimates put it at about 7-9% of overall food consumption in Europe. Bertozzi (1995) gives a partial indication for the cheese market. One rare exhaustive database is built on the number of PDO-PGI labels by country and product category. In the organic food market, variations are seen among

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different estimates because of the rapid increase per year, as shown in Table 2.

Data from the most recent European sources give the specific features of how both PDO-PGI and organic food products are distributed within the EU, as indicated in Table 3. Three clusters of countries appear:

- Denmark, Austria, Sweden, Finland and Germany have a high and rapidly increasing market share for organic food products. These countries also have very few PDO-PGI food products.
- France, Italy, Portugal, Spain and Greece are high in PDO-PGI products but have a low market share for organic products.
- The third group, the United Kingdom, the Netherlands, Belgium, Luxembourg and Ireland, are low in both organic market share and the number of PDO-PGI products (see Figure 1).

Perception of Labeled Food Products

When one focuses on consumers' perception of typical food products within Europe, no single European consumer of such products can be found. Rather, one finds a splendid mosaic with a great diversity of consumer responses. The results are obviously different among countries, but also seem to differ according to the kind of survey. Within the scope of consumer surveys we have to take into account the differences between declarative surveys, focus-group surveys, and scanned data panels.

Food label recall

In face-to-face interviews, we have to keep in mind that responses depend on how consumers control the vocabulary and their own memory. For instance, unaided recall of food labels in France varies with age, as shown in Figure 2. It is interesting that ten years ago the label *Appellation d'Origine Contrôlée* was in second place, and the *Organic Farming* label was lower. Nowadays, all surveys rank the unaided or aided recall of Organic Farming second.

Focusing on recognition of organic labels, Hamm et al. (2002) present interesting estimates from four of the fifteen EU countries (Table 4). It seems difficult to obtain such data: percentages are often rounded, as they are estimates rather than measurements. Because of the administrative means by which conversion support grants are distributed to farmers, it seems easier to obtain data on organic farming acreage. A recent map drawn at the regional level for Europe is shown in Offermann and Nieberg (2002).

A more recent regional survey that we did shows the same rank among the main labels and a great decline from national to European versions of the same labels (see Table 5). AOC is known by 57.2% of respondents, while PDO is known by only 7.2%; the French version of the Organic Farming label is known by 61.4% of respondents, while the European one is known by only 17.6%. The regional label of the region where the survey was done (Auvergne) obviously is well known.

The rate of aided recall of the label called *Tradition Terroir* is remarkable. Among the 375 respondents, 18.4% said they knew this label. The fact is that it does not exist. It was designed (without registered trademark) specifically for this survey to control for respondents' tendency to answer positively. The aided recall of *Tradition Terroir* is a measure of docility during face-to-face interviews. Every specialist in surveys will confirm that anybody will answer anything about any purpose so long as the interviewer smiles appealingly to the interviewee.

Consumer scanned data panel response to food labels

The usual consumer surveys can only measure verbal responses to questionnaires. They sometimes measure attitudes, but very often miss behavior. Even in sensory analysis we have an experimental context that may introduce some measurement problems, and we need many tests to obtain significant results.

This is the main reason that the protocol called "consumer scanned data panel" was developed and implemented to measure actual behavior and to compare it with verbal and hedonic responses. For the same panelists, measurements of attitude and behavior do not agree. This is a general result in food behavior because attitude is cognitively managed while behavior is affect-oriented (Köster, 1996). This is obviously true for organic and origin-labeled products, which carry more social status and are more likely to be a form of ostentation in social life.

The results of the scanned data panel are very interesting regarding the comparison of actual purchases, hedonic preference and verbal responses of each panelist regarding his or her own purchasing behavior. In our French study, 13.2% of the panelists actually purchase origin-labeled food products frequently; 31.6% preferred these products in sensory blind tests, but 59.2% declared a positive attitude towards them. On

Consumer Scanned Data Panel

Using private credit cards set up by supermarkets, the bar code of a product can be linked to the customer card at the cash register. It thus is possible to identify who buys what, when, how, and how much. Based on the principle of *single source data*, this kind of survey is called a consumer scanned data panel. We used such a survey in France with a broader protocol including sensory preference, declared attitude and actual purchase by the same consumers (Giraud et al., 2000). The study aimed at analyzing the purchasing behavior of consumers regarding Origin Labeled food products compared with commercial brands or the distributors' own label. The survey (supported by the French Government Food National Board) focused on Camembert cheese and dry pork sausage; no organic versions of these products were present in supermarkets during the study.

the other side, 75.0% of the panelists did not buy any origin labeled food products during the past the year and 46.1% rejected these products in blind tests, but only 1.3% expressed a negative attitude towards them during face-to-face interviews, as shown in Table 6.

Consumer responses are more often negative in actual behavior but become favorable when declared, whereas the sensory responses are more balanced. Consumers' verbal responses seem to be strongly linked to the social image carried by brand status.

Consumers' Purchasing Behavior for Organic and Origin-Labeled Food Products

Studies of organic consumers usually characterize them as affluent, well educated and concerned about health and product quality (Richter et al., 2000). Similar features are found for consumers of PDO-PGI food products (Giraud et al., 2001). All studies point out that food scares such as BSE, *E. coli* contamination and pesticide poisonings, as well as concerns over GMOs, have stimulated interest in organic and origin-labeled foods.

Environmental protection seems to be the second most important concern, although not new (Huang, 1996). However, the ITC (1999) notes inconsistencies in several countries between the political views of self-described environmentalists and their shopping habits. Most cross-cultural studies indicate that German consumers can be considered as the most green-oriented and discriminating with respect to organic credentials (Lohr, 2001), whereas southern Europeans seem more enthusiastic towards every proposed item about organic farming but cannot discriminate clearly among them (Sirieix and Schaer, 2000).

The high green commitment level of some consumers results in a relatively small base of consumers interested in organic and origin-labeled food products. The distinction between regular and occasional consumers is commonly used to describe the driving forces and barriers in this market (Michelsen et al., 1999). Consumers can choose among different sales channels: supermarkets; bakers/butchers; specialty, organic, fair trade or dietetic food shops; and direct sales (farmers markets and weekly markets). Regular organic consumers seem oriented towards specialty shops and direct sales, and consider these short retail channels as a convenient guarantee of the products' authenticity, whereas occasional consumers are more oriented towards supermarkets (Richter et al., 2000).

The dilemma between dedicated short channels but small market share versus the supermarkets' broad potential but less involved consumers has been pointed out in several summaries and well-documented studies on organic food consumption (Sylvander, 2000; Lohr, 2001; Hamm et al., 2002). Unfortunately, similar studies about origin-labeled food products are lacking. According to Lohr (2001), the analysis of the raw data used by Hamm et al. (2002) confirms that the future of organic food products significantly involves developing sales in supermarkets (Figure 3).

Another understanding of this phenomenon lies in distinguishing between *conviction* stores, which address green-oriented consumers' demands, and *convenience* stores, which offer organic and origin-labeled products to current shoppers (Pontier, 1997). Bakers, butchers, specialty food shops, delicatessens, farmers markets and weekly markets belong to the category of conviction stores. Supermarkets are larger than convenience stores but belong to the convenience category regarding retail distribution of organic and origin-labeled products. With this distinction, we can explain how conviction stores offer *destination* products while convenience stores offer *interception* products, both organic and origin-labeled.

Looked at this way, it is not certain that occasional consumers can become regular ones. Daily shoppers cannot transform themselves into militant consumers. The former are more price sensitive and likely to seek organic and origin-labeled products in supermarkets, while the latter are more health-conscious and a bit reluctant to frequent supermarkets (Richter et al., 2000).

This perspective seems to be discouraging for farmer and retail premium prices. It means that studies measuring willingness to pay cannot support marketing assessments of organic and origin-labeled food products (Govindasamy and Italia, 1999; Corsi and Novelli, 2002). Willingness to pay is measured by means of declarative surveys whose interpretation could be limited by the shortcomings of verbal responses, as highlighted above.

The main threat to price premiums for organic and origin-labeled food products is that supermarkets are more resistant to charging high prices than are specialty stores (Lohr, 2001). When cross-tabulating data from Hamm et al. (2002) we find a significant negative correlation between proportion of organic food sales in supermarkets and the index of organic food premium price in Europe (Figure 4). (The index of organic food premium prices is the number of organic products with a retail price more than 20% above the weighted EU average price, divided by the number of products with a retail price no more than 20% above the weighted EU average price.)

Premium prices do not seem possible in mass marketing distribution, although a substantially higher price is necessary for a high quality food product. Despite their low involvement in political concerns relating to consumption, most consumers (and most farmers too) can easily understand that an organic or origin-labeled food product cannot be everything they want it to be at once:

- a nutritious, safe and ecological product
- an organic food with a perfect appearance
- tasty, with unanimous acceptability
- available everywhere, ready-to-use and fresh
- with all these attributes supplied at a low price!

Marketing food products is a hard challenge. It should not discourage those who are involved in developing organic farming. Marketing organic or origin-labeled food products cannot give both a good rate of return and a high turnover. The future of organic and origin-labeled food products appears positive with the regular and occasional consumers' complementary demands. Rooted in regular consumers' purchases, this market should find its potential increase in the occasional consumer.

Conclusion

For a consumer who is frequently being uprooted and is stressed by his/her urban environment, the emotional content of where one's food is produced is greater than ever. With a longing for one's home, the consumer becomes an identity seeker. Origin and organic labels respond to this need to identify lost roots or the memory of happy holidays in a rural area. Because of their historical and cultural content, origin and organic labels give a meaning to taste. They provide both a means for busy people living in large urban areas to re-energize themselves and a means of identifying with the area of production.

More generally, the demand for origin and organic labels is to be found somewhere between lifestyle habits and changes. The reference to tradition makes modernity tolerable. The future of origin and organic labels is supported, strangely enough, by the development of novel food products such as fat- or sugar-free foods, restructured meat, alcohol-free wine, and GMOs. The arrival of high tech food products should also result in a demand for compensatory products, and thereby favor organic and origin-labeled foods.

There is a complementarity between high tech products and foods with origin and organic labels. Consumers are looking for safety and taste. They could balance their food habits by purchasing both kinds of products. The consumer's shopping basket contains both novel and typical foods. With organic and origin-labeled foods, the consumer seeks to be reassured by products with a distinctive native character. With novel foods, he or she is looking for ready-to-eat meals of controlled, healthful composition.

Farmers tend to be exclusive (entirely organic or entirely conventional, not both). It is not at all clear that this pattern will continue in consumers' behavior with respect to food. The consumers' approach towards organic and origin-labeled food products differs from producers'. Producers, and most researchers too, are focusing on origin or organic label with territorial veracity (Tregear, 2000). Consumers are focusing on origin or organic labels with confidence in mind.

Strict rules and high standards for obtaining an organic or origin label obviously are necessary. But that is far from consumers' perception. We are thinking about organic or origin-labeled food products while consumers mainly are eating them. Consumers give an affective response towards food, not a cognitive one. This is definitely a chance for the organic or origin-labeled market.

From a methodological standpoint, we have to improve consumer surveys to avoid declarative bias in face-to-face interviews and because food sensory perception can not be easily expressed with a standardized lexicon (Köster, 1996). Dealing with the consumer as a whole does not allow us to focus only on the stomach or the purse. We have to take into account contradictions, discrepancies and diversity that affect consumer behavior with respect to food. This is a difficult but exciting challenge. We can expect that the consumer scanned data panel protocol will help us meet it.

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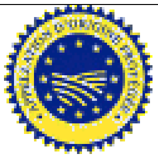
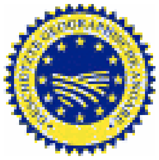
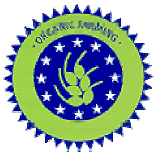
Table 1. Different European food quality labels.[a]

	A *Protected Designation of Origin* (PDO) covers the term used to describe foodstuffs that are produced, processed and prepared in a given geographical area using recognized know-how. Example: Italian cheese *Pecorino Toscano*. On the left, the French version of this label.
	In the case of the *Protected Geographical Indication* (PGI) the provenance must occur in at least one of the stages of production, processing or preparation. Furthermore, the product can benefit from a good reputation. Example: French dry-cured ham *Bayonne.* On the left, the German version of this label.
	A food product with the *Organic Farming* label contains at least 95% organically produced ingredients; the product complies with the rules of the official inspection scheme; the product has come directly from the producer in a sealed package; the product bears the name of the producer and the name or code of the inspection body. On the left, the British version of this label.

[a]Source: *europa.eu.int/comm:agriculture/qual/*

Table 2. Increasing organic market share of European food consumption (%).[a]

Organic market share	Au	Ge	Dk	Fr	It	Swe	UK	Swi
1998	2.0	1.2	2.5	0.4	0.5	1.8	0.4	2.0
2000	2.9	1.5	4.5	0.6	0.7	1.6	0.9	1.9

[a]Sources: Michelsen et al. (1999); Hamm et al. (2002).

Table 3. Indicators of food labels' market share in European consumption.[a]

Number of PDO-PGI labels	Au	Be	Ge	Dk	Fr	Fi	Gr	It	Ir	Lu	NL	Por	Sp	Swe	UK	Total
Cheese	6	1	4	2	41		19	30	1		4	12	16	1	11	148
Meat based products	2	2	4		4			25	1	1		14	9			62
Fresh meat			3		48			2		1		19	7		5	85
Sea products			1		1		1		1						1	5
Eggs, honey					4		1			1		9	1		1	17
Oil, fat, olive oil	1	1	1		6		23	25		1		5	9			72
Table olives					3		10	2				1				16
Fruits, vegetables, wheat	3		2	1	16	1	19	29			1	18	21		1	112
Bread, cakes, biscuits			4		1		1	2		1			3			12
Total (excepted drinks)	12	4	19	3	124	1	74	115	3	5	5	78	66	1	19	529
Organic market share in 2000	2.9	0.6	1.5	4.5	0.6	1.6	0.1	0.7	0.1	0.6	0.9	0.4	0.1	1.6	0.9	

[a]Sources: Hamm et al. (2002) and *http://europa.eu.int/comm:agriculture/qual/en/pgi_01en.htm*

Table 4. Consumers' organic label recognition.[a]

Country and label	% of consumers recognizing label	% of labeled organic products
Austria (Austria Bio-Zeichen)	10	80
Denmark (Statskontrolleret Økologisk)	100	80
Finland (Rising Sun Label)	80	85
France (AB Agriculture Biologique)	41	No data

[a]Source Hamm et al. (2002).

Table 5. Food labels aided recall in France (%, n = 375).[a]

Do you know the following food labels?			
Appellation d'Origine Contrôlée	57.2%	Protected Designation of Origin	7.2%
Label Rouge	80.6%	Protected Geographical Indication	2.9%
Organic Farming	61.4%	Organic Farming	17.6%
Mountain Food Product	42.0%	Traditional Speciality Guaranteed	2.9%
Fair Trade	9.8%	Produced in Savoie	21.1%
Tradition Terroir	18.4%	Produced in Auvergne	74.4%

[a]Source: regional survey made in Auvergne by the author and his students, June 2002.

Table 6. Variation of consumer panel responses according to the kind of measurement.[a]

Level of response	Kind of measurement		
	Recorded purchases over one year	Hedonic preference in blind test	Verbally declared attitude
Highly positive	frequent: 13.2%	preferred: 31.6%	positive: 59.2%
Highly negative	none: 75.0%	rejected: 46.1%	negative: 1.3%

[a]Source: Giraud et al. (2001). Camembert PDO cheese consumption, n= 123 respondents, France.

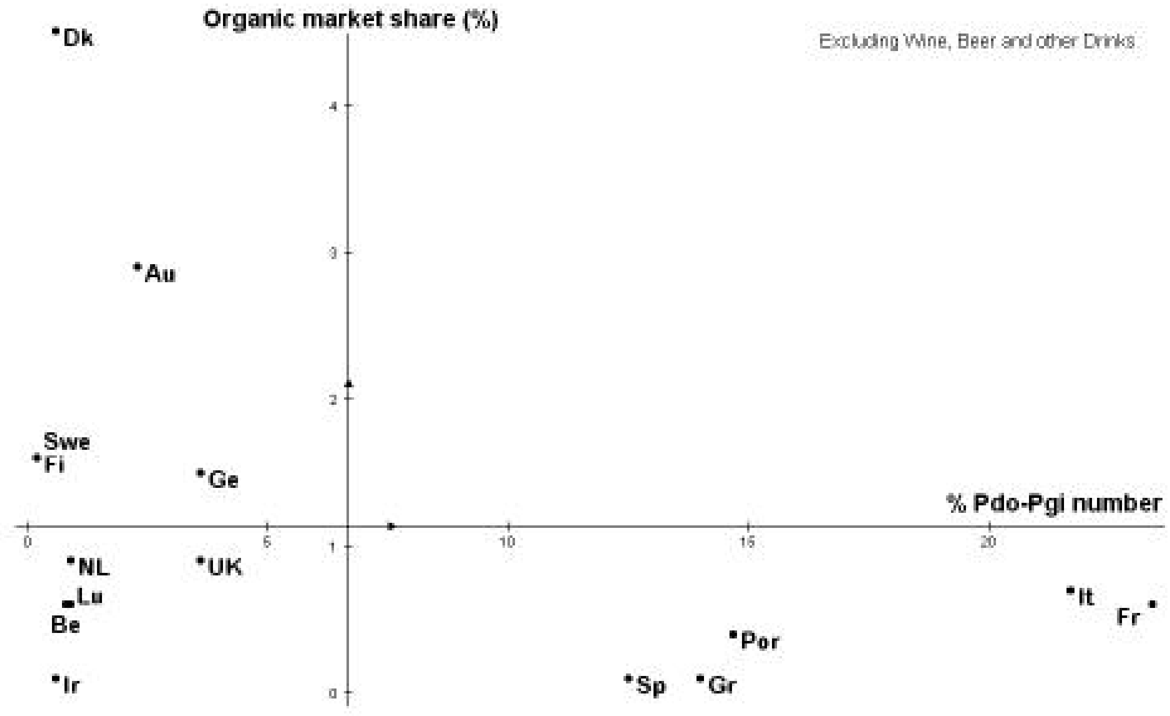


Figure 1. Market share of organic or PDO-PGI food products within the European Union.[a]

[a]r Pearson: -0.404

Cross-tabulated data from Hamm et al. (2002) and *europa.eu.int/comm:agriculture/qual/en/pgi_01en.htm*.

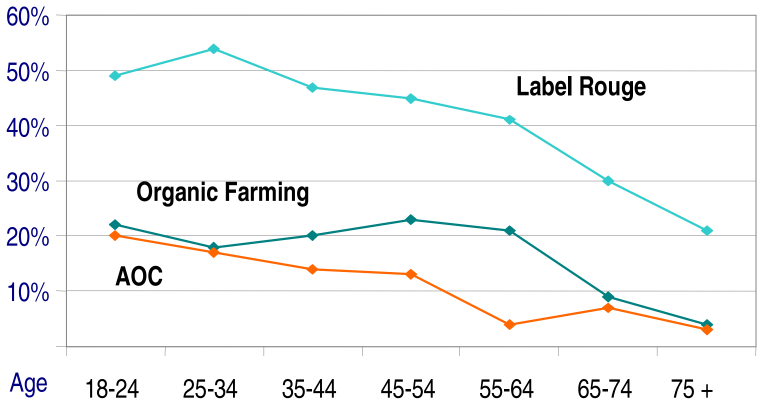


Figure 2. Unaided recall of food labels in France.

[a]Source: CREDOC – INC France 2001.

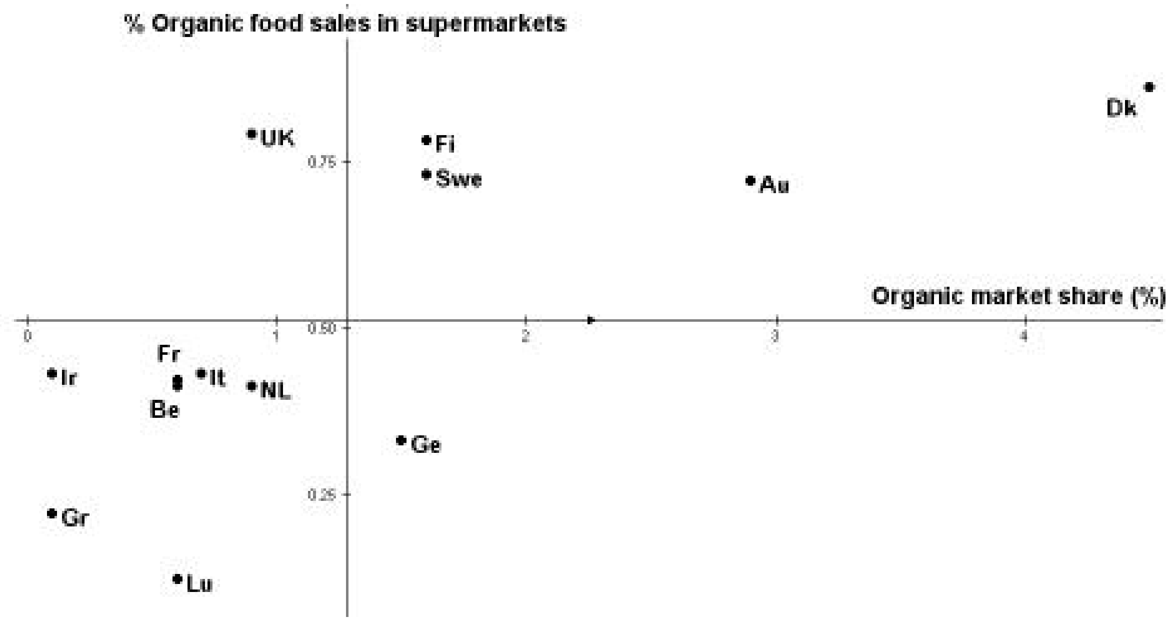


Figure 3. Relationship between organic market share and organic foods sold in supermarkets in EU.[a]

[a]r Pearson: 0.685 (p=0.01)

Source: author's own calculation using data from Hamm et al. (2002). Missing data from Spain and Portugal.

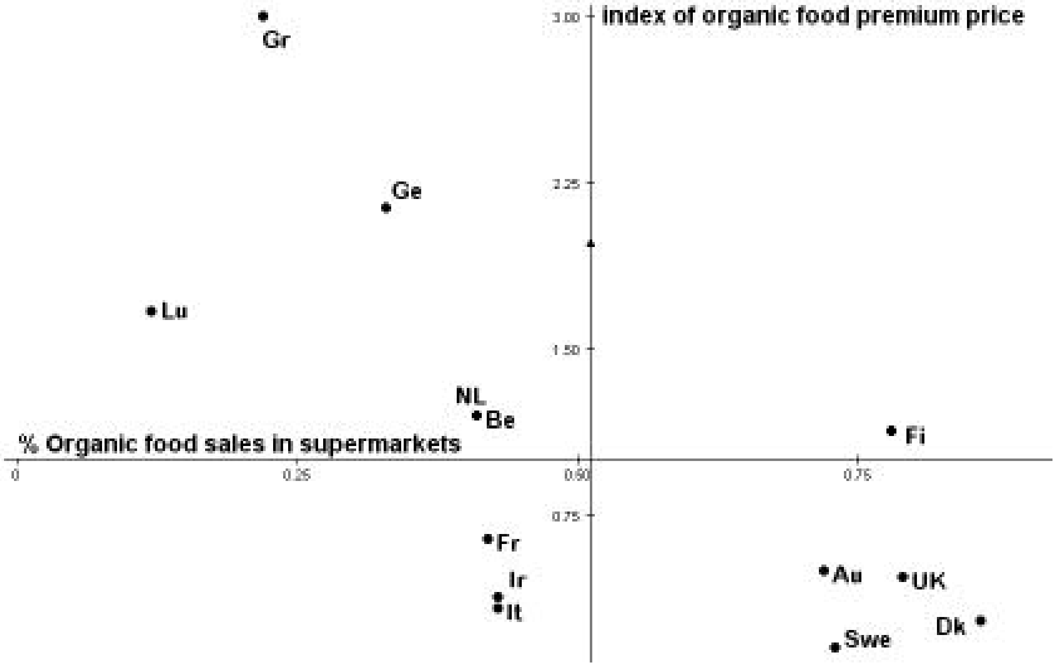


Figure 4. Relationship between organic food premium price and organic food sales in supermarkets in EU.[a]

[a]r Pearson: -0.669 (p=0.05)

Source: author's own calculation on data from Hamm et al. (2002). Missing data from Spain and Portugal.

The Commodification of Heritage and Rural Development in Peripheral Regions: Artisanal Cheesemaking in Rural Wales

Tim Jenkins[1] *and Nicholas Parrott*[2]

The imperatives of rural development in high income countries have changed significantly in recent years in response to what many have characterized as the exhaustion of the modernization project (van der Ploeg et al., 2000) and the impact of postmodern concerns (Jenkins, 2000) in rural areas. The demise of modernization is reflected in the economic decline of agriculture and the persistent unevenness of regional development performance, while postmodern issues are reflected in societal concern over the natural environment, food safety, the quality of life, and the provision of other public goods. Europe's peripheral rural regions are particularly affected by the failures of the modernization paradigm of rural development. They are often highly dependent on primary production and particularly exposed to external competitive forces in the increasingly global and liberalized agri-food economy, facing falling commodity prices, lower levels of subsidization, falling incomes, and pressures to diversify their economies.

At the same time, however, rural regions face new opportunities in the form of increasingly discerning consumer demand. Today's consumers are especially concerned about food-related health issues (Nygård and Storstad, 1998; Shaw, 1999), adventurous in their tastes (Warde, 1997), interested in regional identities and products that resonate with such identities (Cook and Crang, 1998), and inclined to construct personal identities through their consumption patterns (Bell and Valentine, 1997). Niche markets associated with such trends, such as organic and specialty foods, are among the few growth sectors in the food industry (OECD, 1995), and the companies involved in the production and distribution of such foods are recognized as making a growing contribution to the rural economy (DTZ Pieda Consulting, 1999).

The combination of these threats and opportunities facing rural regions suggests the need for a shift from the "logic of productivism" towards a "logic of quality" (Allaire and Sylvander, 1996) that will reconstruct the eroded economic, social, cultural and environmental base of rural areas and take them "beyond modernization" (van der Ploeg and van Dijk, 1995). Peripheral rural regions are well positioned to make this shift. Often, they have not been fully integrated into intensive agro-industrial food production systems and have maintained relatively traditional patterns of farming and local attributes that allow them to retain unique identities and to be relatively well positioned for entry into the post-Fordist era (van der Ploeg and Renting, 2000). In particular, they have the potential to market their products with desirable environmental, social and cultural characteristics that tap into the requirements of health- and identity-conscious consumers.

Against this background, in this paper we take a practical example of the commodification of rural heritage – namely, the small but symbolically significant artisanal cheesemaking sector in rural Wales – and contextualize it within recent rural development thinking. In so doing, we uncover various paradoxes that are not always apparent in the literature, and suggest some of the constraints that need to be overcome if the new conceptualization of rural development is to be successful in practice. First, we outline some characteristics of the artisanal farmhouse cheesemaking sector in Wales. With the sector in mind, we then use a Porterian framework (Porter, 1990; Jenkins and Parrott, 1997) to clarify some important issues in recent rural development thinking, and we outline some of the theoretical and practical aspects of the commodification of heritage. Finally, we draw some conclusions.

Artisanal Cheesemaking in Rural Wales

In many respects, rural Wales is a classic example of a geographically peripheral and economically marginal region in what is largely a progressive,

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outward-looking and globalized national economy. Traditionally, Wales has been highly dependent, both economically and culturally, on agriculture, but there is increasing policy recognition that agriculture alone is now unable to secure viable and stable rural economic and social development in the face of general trends that include the loss of traditional farming, manufacturing and craft employment, the effects of globalization and trade liberalization, and the centralization of services. In addition, Wales retains a unique historical, cultural and linguistic heritage, largely embedded in rural areas, that is also threatened by economic decline.

The long tradition of farmhouse cheesemaking in the UK was decimated during and immediately after World War II, largely by government decree following the 1947 Agriculture Act. At a time when rural policy was essentially dominated by the "logic of productivism" or, more cynically, by a conspiracy between politicians and big business to commercialize the countryside (Moore-Colyer, 2001), such old-fashioned small-scale activities were seen as bad uses of resources and labor (HCSCA, 2000) and a disruptive influence on the modernization agenda to which agriculture was subjected (Bertozzi, 1995). In Wales, farmhouse cheesemaking had completely disappeared by the 1970s, when a few individuals, largely working in isolation and unsupported by official development efforts, began to revitalize it.

Today, there are some thirty producers in Wales, mostly in the dairying areas of the southwest.[1] Most are well-established, and almost all are micro-businesses. They come from two distinct types of background. Around two-thirds are in-migrants, mainly "refugees from modernity" (Featherstone, 1991) seeking an improved lifestyle in a peaceful and attractive part of Britain. The remaining one-third are traditional small-scale dairy farmers seeking to diversify their business activities in order to maintain the viability of their farms in the face of the severe economic pressures facing the dairy sector. Both groups have similar motivations: they tend to be "income sufficers" rather than maximizers, and many resist expansion on the grounds that it would change their way of life and the nature of their products. All are self-starters and self-taught innovators exhibiting considerable entrepreneurship. The combined direct economic significance of artisanal cheesemaking makes very limited contributions to Welsh employment or income. Yet, the sector is coming to be seen and promoted as one of symbolic importance, producing "flagship" products that incorporate product quality, local tradition, local raw materials, and local retention of added value and that, most importantly, contribute to the image and distinctiveness of rural Wales. Typically, producers use rural and Welsh imagery in their marketing, echoing the French notions of *pays* and *terroir*, in which place and product are intimately linked through the unique characteristics of a locale or production method (Buchin et al., 1999).

Rural Development Thinking

Given the clear failure of productivist logic to promote sustained development in peripheral regions such as rural Wales, academic and policy thinking about rural development has shown significant change in recent years. For forty years following World War II, it was largely concerned with structures, economies of scale, functions, dependence, standard models, specialization, transferability of practices, uniform exogenous interventions, and a normative concern for rationality and efficiency – manifested in uni-sectoral concerns and a subsidized agriculture. Current rural development thinking places greater emphasis on actors, processes, economies of scope (Saccomandi, 1998), strategy, differentiation, locality, heterogeneous endogenous capacities, and a positive concern for societal expectations and interests – manifested in integrated policies and multi-sectoral approaches (Saraceno, 1994; Marsden, 1999).

Among other things, this shift has brought an interest in esthetics as much as rationality (Urry, 1995) and has resulted in culture being seen as an intrinsic dimension of the socio-economy rather than as simply a contextual variable (Lagendijk and Kramsch, 2000). Importantly, the earlier reliance on the broad determinism of economic forces to explain and influence rural development has been undermined in favor of a multi-dimensional focus that embraces more particular institutional and political processes, the agency of communities, networks and association (Ray, 1999; Bristow, 2000; Murdoch, 2000). Space is increasingly viewed as a positive attribute rather than as a constraint to be overcome, difference is perceived as a potential asset rather than as a deviation from the optimal, and recognition is given to the importance of symbolism in consumption and in the creation of identity.

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[1] Much of the detail in this paragraph is taken from Jenkins et al. (1998).

The increased emphasis on the importance of the local in a global context arises in part from two failures on the part of Ricardian and neo-classical trade theory: failure to explain the real nature of interaction and engagement between the local and the global, and failure to produce persuasive reasons why some spatial entities are more competitive than others (Porter, 1990). Traditionally, localities have tended to be seen, in economic terms, as passive (dis-)beneficiaries of wider systems, with little potential actively to influence their circumstances within such systems.

Porterian competitive advantage theory, by contrast, stresses the creation and mobilization of nationally or regionally embedded resources in a way that can increase productivity and competitiveness, a conceptual leap of clear potential interest to economically marginal and geographically peripheral rural regions (Jenkins and Parrott, 1997). While, for Porter, competitive advantage tends to be seen in terms of innovation and effectiveness in deploying factors of production, his insight that competitive strategies need to move beyond factor cost advantages and therefore beyond policies based on altering factor costs is instructive for such regions, as is the importance of his concepts of resource hierarchies[1] and resource specificities[2].

These considerations suggest that the most valuable resources in regional development terms are those that are relatively unique, immobile, innovative and embedded in specific socio-cultural settings, and that differentiation on the basis of such resources is potentially a powerful competitive instrument for specific regions. Resources are here seen in broad terms, encompassing not only given and created physical and human assets, including knowledge, skills and organization, but also what have been termed the locally rooted “competencies” (Lawson, 1999), the local capabilities and the “creative impulses” (Salais and Storper, 1992) that are highly intangible but that are important in enabling the use of assets and association to achieve practical developmental performance. As the Welsh cheesemaking example shows, there is evidence that some actors within localities are, in fact, responding to globalization by pursuing economic activities that are explicitly based on local resources, that involve a search for local specificity, and that represent an attempt to (re)valorize place in a “culture economy” approach to rural development (Ray, 1998). Such approaches reveal a localized agency that engages reflexively with the extra-local, not only in cognitive and normative ways (Habermas, 1984), but also esthetically (Urry, 1995) at the level of feeling, image and symbol.

The recognition of esthetic reflexivity is important in showing that the commodification of culture leads to the production of “symbolic” as well as “real” goods. Artisanally produced Welsh cheeses, for example, are not substitutable for, or comparable with, bulk cheeses manufactured under industrial processes, since the former contain connotations and imagery that resonate with producers, consumers and societal expectations alike in a way that “placeless” products do not. Analysis of the culture economy necessarily involves the study of such symbolic forms in relation to the specific contexts and processes by which they are produced and consumed (Thompson, 1990).

Porter (1990) also pointed out that competitive advantage involves the entire value system of the production-marketing-consumption process, an insight also attributable to Appadurai (1984), for whom values and meaning become inscribed in products throughout the whole length of their economic trajectory. Symbolic criteria are thus fundamental to commodity exchange and value, and such criteria are generated and maintained by the active involvement of all in the marketing chain. This point is well recognized by Welsh artisanal cheesemakers, who unanimously seek to maintain close involvement along the entire length of the supply chain, from a personal acquaintance with their suppliers, to an intimate involvement in production by which they maintain quality control, to discernment over the nature of the marketing channels that they utilize to determine that their products flow to discerning consumers.

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[1] Taking a hierarchical view, resources range from “basic” to “advanced.” Basic resources are those, such as natural resources, that are passively inherited; while advanced resources, such as infrastructure or heritage, require innovative investment or creation.

[2] Taking a specificity-based view, resources range from “general” to “specialized.” General resources, such as generally available technologies, are potentially available to all regions; while specialized resources, such as culture or imagery, are region-specific and difficult to emulate.

Various results derive from this. First, innovation (a central concept in the analysis of Porterian competitive advantage) goes well beyond the relatively simple realms of technology and organization to encompass more complex notions of meaning and valorization. Innovation is socially and culturally constructed by actors whose motivations are shaped by macro- as well as micro-processes that are more than economic. In the case of Welsh artisanal cheesemaking, for example, innovation is intimately connected with the motivational psychologies of both producers and consumers as well as the simple desire to exploit niche markets.

Second, as the "messages" contained in Welsh artisanal cheese production show, economic practices are as much about creating meaning as about exchange. As Lagendijk and Kramsch (2000) express it, such practices are to be understood as symbolic-interpretative processes with important political, social and cultural dimensions. Third, commodities have a "social life" (Appadurai, 1984) whereby a complex array of assumptions, conflicts and relationships define their legitimization, and they are turned into symbols within specific historical, cultural and spatial contexts, a process molded by both external and internal forces. Artisanal cheeses, for example, even though almost exclusively "re-inventions of tradition" (Hobsbawm and Ranger, 1983) and often created by non-local in-migrant artisans, tend to draw upon tradition, locality and Welshness for their inspiration and presentation, as well as being harmonized with wider associative and relational forces, such as environmentalism and concerns for quality, which are culturally and socially determined.

The view that localities possess endogenous agency has encouraged some to seek cultural explanations for economic development processes. Hence, evolutionary economists stress the importance of social conventions (Nelson and Winter, 1982); others relate economic outcomes to societal or civic characteristics assumed to result from the historical accumulation of social capital (Putnam, 1993); still others seek to disentangle the complex interaction of economic performance and its cultural context as revealed in people's attitudes and values (Inglehart, 1997). All effectively focus on "untraded interdependencies" (Storper, 1995), the networks of values and understandings through which economic actors are clearly connected but which are outside the purview of most economic analysis. A region or locality becomes a "nexus of untraded interdependencies" (*ibid.*), in which linkages may be stronger than purely economic ties between actors and may lead to innovations that result in competitive advantage for their localities. Culture and economy thus become "mutually constitutive and enabling" (Kramsch, 2000).

Many of these points are well illustrated by the artisanal cheesemaking case. Producers' innovative behavior is manifested in products, markets, market linkages and technological patterns essentially different from those presupposed by the modernization paradigm applied to agriculture. The relationship between producers and consumers is redefined in terms of traceability and feedback, again features conspicuously lacking in modernist agriculture. New networks are created, largely in the form of shorter food supply-chains that reduce the anonymity of producers and capture a higher proportion of added value. Locality becomes important and enshrined in both production and consumption patterns. The importance of the farm household is resurrected as a basis for determining personal and social identity, economic strategies and network relations. Rural resources are reconfigured as they become increasingly redundant in modernist agriculture. Synergies are created in the form of interconnections and cohesion among activities, sectors and actors, as cheesemaking contributes to regional identity and image, which then has the potential for positive impacts on other products, services and public goods produced in the region.

In short, the fabrics created by the activities of the cheesemaking sector deviate significantly from the productivist logic of the modernization paradigm (van der Ploeg et al., 2000). They result in a product that makes profitable use of an "oversupplied" product (i.e., milk); they use artisanal (rather than industrial and scale-oriented) labor and production processes; they link micro-businesses with (often international) markets that reflect societal expectations; and they encourage endogenous solutions and entrepreneurship based on renewed uses of ecological, cultural and social capital.

Underlying the focus on endogenous agency, however, are two implicit assumptions that the Welsh artisanal cheesemaking example suggests may not be as clear-cut as most theorists imply. The first concerns the existence of a purposive and socially aware orientation on the part of economic actors, most often manifest in profit-maximizing behavior and in various forms of association and cooperation. Yet, the artisanal cheese sector is highly atomistic and in many ways fails to conform to the conventional rationalities of economics and marketing. Producers often work in isolation, and many care little for developing their businesses beyond the small scale necessary for an adequate income. Moreover, many are motivated simply by a love of their craft and by achieving a satisfactory standard of living in a congenial rural environment, and most are too heavily involved in the production process to have the time or inclination to take full advantage of "untraded interdependencies" or to become concerned about the wider competitive advantage of their locality. Local actors, therefore, engage strategically, but not necessarily rationally (in the pure economic sense), in the wider economy and in global markets. To the extent that similar behavior occurs in other sectors, differential patterns of regional development are to be expected over time and space, since reflexive engagement with the extra-regional varies, and as the engagement of local actors with the broader economy is motivated by a broader range of concerns than economic optimality or even economic purpose.

The second implicit assumption of much of the theorizing about endogenous agency concerns the dynamics of indigenousness and innovation. Many theorists (e.g., van der Ploeg et al., 2000; van der Ploeg and Renting, 2000) assume that farmers are necessarily central to the rural development process, given their access to resources and their embeddedness within existing rural networks. Yet in Wales, more than 5,000 farms have ceased milk production in the last 20 years for economic reasons (NAfW, 1999), and very few have chosen cheesemaking or any similar food-related value-adding activity as a diversification strategy. There is considerable policy awareness that a farming culture characterized by the traditional successional regime of inheritance from father to eldest son, modernist labor patterns, regulated and highly disarticulated markets in which producers rarely have contact with final consumers, and a high degree of dependence on public subsidy combine to constrain the emergence of an innovative and entrepreneurial agricultural sector that can successfully challenge the processes currently contributing to economic decline and threatening the viability of farming.

By contrast, the majority of artisanal cheese producers in Wales are in-migrants to a region once noted for its economic decline and depopulation. Almost by definition in-migrants are in a region that has its own strong indigenous culture and language, and are not connected into the networks of values and understandings that link the indigenous population. Nor are they the natural inheritors of the region's historically accumulated social capital. Despite this, they appear to be more able to "reconfigure" local resources, traditions and imagery in ways that successfully communicate with both local and distant customers.

This raises important policy questions about the dynamics of indigenousness, in-migration and the processes of innovation for peripheral regions. In Wales, much has long been made of the negative effects of high levels of in-migration into the heartlands of Welsh language and culture (Day, 1989; Griffiths, 1992) and of the consequent need to stimulate indigenous entrepreneurship. The example of the artisanal cheesemaking sector appears to contradict many of the premises underlying such views, and suggests that in-migrants may have a key role to play in fostering and re-interpreting local cultural traditions. Because of their awareness of, and empathy with, the values and aspirations of people living outside Wales, in-migrants are often well-placed to recognize the potential for revalorizing tangible and intangible local resources in the light of external market demands. Inevitably, however, the role of in-migrants in the resource-valorization process gives rise to questions of "authenticity" and "ownership" of local cultural traditions.

Heritage and Its Commodification

A specific practical example of new forms of rural economic development thinking is provided by the creation and subsequent commodification of cultural heritage[1]. Heritage creation is the enlistment of the "spoils of history" for present purposes (Lowenthal, 1997) or, more specifically, the contemporary use of the past as a resource (Graham et al., 2000). The process of heritage creation is purposeful in political, social, cultural, psychological and economic senses.

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[1] Some have regretted such commodification as "vulgar culturalism," no better than "vulgar materialism," that allows esthetic values to crowd out more important moral-political ones (Sayer, 1997). Such arguments, however, seem to have little popular or political resonance in the globalized market economy of the post-Fordist late capitalist era, in which everything appears commodifiable (Brett, 1996).

It can be used to erect and justify particular power and privilege structures (Lumley, 1988), be important in the creation of identity and a sense of community, be used to validate the progressiveness of the present and sanction contemporary policies by stressing continuity and unbroken value systems, and be commodified both culturally and economically.

Hence, the creation of heritage is a symbolic, socially constructed, representational process, and control over this process determines what is actually selected and identified as heritage out of the many possible constructions of the past. Given this political dimension, and since meanings are as fundamental to heritage as artifacts, heritage creation is interpretative and esthetic rather than a rational search for the authentically "real," designed to "invest the contingent with a material, representational and symbolic iconography of permanency" (Harvey, 1996).

Heritage involves intangible values, customs, meanings and symbols as much as tangible objects, monuments and other material artifacts. Heritage creation is, in practice, a highly flexible process: recent socio-cultural trends have made for the inclusion of vernacular and everyday artifacts and meanings as well as those of social and historical elites, and the use of the more recent past as well as the remoter historical past (Lowenthal, 1997). In fact, much heritage is forged, fabricated, invented or willfully contrived *(ibid)*, and reflects an imagined, Utopian or corrupted past rather than an actual one. Artisanal cheesemaking in Wales, for example, reinvents and reconstructs a defunct tradition rejected by modernization, intimates in its advertising the use of supposedly vernacular recipes, and rejects modernist genericism by employing regional imagery and the distinctiveness of locality to differentiate its products. The lack of a verifiable long-standing historical lineage or of a genuine authenticity is more than compensated by the image, quality, meaning and symbol encapsulated as "messages" within the products.

Heritage is often bound to specific places, and such spatial linkages are perhaps most fully and subtly exploited in France, where concepts of territorial identity have traditionally been strong and where the reputation of local and regional artisanal food specialties is legendary. Braudel (1988) sees France as a patchwork of separate communities rooted in distinguishable *pays* that are the products of interaction between humanity and its environment over time. Such territorial identities are layered, with *pays* overlaid with *communes*, *départements*, *régions* and less official spatial entities.

Such layering shows the fluidity of place as a construct, the potential diversity of its constructions, and the potential conflicts that can arise from its use in heritage. Such conflicts surface in attempts to improve the marketing of artisanal cheeses in Wales, with individual producers often hostile to any suggestion that they should subsume their own unique local products within a wider regional cheese branding initiative, even though such regional branding might increase the market visibility, product range and marketed turnover of Welsh cheeses. These considerations also show the importance of scale in heritage creation and use. While national-level heritage has often been the predominant use of the past as a current political resource, recent trends in regional and local development suggest that heritage also is a powerful instrument in shaping distinctive regional and local identities for use both in external promotion of localities and in the forging of their internal cohesion (cf. Ray, 1998). Its power lies in the fact that all places have or can create a "heritage" that encapsulates symbolic associations and that is relatively easily differentiable as a competitive instrument (Barham, 2002). Interscalar relations between layers of territorial identity can be complex, with local levels conflicting with, undermined by, or supported by higher levels.

The commodification of heritage can be conceptualized as an interpretative process of converting a set of resources into marketable products (Tunbridge and Ashworth, 1996), an example of the resurrection and reconfiguration of resources emphasized in current rural development thinking. The heritage resource base is a complex and imaginative mixture of historical and ahistorical events, people, artifacts, mythologies and associations, often linked historically and symbolically to specific localities. These resources are further interpreted, selected, shaped, assembled, combined and integrated, and the resultant "heritage" can then be associated with a product that combines a physical presence with intangible attributes that happen to resonate with potential consumers at a particular point in time. The commodification process is one of interpretative construction in conformity with current requirements, and suggests that a wide variety of products can be produced and a wide variety of markets can be served from the same resource base.

A particular heritage resource may, for example, be used as a representation of culture, a symbol of identity, an inducement to tourism, an instrument for attracting inward investment, and a marketing asset for local producers. The symbolic importance and "flagship" nature of Welsh cheesemaking illustrates the multiply used and multiply consumed nature of heritage as a commodity, a multiplicity limited only by marketing's inventiveness with product differentiation, pricing strategies and market segmentation (Jenkins and Parrott, 1997).

Just as the focus of current rural development thinking is no longer confined to agriculture, nor even to rural areas in a strict geographical sense, so heritage has an applicability that transcends convenient sectoral boundaries. The plurality of uses to which heritage is put and the profusion of messages that it provides to a range of markets ensure contestation and dissonance, as different actors contest the meanings invoked (Tunbridge and Ashworth, 1996). Contestation can lead to conflicts of values, to social/cultural exclusion, and to practical problems such as those of establishing property rights. The artisanal cheesemakers' image of Wales as traditional, rural and suffused with local values, for example, may resonate well with the image of Wales promoted by those concerned with tourism, but it is contested by others concerned with attracting inward investment, who prefer to present Wales as dynamic, forward-looking and ready to play a full part in the global economy. Such conflicts are in practice reconcilable in the artisanal cheesemaking sector, where producers succeed in combining traditional values with market-orientation and entrepreneurship, but they become harder to avoid when "scaling up" to a Welsh image that finds universal acceptance and support.

Various approaches to the evaluation of the economic commodification aspects of heritage can be distinguished (cf. Graham et al., 2000). One is to see heritage as a fortuitous endowment that can be commercially exploited for economic benefit at minimal cost. Under this approach, economic functions are accommodated by particular localities as the past is traded for current income and employment; heritage-based commerce is thus often seen as a free-riding activity; and the "consumption" of heritage becomes essentially parasitical in that it adds nothing to, and may actually damage, the heritage "resource."

Another approach is to see the commodification of heritage as an activating process in which the entrepreneurial recognition of potential commercial benefits leads to the active creation of tradable commodities from previously untraded resources. Under this approach, heritage-based commercial activity involves a positive concern for resource conservation and maintenance, place imagery, marketing and consumer demand.

A third approach is to view heritage more creatively, recognizing that it is not in fixed supply and that its commodification for contemporary purposes is effectively unlimited. Under this approach, heritage becomes an intrinsic part of the economic system, its sustainability as a productive resource assumes even greater importance, the identification of market segments becomes vital to creative heritage commodification, and the inter-sectoral balance of multiple heritage-based commercial activities also becomes important, as does the reconciliation of potential conflict, contestation and dissonance.

To date, on the limited scale on which it is currently practiced, Welsh artisanal cheesemaking is best seen as of the second, activating, kind. It can further be argued that for heritage to become a significant instrument for rural development, the third, creative, kind of commodification is required, involving not only small groups of individualistic entrepreneurs, but also wider inputs from institutions, communities and developmental organizations.

The difference can be illustrated by considering the regulatory regime under which artisanal cheesemakers in Wales operate. Almost all use unpasteurized raw milk, another example of the reconfiguration of a resource which, though rejected under the modernist model of agriculture, they see as a major key to cheese quality[1]. However, this has brought many producers into conflict with regulatory authorities for whom, following modernist logic, industrial modes of production and hygiene are the norm. Pressure for banning the use of raw milk comes from various sources, including the WTO (Refabert, 1997) and bodies such as the UK Institute of Food Hygiene and Technology, which maintain that it poses a public health risk (Kupiec and Revell, 1998). Many food safety officers appear to support this view, giving rise to "bias and suspicion" against unpasteurized cheese and a culture that regards small food producers as an inherent threat to public health (HCSCA, 2000). For many artisanal cheesemakers, therefore, and indeed for their customers, the regulatory environment is over-zealous and even hostile because of the gap in perception as to what constitutes an acceptable level of risk and, by the same token, what constitutes “quality” in the context of the production of “traditional” foods for niche markets.

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[1] The gold prize at the British Cheese Awards has only ever been won by unpasteurized cheeses.

This raises important questions about the coherence and direction of food policy and institutional involvement, where the aim is to meet consumers’ requirements for quality, identity and other postmodern attributes in a market economy. On the one hand, recognizing the need to progress beyond modernization in rural development, small-scale entrepreneurship is actively promoted by regional development agencies keen to develop regional imagery and association, by rural SMEs (small and medium-sized enterprises), and by a portfolio of identifiable local products that can be competitive in a market economy. On the other hand, regulators seek standardization of procedures along the lines of an industrial model that continues the technological and regulationist trajectories developed in accordance with the predominantly productivist ethic of much post-war food production – a model now overlaid by a quest for “risk-free” food production in response to increasingly stringent food hygiene requirements.

The perception of artisanal cheesemakers as entrepreneurs in a hostile environment is also reflected in their marketing relationships. Not only does artisanal cheesemaking sit uneasily alongside the productivist ethic, but also alongside the marketing and distribution networks associated with the modernist food production and marketing system. The markets for specialty cheeses are growing (Mintel Intelligence, 1997) while the number of independent retail outlets is declining, forcing producers to develop increasingly innovative and direct supply chains in order to maintain market access and retain added value. Nevertheless, such innovation faces constraints: in Wales, high transport costs are a major issue, as is the relative lack of a cooperative ethos among often highly individualistic producers reluctant to engage in the full creation of enabling networks envisaged by much rural development theory (Murdoch, 2000).

From a marketing perspective, however, perhaps the most interesting issue concerns marketing strategies. Artisanal cheesemaking in Wales has emerged at a time when food retailing, under the logic of the modernist paradigm, has become highly consolidated and centralized. Five major supermarket chains now account for over 70% of UK food spending (Bell, 1999), and the evolution of centralized sourcing and distribution networks favors nationwide rather than regional sourcing policies. Both trends constrain the market opportunities available to artisanal cheesemakers through conventional channels, forcing many into a range of alternative marketing strategies. Many deliberately shun the retail chains on ideological grounds, since such outlets personify the mass-marketing approach they wish to avoid, and their avoidance illustrates both their desire to escape the modernist treadmill and the point that values and meanings become inscribed in products throughout their economic trajectory. Other producers, more practically, simply cannot accept the unequal relationship implied by contracts between large retailers and individual small producers.

The alternative marketing strategies, aside from tapping into local sales bases that are often in decline, usually involve the exploitation of niche markets. For Welsh cheesemakers, these include the food halls of London’s top department stores, as well as delicatessens and other specialty shops in the UK and overseas, and the mail-order business.[1] Other producers have established themselves as tourist attractions, where visitors can watch the cheesemaking process and buy on the premises. In all cases, the objectives are to obtain premium product prices, to create new market networks and product traceability, and to retain locally as much of the added value as possible. Avoidance of mass marketing by small producers enables them to maintain an image of exclusivity and product identifiability, retain control over their production processes and hence their product quality, and develop the more personal commercial linkages that discerning consumers increasingly value.

The rejection of modernist logic, especially as manifested in highly specialized agriculture, specialized labor processes (Marsden et al., 1993), externalized tasks (van Dijk and van der Ploeg, 1995), and standardized products and marketing arrangements, has severely complicated the economic analysis of rural development. To the extent that artisanal cheeses represent the symbols, values and meanings associated with Welsh heritage, the difficulties include defining the nature of the resources involved; identifying all the components of the total product, their valuation, and how the product should be supplied, priced and marketed; and assessing the complex nature and motivation of demand, consumption and consumers. Further, analyzing investment in the heritage component of cheeses is complicated by the externalities involved; by the characteristics of heritage as a public good; by the long time period over which its benefits can be discounted; by the multifaceted motivation of artisanal product consumers; and by the fact that artisanal cheeses satisfy consumer demand not only for direct user value, but also for less tangible values, including option, existence and bequest values.

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[1] Internet-based sales offer an as yet virtually untapped potential for cheesemakers to expand their autonomy and ability to merchandise on their own terms.

Some of these difficulties can be illustrated by a focus on the "consumption" of heritage products. Although simply subsumed under "demand" by economists, such consumption is clearly a complex psychological process. Essentially, heritage provides humanity with a collective rootedness in the face of an unstable present and uncertain future. Such rootedness bonds individuals vertically with ancestors and horizontally within communities, and it provides them with an identity and allegiances that are validated by time and tradition.

Rootedness has a particular resonance with the rural, providing reassurance of changelessness (or at least continuity) and time-honored verities.[1] The attraction of heritage is also anti-modernist in that, analogously with religion, it exalts faith and moral zeal over rational mental endeavor (Lowenthal, 1996), and it is post-modernist in that it satisfies higher-order consumer demands (albeit often vague ones) for self-expression, product and environmental quality, and sustainability. It reflects popular concern about increasing social isolation, popular feelings of dislocation and exclusion from control over increasingly powerful technological and market forces, and nostalgia for processes supposedly in place before food became mass produced. Just as heritage is the result of construction and interpretation at the producer level, so at the consumer level "authenticity" is derived from consumer knowledge and experience, and the success of heritage products derives from the extent to which they resonate with consumers' interpretation and expectations of the past and their desire for escapism, fantasy and education as well as the immediate pleasures of consumption.

Concluding Note

We have examined artisanal cheesemaking in Wales as an example of the heritage commodification process. Such commodification can be conceptualized as the dynamic and purposeful construction of localized socio-cultural identities through interaction and engagement with extra-local processes. From the perspective of a peripheral region, the intentional and purposeful shaping of the past for contemporary ends represents a safe, differentiable and cost-effective competitive instrument. In this paper, we have examined four general issues. The first two – the re-invention of tradition by cheesemakers and their innovative behavior – relate to the internal dynamics of a sector that has succeeded in developing marketable products that defy modern productivist logic but acquire value through their appeal to tradition, regional specificity and exclusivity. The success of the sector, at least on its own terms, has in turn led us to question a number of *a priori* assumptions about rural development, the role of farmers in this process, and the need for associative capacity for the successful development of rural development initiatives.

The other two issues we have examined – the nature of the regulatory regime within which cheesemakers operate and their marketing innovativeness – relate to the interplay between local actors and broader regulatory and commercial forces. Artisanal cheesemakers in Wales have successfully managed to exploit niches within marketing structures and to negotiate sufficient space within the regulatory framework to permit their survival. Yet both the regulatory and marketing environments are capable of rapid evolution and continue to have the potential to present insurmountable constraints to the survival and development of minority enterprises.

A fundamental set of question remains that cannot be answered solely on the basis of theory or empirical single sector studies such as ours. Can a number of limited sectors such as artisanal cheesemaking, which add value to local resources, collectively add up to a revitalization of peripheral rural regions and provide a way out of the impasse created by the modernist project in agriculture? Or are such sectors destined to remain niche-bound and, while inspirational beyond their marginal economic importance, irrevocably constrained by the institutional and commercial structures and interests that the modernist project has created? In order to answer such questions, rural development theory needs to focus more explicitly on the technological, market and institutional conditions required if endogenous initiatives are to generate wider economic, social, cultural and environmental progress in peripheral regions.

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[1] Hence the extent of public concern over the nature and pace of change in rural areas, and the traditional fondness of conservative politicians for rural values (Bramwell, 1989).

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Local Symbol Systems: Local Food – Local Label

Sky McCain[1] and Phil Chandler[2]

Once upon a time, if you wanted your customers to know that the vegetables you were selling in the market were organically grown, all you had to do was make a sign and prop it up on your stall. If you did that in the UK today, you might be breaking the law. Unless, of course, you had forked out a lot of money for the right to use an organic symbol. This paper examines the whole issue of organic certification schemes and describes an alternative for small producers - the ***local symbol system***.

What is a Symbol?

In 1991, a regulatory system of control of organic products emerged in Europe from what was then the EEC. To protect consumers and producers from substandard products, the new EEC regulations made it illegal to describe food as "organic" unless the producer had signed up with one of several competing government-sanctioned certification agencies. Each agency issues a "symbol" that indicates that the product was produced/grown according to a set of standards issued by each country but containing minimum provisions controlled and applied throughout the present day EU. In addition to the expected organic growing methods, organic standards require detailed records and an on-site inspection at least once a year. In October, 2002, the USDA implemented a similar model.

These broad area, bureaucratic systems of certification are well-intentioned and ostensibly provide the consumer with quality assurance. However, closer examination of this Pan European/national symbol system reveals some worrying problems. We now examine three major ones.

Problems with the Certification System

The tyranny of distance

The organic standards support unlimited import/export of organic produce. This means that an expensive system of inspection and regulation must be enforced to police imports. Domestic growers have a hard time competing with cheap imports of items that can be grown more easily and cheaply somewhere else, and vast amounts of fuel are used in transporting goods between states and countries, which is bad for the environment.

In 1996, for instance, Britain imported more than 114,000 metric tons of milk. (Norberg-Hodge et al., 2000, p. 11). Was this because British farmers did not produce enough milk for the nation's consumers? No, because the UK exported about the same amount of milk that year, 119,000 tons.

For the most part, this excessive transport benefits only a few large-scale agribusinesses and speculators, who take advantage of government subsidies, exchange rate swings and price differentials to shift foods from country to country in search of the highest profits.

To them that have....

The cost of organic certification in the UK has increased from £120+VAT in 1997 to £405+VAT in 2002 (Soil Association Certification Limited, Bristol, UK, private communication, December 11, 2002). Many smallholders simply cannot afford it. This increase did not occur during a period of high inflation, nor has the standards document changed significantly. What did happen during this period was an increased consumer demand for organic products, an increasing organic premium, and the elimination of a price break for certification at the small end of the market. The costs of the symbol are borne through economies of scale that favor large-scale businesses.

It is almost impossible to start small and grow into profitability faced with the usual costs such as liability insurance, organic inputs, and a long waiting period. For example, although one may enter the certification cycle at any month of the year; if that year's growing materials, seeds, compost, and fertilizers were not obtained from a certified supplier, then that growing season cannot be included in the waiting period.

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An applicant in the UK must plan to apply for the program months in advance of the growing season so that the regulations may be obtained, the land inspected, and the application approved. Then – and only if all materials are certified – that growing season can be counted as the first monitored year. The products from that year cannot be sold either as "organic" or as "in conversion," although the full complement of fees was required. The product from the second year that fees were paid may be sold as "in conversion," but not as "organic." Thus, the applicant has paid two full years' fees, nearly £1,000 ($1,600) at the lowest rate (the rate is dependent on size), without benefit of an organic premium. Provided all regulations were rigidly adhered to and all approvals granted, the third year's product can then be sold under the organic symbol.

Against the Tide

Although interest in local food is growing, locating producers willing and able to compete with supermarkets is almost impossible.

> Tony Mannetta does not worry about having enough customers at the hugely popular farmers' market in Union Square in Manhattan, or at most of the 27 other markets scattered across the city that he oversees for the Greenmarket program. What he does worry about is having enough farmers for all of them. So later this summer he plans to head for the fields in Orange, Ulster and Dutchess Counties, to knock on barn doors in an effort to meet the demands of the markets in operation and a dozen more that the program wants to open. 'We are running out of farmers," he said. "Could we use at least 50 more farmers in the next five years? Absolutely"
>
> It is getting to be a common problem. As people grow ever more picky about their vine-ripened tomatoes, and cities and towns from the Hudson Valley to the San Francisco Bay area search for ways to keep their residents happy, it seems that just about everyone without a farmers' market is angling for one in their town. And many are finding that there are simply not enough farmers to go around (Hu, 2002).

In 1964, I was able to purchase all my meat, cheese and vegetables from the local farmers' market or shops. Today the five largest supermarkets in England control around 70% of the retail food market. (Moreton, 2000, p. 1)

Gorelick (1998, p. 9) comments: "The growth of very large businesses has been at least in part at the expense of the very small…. In England a superstore that opened in 1989 cost the nearest town center 70% of its trade within four years; at least ten other towns in the vicinity also lost business."

Government Regulations Especially Harm Small Business

Gorelick (1998, p. 47) states, "The cost of complying with mounting layers of regulations often becomes so onerous that it can represent a barrier to entry for all but the largest and most capitalized companies." Moreover,

> when the regulations imposed because of hazards of mass-produced foods are applied to small-scale producers, it can be financially ruinous for them – even though their products are often far safer, and are sold in face-to face transactions unseparated by layers of corporate anonymity. Because of European Commission food-processing regulations, for instance, countless small-scale cheese producers – whose traditional varieties have for centuries been made in home kitchens or cheese rooms attached to barns – have been forced to give up their livelihoods rather than meet the exorbitant costs of installing stainless steel kitchens, tile floors, industrial pasteurizers, and other requirements for marketing according to EC rules (Gorelick, 1998, p. 48).

Paperwork can be a nightmare

Imagine a grower selling vegetables at a busy farmers' market held accountable for every carrot, potato and onion; how much, how many, at what price, when, and where.

> "I downloaded the forms for Kentucky last week," Alison said, "and after careful consideration over the weekend, have decided that it would impact our bottom line by at least $4,000, including over 100 hours of record keeping. That's 100 hours we certainly do not have." Alison said that for a diversified farm with dozens of different products, keeping production, harvest, yield and sales data for each would be just too cumbersome (Byczynski, 2002, p. 2)

Small communities (local food sector) simply do not offer the volume of demand for organic products that can justify the start-up costs involved.

One size fits all

The minimum organic standards cover the whole EU. They apply equally to an artichoke grower on the coast of Spain, an olive producer in Italy, and a sheep farmer in the Welsh hills. Thus, by their very nature, they completely eliminate provisions for regional diversity, such as the differences in soil, weather, economic health, transport options and social mores. Certifying agencies do have some leeway in enforcement by way of derogations. For instance, in May 2001 UKROFS, (the agency that oversees the application of EU standards by the British certifying bodies), lifted the percentage of non-organic cattle feed allowed to 49% because of the outbreak of foot and mouth disease. However, the procedure for obtaining such exemptions is cumbersome, and involves even more time and paperwork.

So, how can these problems be overcome? Let's suppose that decisions now made in Brussels, London, or Washington, DC could all be safely made at a local level. How would this work?

Overarching Principles – Local Standards

What if the national body simply supplied a general set of clearly defined principles that could then be interpreted at the local level with reference to local conditions? Eliot Coleman (2002) writes: "I also believe national certification bureaucracies are only necessary when food is grown by strangers in far away places rather than by neighbors whom you know."

Local groups are in a far better position to interpret principles according to their own, specific, local conditions than a remote, centralized body can possibly be. A very appropriate motto is "think globally, act locally."

Replacing bureaucracy with trust and cooperation

The maintenance of an inspection team with the associated recordkeeping is a very expensive overhead. Extensive recordkeeping for animals is already required by government agencies, thus organic certification results in duplication. What if we replaced this by a system of simple trust that relied on the basic goodness of human nature? After all, no inspection system is 100% secure, for if people are determined to cheat, they will find a way. Even if your farm is inspected, for the other 364 days, compliance with the standards must be based on trust, anyway.

The great majority of people who can be bothered to grow vegetables or tend animals on a small scale are highly motivated and committed to the benefits of organic methods. Once they have made a public declaration to this effect, they are unlikely to risk exposing themselves to criticism from their peers and neighbors by reneging on it. The very fact that one's customers live nearby, may pass by on the street or turn up for a visit at odd times during the year, engenders a community spirit of cooperation rather than exploitation. It is far easier to cheat when there is a lot of money involved or the people involved are foreign and faceless. Local groups can provide appropriate training materials on how to implement local standards, create peer review systems to protect the integrity of their symbol that safeguard the reputation of the group, and ensure that each member signs an enforceable contract that specifies compliance directives.

Not a replacement

The local symbol systems model is not intended to replace existing organic certification schemes, but to co-exist with them. As long as the demand for organic food exceeds supply, customers will continue to demand imports. Strict certification agencies are necessary in order to ensure quality and standards equivalency.

> Community-based minimum standards for local production and retailing would likely vary from place to place, influenced by local conditions and community values. Community peer pressure would ensure compliance with agreed upon standards much more effectively than current national or statewide systems, which are largely anonymous and rely upon expensive enforcement mechanisms. Local regulation would allow more flexibility, encourage more accountability, and would dramatically reduce the cost of both monitoring and compliance. (Norberg-Hodge et al., 2000, p. 41)

Attributes of Local Symbol Systems

People-based, not paper-based

A local symbol system is a network of local groups, all following one set of overarching principles but interpreting them to suit local conditions.

Trusting, not bureaucratic

Each local group relies on mutual trust rather than submitting to policing by a national body imposing bureaucratic rules and regulations. This is perfectly possible in local communities, where no one is anonymous. Producers sign a pledge detailing their growing methods, and the pledge is available for inspection by customers. Furthermore, an "open gate" policy enables customers to visit and inspect the places where their food is grown. Peer review systems protect the integrity of the symbol.

Local, and ecofriendly

Trade is confined within the local area. The size of a "local" area is variable, according to the bioregion. Some groups have defined it as within a fifty mile radius. By trading locally, transport costs and fuel use are dramatically reduced.

Communal

Local symbol schemes are whole-community based. Customers as well as producers are involved in running the local groups and are encouraged to visit production areas, help with planting, bring their children, etc. Social activities enhance the cohesion of local groups by adding to the enjoyment.

In the Western world, agriculture has become increasingly divorced from the lives of ordinary people. UK farmers are leaving the land at the rate of about 20,000 per year, yet at the same time, a growing number of people are operating sustainably managed smallholdings and small-scale farms with the aim of supplying quality food to their local communities. We believe that they hold the key to the regeneration of our agricultural system and that they deserve our support and encouragement

Local symbol – national logo

The advantage of having one national logo is self-evident. Customers would be confused by a proliferation of different logos all over the country. (One of the big advantages of organizations like the Soil Association in the UK is that their logos are recognized everywhere). However, if all local groups are adhering to the same set of principles for food production and using the same logo, then anywhere you see that logo you know the product is of the same, high standard. Furthermore, you know that wherever you are, the food is locally produced and not flown or trucked in from hundreds or thousands of miles away.

Organic food has moved from the margins into the mainstream not because shoppers had a Damascene conversion *en masse*, but because they lost faith in what men in white coats and men in black suits said was good for them. They didn't get religion; they got scared. The response of the supermarkets to this shift in the nation's buying habits has been to import organic food from countries where it is relatively cheap to produce, either because of government subsidies in most of the rest of Europe, or the availability of cheap labor in Africa and elsewhere. About 80% of organic produce sold in the UK is not grown there. Not only are conversion grants there less generous than elsewhere in the EU and ongoing subsidies non-existent, but certification fees of around £500 per annum represent an additional tax on the grower just to allow them to use the "organic" label.

The Wholesome Food Association: The First Local Symbol System Implementation

The first UK local symbol system – The Wholesome Food Association – was launched in Devon, in September 1999. The WFA is a low-cost, grassroots alternative to official organic certification that implements all the attributes listed above. It consists of a support organization composed of producer and consumer members who come together in local groups to market locally produced, clean, wholesome food. It is based on a system of peer review and pledges to uphold a set of agreed-upon principles for food production. Since its inception, the WFA has sprouted groups in England, Scotland, Wales and the US.

Platform of trust

The WFA is based on a platform of trust – the trust that still exists in community where people still care enough to "do the right thing" by each other. This kind of trust is impossible in a global market where goods from unknown origins are thrust into foreign supermarkets onto foreign shelves, replacing local products because of "free trade" edicts enforced by blackmail. Trust is acceptable among people who trade at local markets. The WFA has a tripod of support for the platform of trust.

- We strongly encourage the formation of local groups. The local group consists of both supporting consumers and producers who compete with the supermarkets, not with each other. Opportunities for cooperation and mutual benefits are limited only by the imagination of the group members. We advise a yearly "open house" where group members as well as the public visit the premises.
- We insist on our "open gate" policy whereby the customer or any interested party can make an appointment to visit the production/growing area. More and more people are taking a closer look at

where their food comes from.

- Each producer signs a pledge to uphold our WFA "Principles" prominently displayed at the point of sale. Thus, the customer can evaluate the production criteria.

WFA Principles

WFA Principles follow guidelines that are fundamental to wholesome and authentic food. "Authentic" is the word suggested by the well-known author of gardening books, Eliot Coleman. For example, we prohibit the use of synthetic chemicals in sprays, powders, and fertilizers. GMOs in any amounts are strictly forbidden. No animal growth hormones are allowed, and growing methods that enrich the soil are required. We feel that food should be treated as an integral part of life and community, rather than merely a commodity for profit. The foundation on which our three-legged platform rests is the insistence that food be ***local*** and ***authentic***.

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The Load Less Traveled: Examining the Potential of Using Food Miles and CO_2 Emissions in Ecolabels

Rich Pirog[1] and Pat Schuh[2]

Food Miles and Weighted Average Source Distance (WASD)

Food miles are the distance food travels from where it is grown to where it is ultimately purchased or consumed by the end-user. A Weighted Average Source Distance (WASD) is used to calculate a single distance figure that combines information on the distances from production to point of sale and the amount of food product transported (Carlsson-Kanyama, 1997). The formula for the WASD is:

$$\text{WASD} = \frac{\Sigma\,(m(k) \times d(k))}{\Sigma\, m(k)}$$

where:

k = different locations of the production origin
m = amount consumed from each location of production origin, and
d = distances from the locations of production origin to the point of consumption.

Calculating Food Miles from Food Distribution Data

The U.S. Department of Agriculture's Agricultural Marketing Service 1998 arrival data for produce were used to calculate a WASD for 30 different fresh produce items arriving by truck at the Chicago Terminal Market from across the continental United States and Mexico (Table 1). Only pumpkins and mushrooms traveled less than 500 miles to reach the Chicago market, while six fruits and vegetables (broccoli, cauliflower, table grapes, green peas, spinach, and lettuce) traveled more than 2,000 miles. In a recent study of Iowa local food system projects, the WASD for conventionally sourced meat and produce was 34 times greater than the distance for the same food items sourced locally (Pirog et al., 2001).

Using Food Miles in Promoting Local Food Systems

The concept of a food mile is appealing to use to promote local food systems for two reasons: 1) Most consumers understand the concept within the context of their own travel experience; 2) Information needed to estimate food miles for fresh foods such as produce is available.

Figures 1 and 2 provide examples of how the concept of food miles can be shared with consumers to promote locally grown foods.

Comparing Fuel Use and CO_2 Emissions for Different Food Transport Systems

The burning of fossil fuels releases carbon dioxide (CO_2) and other gases known as greenhouse gases that absorb heat and likely contribute to an increase in global warming. Would there be transportation fuel savings and a reduction in CO_2 emissions if more food were produced and distributed in local and regional food systems? A recent study strove to answer this question by calculating fuel use and CO_2 emissions to transport 10% of the estimated total Iowa per capita consumption of 28 fresh produce items for three different food systems (Pirog et al., 2001). A number of assumptions regarding production origin, distance traveled, load capacity, and fuel economy were used to make the calculations. The goal was for each of the three systems to transport 10% by weight of the estimated Iowa consumption of these produce items from farm to point of sale.

The *conventional system* represented an integrated retail/wholesale buying system where national sources supply Iowa with produce using large semi-trailer trucks. The *Iowa-based regional system* involved a scenario modeled after an existing Iowa-based distribution infrastructure. In this scenario, a cooperating network of Iowa farmers would supply produce to Iowa retailers and wholesalers using large semitrailer and midsize trucks. The *local system* featured farmers who market directly to consumers through community supported agriculture (CSA) enterprises and farmers markets, or through institutional markets such as restaurants, hospitals, and conference centers. This system used small light trucks. See Figure 3 for a schematic representation of these three systems. The conventional system used 4 to 17 times more fuel and released 5 to 17 times more CO_2 than the Iowa-based regional and local systems, depending on the system and truck type used.

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Table 1. Weighted average source distance[a] (WASD) estimations for produce arriving by truck at the Chicago Terminal Market – 1998.

Fresh produce type	**Distance by truck – Continental U.S. only[a] (miles)**	**Number of states supplying**	**% total originating from Mexico (percent)**
Apples	1,555	8	0
Asparagus	1,671	5	37
Beans	766	11	10
Blueberries	675	6	0
Broccoli	2,095	3	3
Cabbage	754	17	< 1
Carrots	1,774	6	3
Cauliflower	2,118	3	2
Celery	1,788	4	3
Sweet Corn	813	16	7
Cucumbers	731	17	36
Eggplant	861	8	36
Grapes (table)	2,143	1	7
Greens	889	11	2
Lettuce (iceberg)	2,040	7	0
Lettuce (Romaine)	2,055	6	0
Mushrooms	381	4	0
Onions (Dry)	1,675	15	10
Peaches	1,674	8	2
Pears	1,997	4	0
Peas (green)	2,102	1	30
Peppers (bell)	1,261	12	27
Potatoes (table)	1,239	14	0
Pumpkins	233	5	0
Spinach	2,086	6	< 1
Squash	781	12	43
Strawberries	1,944	2	15
Sweet Potatoes	1,093	4	0
Tomatoes	1,369	18	34
Watermelons	791	14	2

[a] The weighted average source distance is a single distance figure that combines information on distances from production source to consumption or purchase endpoint. For these calculations, USDA Agricultural Marketing Service arrival data for 1998 were used to identify production origin (state). Production origin distances to Chicago were estimated by using a city located in the center of each state as the production origin, and then calculating a one-way road distance to Chicago using the Internet site Mapquest (mapquest.com). The estimates do not include distance from the Chicago Terminal Market to point of retail sale. Source: Leopold Center for Sustainable Agriculture.

Combining Information on Food Miles and CO_2 Emissions into an Ecolabel

Consumers may be able to understand the concept of a food mile as it relates to food distribution, but the mode of transportation must be taken into account before assuming that fuel use and CO_2 emissions will be lower for food that is transported for shorter rather than longer distances. Water is the most energy-efficient mode to transport food or other goods, followed by rail, truck, and airplane (Pimentel and Pimentel, 1996).

We propose ecolabel information that takes into account both food miles and CO_2 emissions to provide consumers with a relative indicator of the transport-related environmental impact of their purchases. We estimated fuel used and CO_2 emitted for a set of fresh produce examples that would provide a range of distances traveled and transportation modes to reach a Des Moines, Iowa supermarket. Those examples include:

- Apples grown in Iowa and transported by truck (60 miles)
- Apples grown in Washington State and transported by truck (1,722 miles)
- Potatoes grown in Idaho and transported by truck (1,246 miles)
- Potatoes grown in North Dakota and transported by truck (558 miles)
- Table grapes grown in California and transported by truck (1,887 miles)
- Table grapes grown in Chile, transported by ship to California, and by truck to Iowa (7,268 miles)
- Pineapples grown in Costa Rica, transported by ship to Florida, and by truck to Iowa (2,677 miles)
- Pineapples grown in Hawaii, transported by plane to California, and by truck to Iowa (4,234 miles)

Other researchers in Great Britain and Japan have calculated CO_2 emissions for produce transported locally, nationally, and internationally (Jones, 2001; Woodward et. al., 2002; Taniguchi and Hasegawa, 2002). We used the distance the item traveled, converted information on the energy needed to move goods for each mode of transport (air, water, truck) to fuel equivalents, used higher heating values (the energy released per mass of fuel burned) for each mode of transport, and chemical equations for combustion of each fuel to solve for the amount of CO_2 produced. Our results are at best rough approximations, as we did not take into account the fuel efficiency of a specific type of truck, plane or ship for each transport system, nor did we estimate total load capacity for the trucks, planes, and ships used in transport.

A comparison of the eight examples can be found in Figure 4. The Iowa-grown apples had the lowest fuel usage and CO_2 emissions, followed by the North Dakota potatoes. Hawaiian pineapples flown to California and trucked to Iowa burned 250 times more fuel and released 260 times more CO_2 per pound of produce transported than did the Iowa-grown apples. Although the Costa Rican pineapples traveled further than the California table grapes, the pineapples used less fuel and emitted less CO_2 because of the higher efficiency of water-based transport compared with trucks. Approximately 45% of the distance traveled by the Costa Rican pineapples was by water.

We used information on distance traveled and CO_2 emissions from our eight examples to design a simple ecolabel that would inform consumers of:

- Source (state, country) of the produce item
- Mode(s) of transportation
- Miles traveled (food miles)
- Relative environmental impact due to transport (based on CO_2 emissions).

We used the CO_2 emission information to develop a simple Transport Environmental Impact (TEI) ranking with the following range, ranking, and color scheme:

1. Less than 1 pound CO_2 released per pound of product transported - *Low* (green)
2. 1 to 2 pounds CO_2 released per pound of product transported - *Moderate* (yellow)
3. From 2 to 10 pounds CO_2 released per pound of product transported - *High* (orange)
4. More than 10 pounds CO_2 released per pound of product transported – *Very High* (red)

Rationale for the Color Scheme

We chose green for the color of our *Low* ranking because a typical American consumer associates the color green with “go” (as in a traffic light) and as a color that is good for the environment. The color red was used for the opposite ranking of *Very High* because consumers associate the color with "stop" (as in a traffic light) and with hot or dangerous. Figs. 5 through 8 illustrate several of our ecolabels (examples are in black and white). We used symbols to illustrate mode of transportation, and the metaphor of an automotive temperature gauge to exemplify the TEI rankings from *Low* to *Very High*.

Discussion

The TEI ranking is based only on the eight examples and does not reflect an evaluation of miles traveled, fuel used, and CO_2 released for a comprehensive list of food products covering all four modes of transportation. The range, ranking, and color scheme chosen reflect a possible approach to be used, but are not meant to be employed as a research-based set of standards. Also, this ranking does not cover other environmental impacts incurred, such as the production of the food, storage (refrigeration), or transport from store to home.

Our sample ecolabels are a first step to communicating information to consumers about the source and the transport environmental impact of their purchase. Although food transported in local and regional food systems will likely travel shorter distances and have lower CO_2 emissions than in conventional systems, one cannot assume that local and regional systems will have lower CO_2 emissions when considering production, storage, and distribution of the food.

Life Cycle Assessment (LCA) should be used to assess fuel use and CO_2 emissions generated for food products from farm production through consumer purchase and use. LCA is a method for performing an integral analysis of the environmental impacts of products in a "cradle to grave" fashion (Centre of Environmental Science, 1996; ISO, 1997). CO_2 equivalents per kg of tomato were compared over a 20-year period for tomatoes grown in Denmark, the Netherlands, Sweden, and other countries (Carlsson-Kanyama, 1998), with Sweden being the end consumption point. Spanish tomatoes had lower CO_2 equivalents than those produced in Denmark, the Netherlands, and Sweden, even though the transportation distance to Sweden was longest for the Spanish tomatoes. The reason is that the Spanish tomatoes were raised in open ground while the greenhouse-raised Swedish, Dutch, and Danish tomatoes expended more fossil fuel energy in crop production.

Future Directions

Future research will be conducted to evaluate the TEI ranking system using a more comprehensive sample of food products across the four transport modes. Investigations will be made into the use of LCA to develop ecolabels for several food products. Focus groups will be conducted to gauge consumer and retailer/distributor interest in the ecolabels. Investigations also will be made to determine if such ecolabels could be used in promoting local foods at farmers markets, on-farm stands, and other venues.

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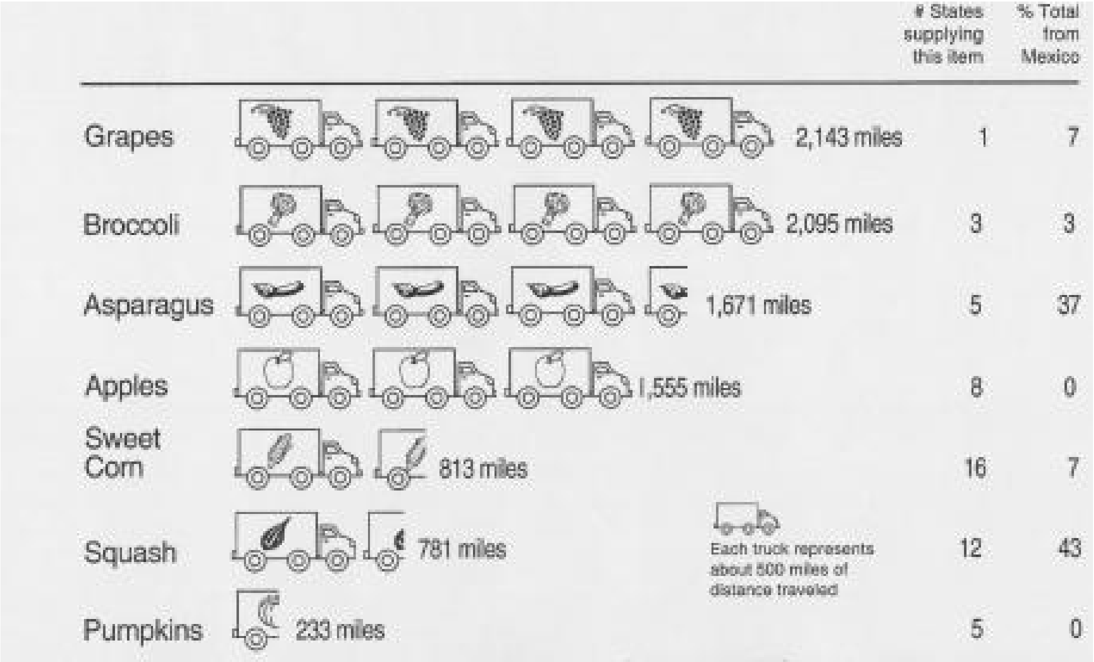


Figure 1. Average distance by truck to Chicago Terminal Market (Continental U.S. only) (Source: Leopold Center for Sustainable Agriculture.)

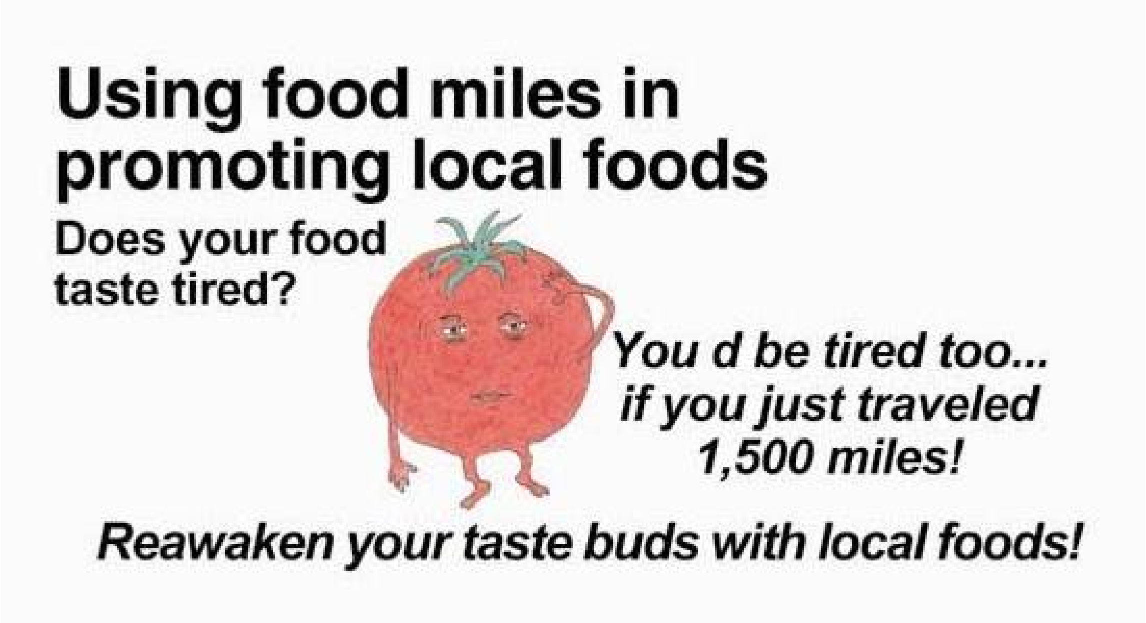
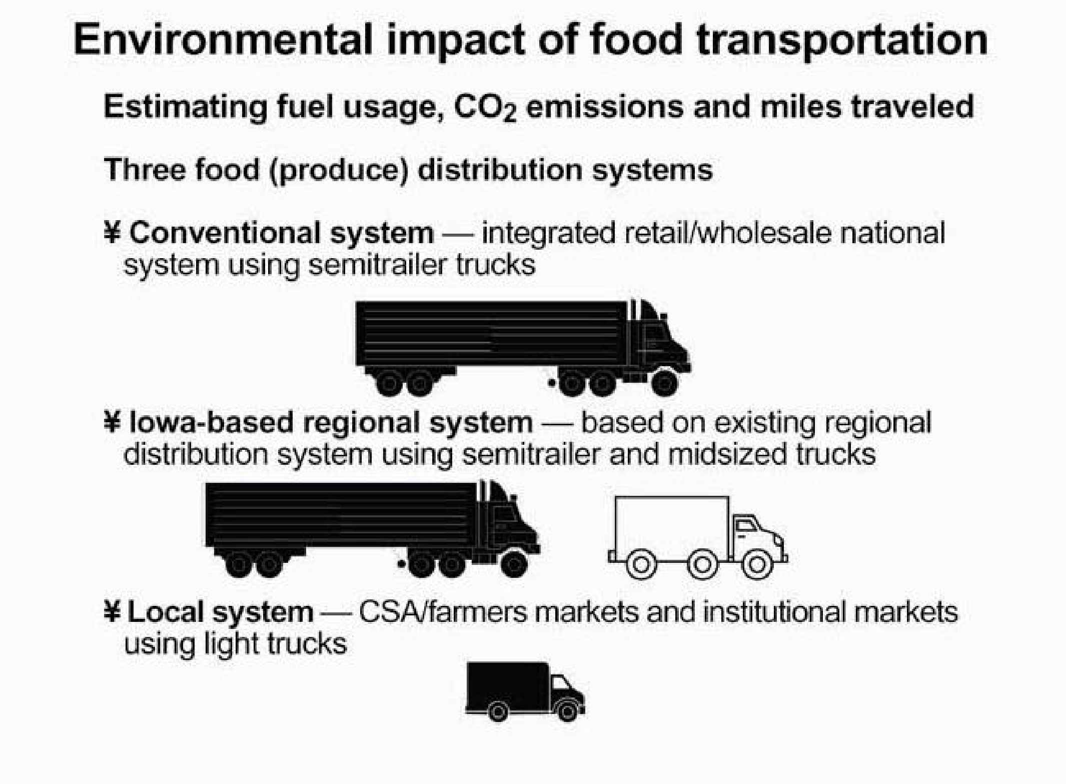

Using food miles in promoting local foods
Does your food taste tired?
You d be tired too... if you just traveled 1,500 miles!
Reawaken your taste buds with local foods!

Figure 2. Using food miles in promoting local foods.



Environmental impact of food transportation

Estimating fuel usage, CO_2 emissions and miles traveled

Three food (produce) distribution systems

- **Conventional system** — integrated retail/wholesale national system using semitrailer trucks
- **Iowa-based regional system** — based on existing regional distribution system using semitrailer and midsized trucks
- **Local system** — CSA/farmers markets and institutional markets using light trucks

Figure 3. Environmental impact of food transportation. (Source: Leopold Center for Sustainable Agriculture)

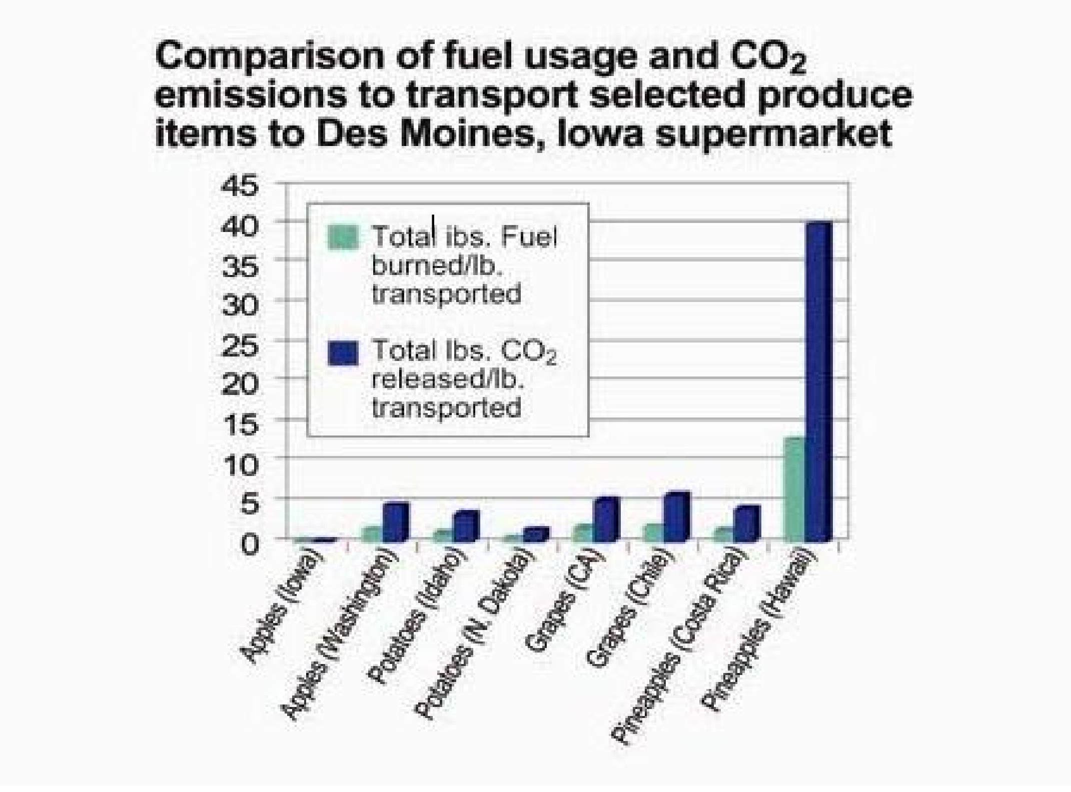


Figure 4. Comparison of fuel usage and CO_2 emissions to transport selected produce items to Des Moines, Iowa, supermarket. (Source: Leopold Center for Sustainable Agriculture)

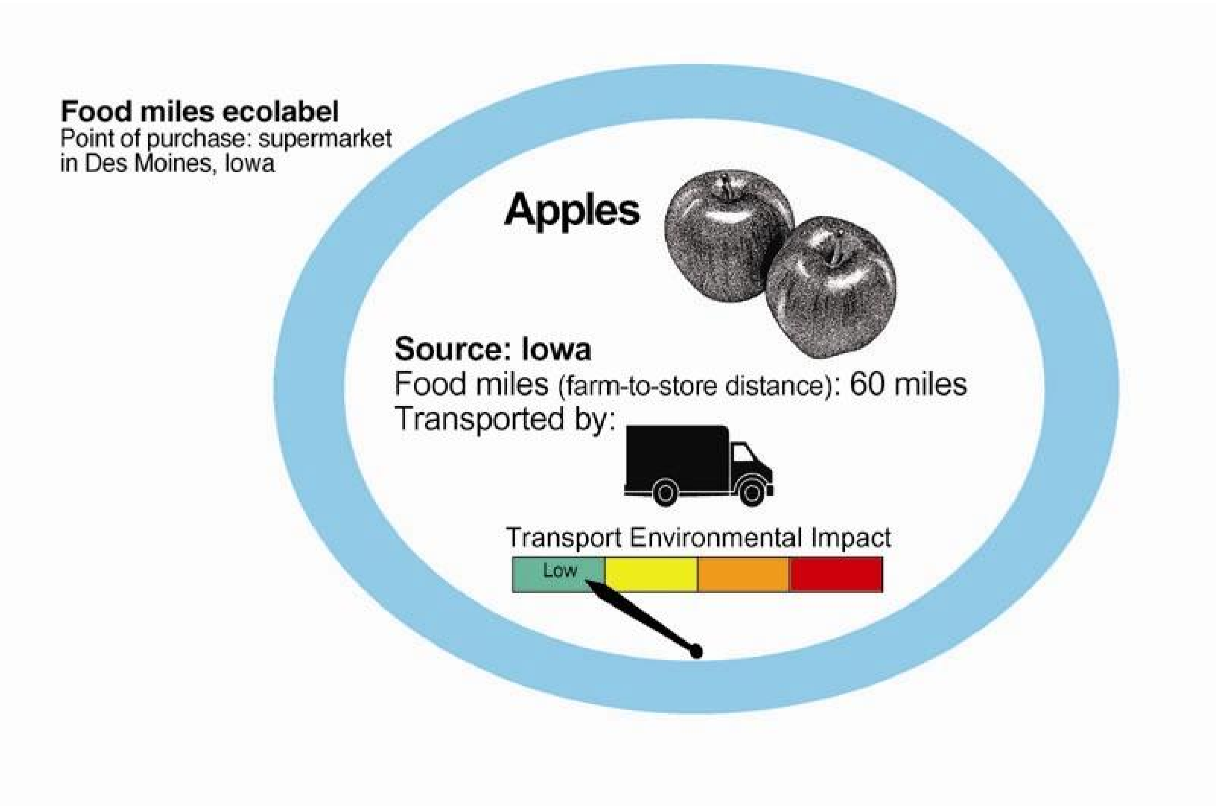

Food miles ecolabel
Point of purchase: supermarket in Des Moines, Iowa
Apples
Source: Iowa
Food miles (farm-to-store distance): 60 miles
Transported by:
Transport Environmental Impact
Low

Figure 5. Apple ecolabel.

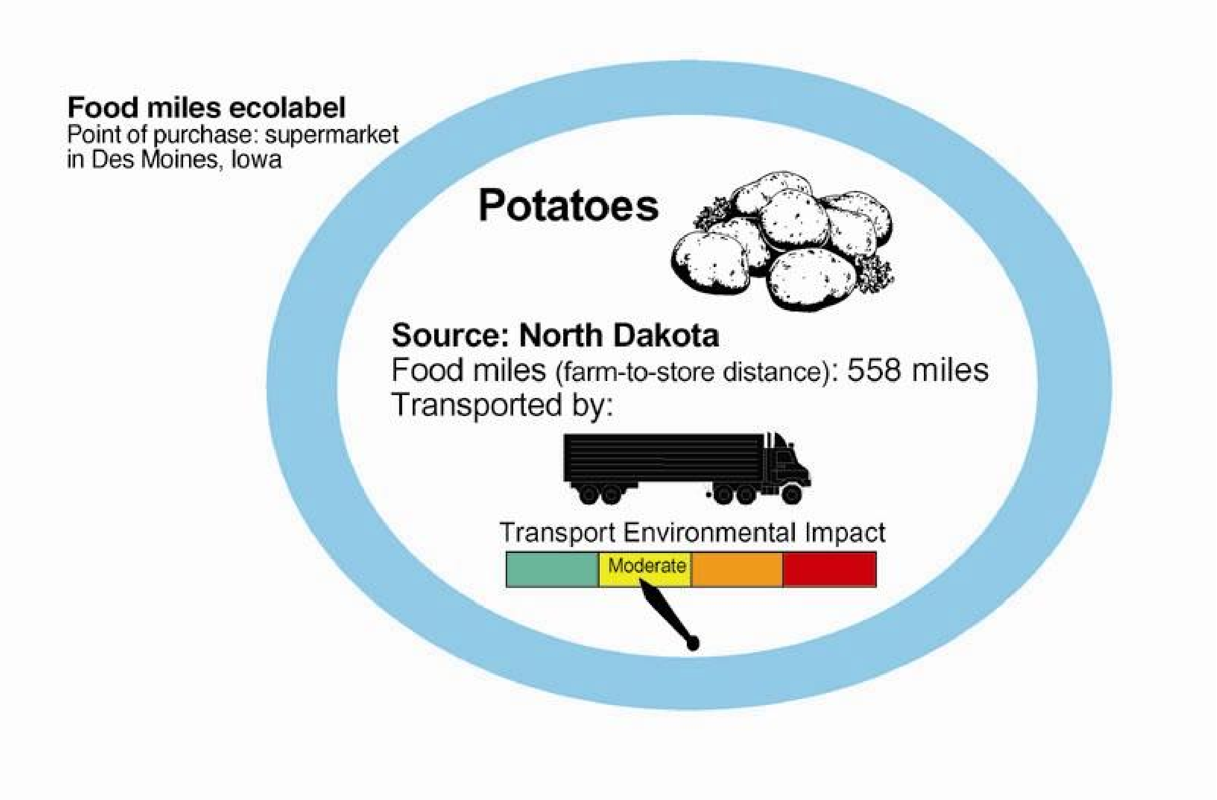

Food miles ecolabel
Point of purchase: supermarket in Des Moines, Iowa
Potatoes
Source: North Dakota
Food miles (farm-to-store distance): 558 miles
Transported by:
Transport Environmental Impact
Moderate

Figure 6. Potato ecolabel.

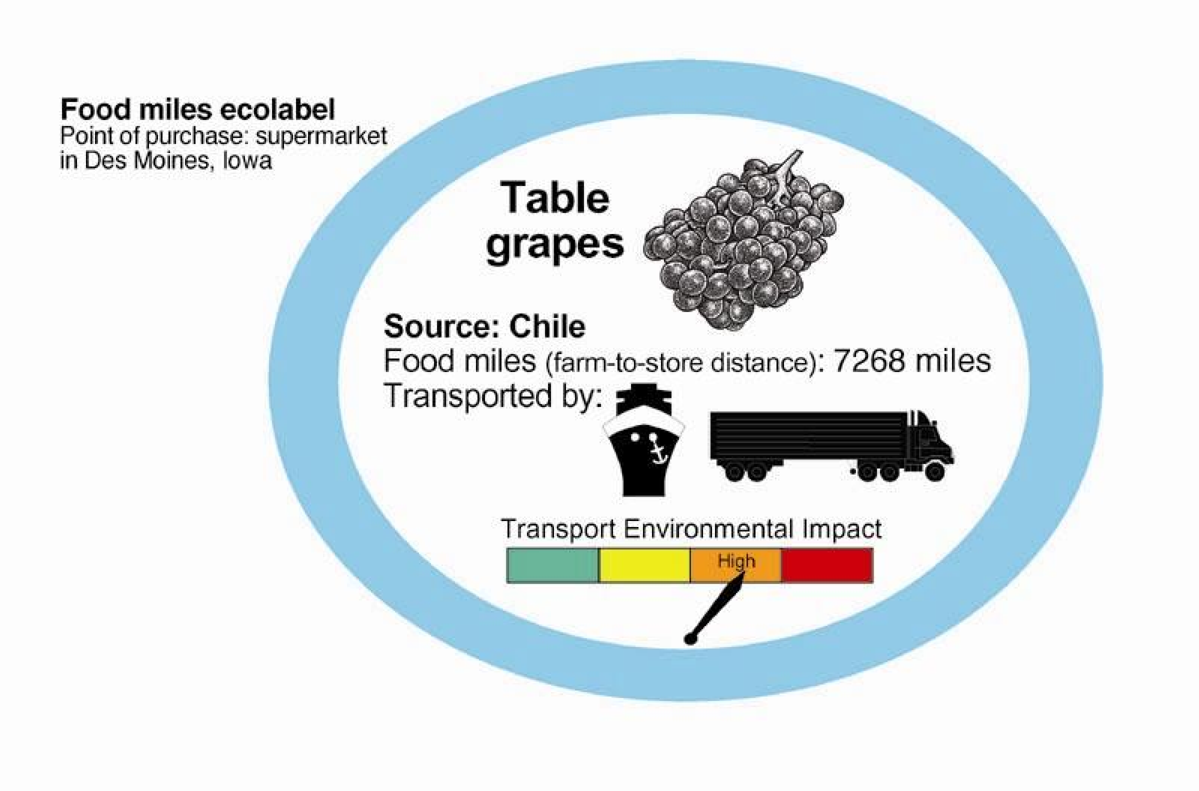

Food miles ecolabel
Point of purchase: supermarket in Des Moines, Iowa
Table grapes
Source: Chile
Food miles (farm-to-store distance): 7268 miles
Transported by:
Transport Environmental Impact
High

Figure 7. Table grape ecolabel.

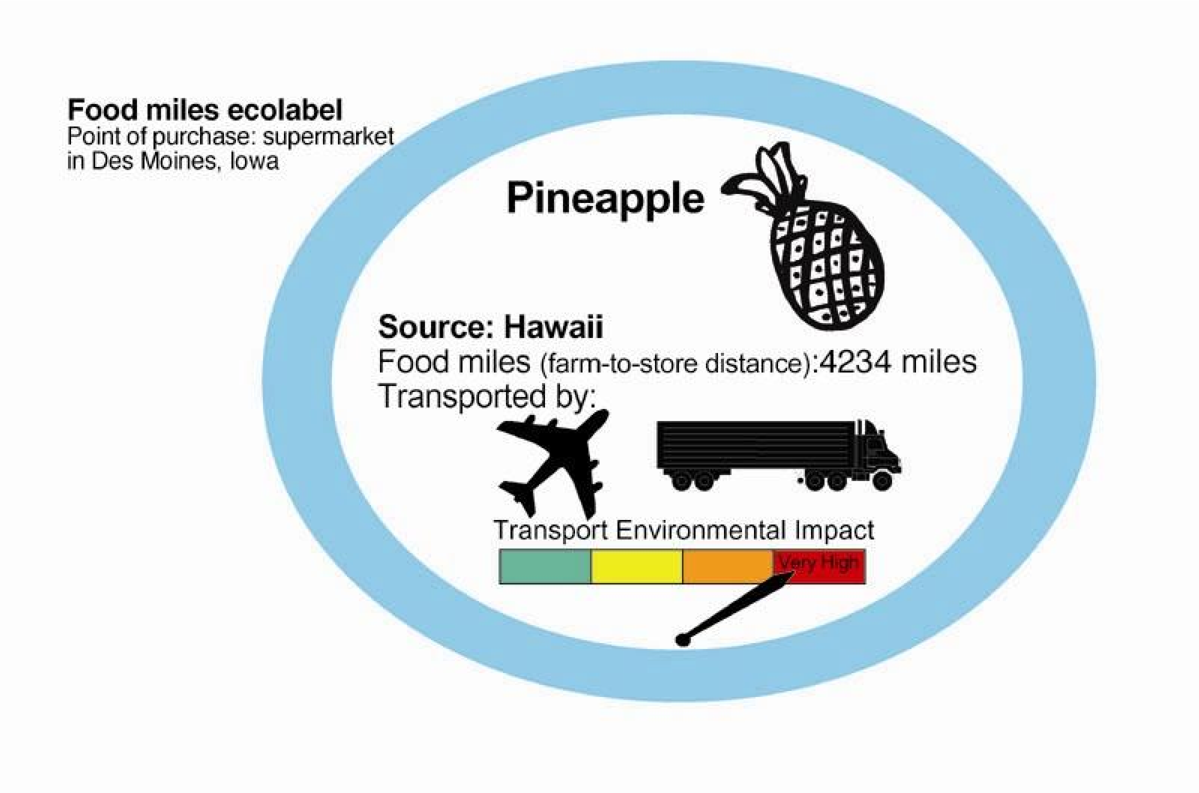

Food miles ecolabel
Point of purchase: supermarket in Des Moines, Iowa
Pineapple
Source: Hawaii
Food miles (farm-to-store distance):4234 miles
Transported by:
Transport Environmental Impact
Very High

Figure 8. Pineapple ecolabel.

Food Alliance: Transforming a Regional Success Story into a National Network

Deborah J. Kane[1] *and James F. Ennis*[2]

Food Alliance

Food Alliance, a non-profit organization with operations based in Portland, Oregon, and St. Paul, Minnesota, is dedicated to promoting expanded use of sustainable agriculture practices through market-based incentives. Food Alliance operates an ecolabel program encouraging environmentally and socially responsible food production.

Farmers and ranchers who meet our strict eligibility requirements in the areas of pest and disease management, soil and water conservation, safe and fair working conditions, and wildlife habitat conservation earn the right to market their products with our ecolabel: ***Food Alliance certified.***

In just a few years, Food Alliance has grown from a seedling alliance to an organization recognized regionally and nationally for an innovative farm evaluation and approval program. We have enjoyed early success in promoting the program with farmers, shoppers and retailers alike.

Measuring Success

- **Impact:** Working with both fresh and processed foods, Food Alliance is one of the largest and most diverse agricultural ecolabels in the United States. Over 200 varieties of fruits and vegetables, as well as livestock, dairy, wine, and wheat, are Food Alliance certified.
- **Participation:** There are currently Food Alliance certified farms and ranches in eight states: Florida, Iowa, Wisconsin, Minnesota, Oregon, Washington, California and Hawaii. Food Alliance certified producers total just under 200, with 1.57 million acres in production.
- **Access:** Food Alliance certified products are currently available wherever people shop. From Costco in Hawaii to Fred Meyer stores up and down the West Coast, conservative estimates indicate that Food Alliance certified products are sold in retail establishments in nearly 20 states. In addition, Food Alliance certified products are sold in countless outlets such as farmers' markets, farm stands, specialty markets and on-line.
- **New markets:** Food Alliance has fine-tuned the practice of developing innovative partnerships that expand market access for producers as well as consumers, including contracts with food service outlets (Portland State University) and product development with artisanal food producers (Grand Central Baking).
- **Consumers:** Interest in Food Alliance certified products and acceptance of the Food Alliance seal are on the rise. As a result of sophisticated marketing and promotional campaigns, consumer awareness of the Food Alliance program peaked at 24% in the Northwest in 2001.
- **Exposure:** Food Alliance has received 12 million media impressions in a single year, including coverage from *National Public Radio, The Wall Street Journal, The New York Times Magazine, The Oregonian,* and numerous local and national trade publications.
- **Support:** Food Alliance has consistently attracted support from over two dozen national and regional foundations and government agencies. In addition, a growing membership and donor roster have helped diversify Food Alliance's revenue base.

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- **Bottom line:** Participating farmers report new markets, price premiums, and sales volume increases as a result of new marketing opportunities created by Food Alliance. Retailers report strong sales of Food Alliance products, with over half of those surveyed experiencing increases in produce sales.

Creating a National Network

The seeds of a national Food Alliance program were planted in 2000 with the establishment of a Midwest affiliate, based in St. Paul, Minnesota.

An 18-month test partnership in the Midwest was our first attempt at replicating the Food Alliance model in other regions. As a direct result of the partnership, the Midwest Office was able to:

- create efficiencies, thus minimizing start-up time and costs. Less than four months after signing a memorandum of understanding with the Food Alliance, the Midwest Office was able to launch a retail campaign.
- offer a much broader array of Food Alliance certified products and expand seasonal availability previously limited by the Midwest growing season and crop selection. Not only can Midwest retailers offer Food Alliance certified apples from Wisconsin or corn from Iowa, they can access certified products such as Oregon pears, Washington cherries, or Walla Walla sweet onions – sustainably certified items not traditionally available to consumers in these markets. Conversely, Food Alliance certified products from the Midwest can more easily find their way to markets on the West Coast through the growing network of Food Alliance retail and distribution partners.
- start further up the learning curve, avoiding pitfalls and lessons already learned by Northwest counterparts. There was no need to “start from scratch” in developing programs, materials and other operational components.
- gain immediate credibility by highlighting the successful Northwest model; this was especially effective in addressing regional concerns about program implementation.

In January 2002 the relationship with the Midwest Office was formalized, moving beyond test to full implementation. The most significant consequence of this has been the creation of a national infrastructure and hiring of staff to support regional programming and additional regional affiliates.

The benefits of consolidating specific functions within a national office are clear. With a national staff providing program development, consumer research, planning, and evaluation services to regional programs, regional affiliates can focus on program implementation, recruitment and region-specific opportunities. The primary services the national office provides regional affiliates are:

- establishing and maintaining third-party verifiable standards for agricultural producers and processors, including administration of our highly regarded Stewardship Council.
- developing promotional strategies and materials for the Food Alliance certified label at the national, regional and local levels.
- overseeing promotional campaigns for Food Alliance certified products at the national, regional and local levels.
- building and maintaining a national alliance of regional partners.
- maximizing media opportunities and exposure on both the regional and national level.

With operations in the Northwest and Midwest firmly established, Food Alliance is now ready to launch a third regional affiliate. Earth Pledge Foundation, based in New York, will host Food Alliance’s Northeast Office starting in January 2003.

Environmentally Friendly Food Production in St. Petersburg, Russia: Consumers' Awareness and Ecolabeling Scheme Development

Olga Sergienko[1] and Alena Nemudrova[1]

At present the food industry is among the most dynamic branches of the Russian economy, providing various products for people's daily consumption. Starting new production does not necessarily mean that new energy- and resource-conserving technologies are going to be used. Therefore, energy and resource savings are becoming crucial. Also, special emphasis should be given to safety and especially the environmental aspect of food, as its hygienic cleanliness directly affects the health of consumers. Usually under the term "safety" we understand the absence of toxins, carcinogens, and other negative influences on humans, assuming consumption does not exceed normal daily amounts.

The concept of environmental safety is wider and covers not only conventional food safety, but also the safety of the raw materials used in production, the environmental impact of production itself, and the storage and utilization of wastes. To confirm that a company is concerned about its consumers, the quality of its products and the environment, it can launch a voluntary ecolabeling process in addition to the certification that is mandatory for food products.

Special rules concerning voluntary environmental label schemes are already established in many countries, such as the German Blue Angel, the Nordic White Swan, the US Green Seal, and the ecolabel of the European Union, the Euroflower. The special mark "Life Leaf" was recently introduced in St. Petersburg, Russia (Figure 1), and an ecolabeling scheme and rules were developed. The ecolabeling project was launched in the city by a non-governmental organization, the St. Petersburg Ecological Union.

We present a brief description of the Union and other organizations involved in the ecolabeling project, as well as their roles in developing the ecolabeling methodology and scheme that prove that this product-oriented environmental strategy is suitable for validation and certification by third parties.

Within this scheme, environmental criteria were developed for evaluating the environmental quality of meat products, from "less discharges of toxic and polluting substances into water, soil and air" to special sanitary hygienic requirements for the production process, the chemicals used, and sustainable farming. Currently the project is aiming to develop ecological quality criteria for baked goods and bottled drinking water.

The successful implementation of an ecolabeling project depends not only on the readiness of producers to be rewarded by the ecoseal, but also on consumers' interest in and awareness of environmentally safe products. Research on consumers' preferences showed that poor environmental consciousness could slow the greening process of the food industry.

Although the ecolabeling process in St. Petersburg is at the beginning stage, its developers hope it will be continued in the future.

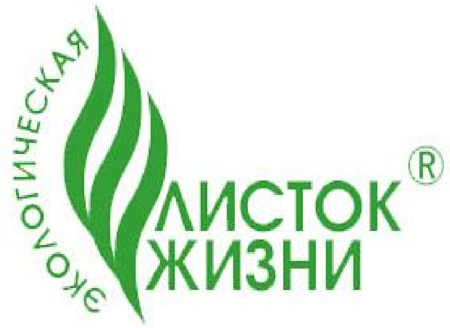

Figure 1. The St. Petersburg Ecolabel "The Life Leaf"

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Development of the Ecolabel Project in St. Petersburg

The Russian market only now is about to realize the potential of environmentally friendly products. Until recently there were no schemes for analyzing whether products were "green" or not. A national system of ecolabeling was introduced in 1999, based on ISO 14041 requirements. However, it was abandoned because of lack of interest and support on the part of industry and the public. Only in 2001 did this system begin operating again, when the St. Petersburg Ecological Union, with the support of the St. Petersburg Chamber of Commerce and Industry and the city administration, initiated a project to develop an ecolabeling scheme for food products. For the first time in the history of environmentally safe production, the "Life Leaf" ecolabel was introduced and officially registered as a trademark. Ecolabeling aims at establishing a public ecolabeling system as a procedure that can ensure that the special symbol is rewarded only to environmentally friendly products and goods.

Rationale for the ecolabeling project

Food and processing industries based in St. Petersburg are steadily increasing. In 2001, their contribution to the industrial output of the city reached 40%. The most significant sectors of the St. Petersburg agricultural industry complex (AIC) are beer and alcohol-free beverages (32%), tobacco (11%), baked goods (10.5%), fats and oils (8%), dairy (8%), and flour and cereals (6%). In 2001, the city's AIC output increased by 15% compared with 2000, nearly twice the average increase in Russia (8%). The AIC includes 86 large and medium-size companies that cover 23 branches of industry. About 25% of the food products come from small business. (Shirokov, 2002), and the number of small and medium-size companies is increasing rapidly. However, the new production facilities do not necessarily use new environmentally friendly technologies.

The city has continued cooperation with the Leningrad Oblast (Region) under an existing bilateral agreement. According to recently published data, the Leningrad Oblast sent 100% of its dairy and egg production to St. Petersburg, 70% of its poultry, 60% of its vegetables, and 30% of its potatoes. The retail market in 2001 was steady and sound, without any dramatic fluctuations. The domestic share of total food sales was 80%, and the local contribution in some sectors exceeded 50% (Petrov, 2002) The extent of market saturation with some commodities approached 100%, which may soon lead to sharp competition.

All arguments point to giving special emphasis to the quality of food produced, and the city government pays special attention to issues associated with environmental quality, which has become a keynote of the consumer market. Both consumers and producers face the challenge of the quality of food, especially regarding its environmental safety.

Though it may seem paradoxical, growing interest in environmental quality is a sign of economic well-being because it is in the developed countries that people pay attention to what they eat, drink, breathe and use. The founders of the St. Petersburg Ecological Union consider that environmentally friendly business could become a present-day reality, since the psychology of modern Russian consumers has changed in recent years. Now they are ready to buy even more expensive goods and foods in lower quantities but of better quality, more healthful and safe. Therefore, besides educational activities, the Union formulated its new challenge – to unite all the efforts and to link consumers' preferences with producers' readiness to satisfy them. (Gordyshevsky, 2002a).

Objectives of the program

Ecolabeling should comply with ISO 14024 requirements. One can get the label only by voluntarily submitting one's environmental and quality performance to a comprehensive evaluation. The procedure should be transparent and open to the public (Gordyshevsky, 2002b).

The objectives of the project are the same as those already established in different countries:

- providing for the product's safety at all stages of its life cycle
- suspension or stoppage of sales of products that do not fulfill the established environmental requirements
- help in selling goods with the best environmental characteristics
- evaluation of production waste from the point of view of its environmental safety and possibilities for further utilization.

There is another important feature that distinguishes the St. Petersburg project: the products' safety is considered in terms of both consumer health and environmental safety.

The following steps should be undertaken in the framework of the project:

- selecting a product category that responds to suggestions from industry, environmentalists, consumers, and other interested parties
- assessing the environmental impacts of products in the product category by life-cycle analysis (LCA)
- setting criteria and thresholds for awarding the ecolabel
- reviewing the product category and criteria.

Principal model for the organization of the ecolabeling project: the St. Petersburg Ecological Union and its role

The organization of a coordination system cannot be isolated from a discussion about how similar functions are organized at the European or even at the global level. It might be a bad strategy to develop too strong regional organizations at the federal level, when most companies want their products to be certified for a more global market. Certainly, a national body is needed. However, it is better to develop and operate a system with approval of validating institutions at the local level, where more knowledge about capacity, experience and companies' images exist in consulting companies.

Since 1991, the St. Petersburg Ecological Union has operated as a non-governmental organization. It was organized primarily as a union of environmental cooperatives, and in 2000 it became a not-for-profit and non-governmental organization. At first the Union was occupied mainly with information and educational activities. The next step was drafting and approving the "Ecology and Human Beings Program," aimed primarily at enhancing ecological culture through practical solution of specific tasks. Within that project the Union started working with companies oriented towards environmentally safe business, and it continues to look for ecologically oriented companies.

At the moment, in collaboration with the city administration and with the support of the St. Petersburg Chamber of Commerce and Industry, the Union is working on introducing the "Life Leaf" ecological label. The Union's role and functions within the project can be described as:

- ecolabeling program founder
- registration
- license submission and confirmation
- information and marketing.

The general principles in issuing a license to the companies are illustrated in Figures 2 and 3. By analogy with the procedures used in the certification of environmental management systems or environmental laboratories, the general principles in certification are as following:

1. The company issues a declaration and announces the product or product group that is supposed to be awarded the ecolabel (Figure 2).
2. The Union seeks an expert or organization that has relevant expertise and can develop a methodology for the ecolabeling.
3. The Advisory Board confirms the draft methodology if there are no amendments needed and all the parties have approved it. The Board consists of representatives of the city administration and its committee on natural resources, environmental protection and provision for ecological safety, as well as the St. Petersburg Chamber of Commerce and Industry and representatives of organizations involved, well-known academics, and experts.
4. When the methodology is available, the consultant is accredited to perform an evaluation of the production chain through a complete or partial LCA, and guarantees that the LCA meets the requirements or criteria listed in the methodology (Figure 3). This procedure is similar to that of an accredited laboratory that carries out chemical analyses and guarantees that the analyses were done according to specific standards.

Independent validation, i.e., the quality assurance procedure, is important in order to achieve high reliability of the environmental labeling scheme. ISO requirements include certification and accreditation as optional possibilities.

Accreditation and certification may be components in the quality assurance procedure of an environmental labeling project at the later stages, since in St. Petersburg there currently are no national accreditation organizations able to control certification processes in accordance with the ISO 14024 standard. Therefore, the certification of a Type III environmental declaration remains an option to increase the credibility of the ecolabeling scheme. A Type I ecolabeling program is currently being considered: a voluntary procedure undertaken by an independent third party that leads to the issuing of license confirming the organization or company’s right to put an ecolabel on its products or packaging. (See Bougherara and Grolleau [2003] in this volume for an explanation of Types I, II and III ecolabels.}

An example of an environmental labeling scheme development from St. Petersburg, including a description of the roles of the different parties involved, is presented at Figure 3. The figure illustrates three different levels for the organization of the ecolabeling project:

1. the technical level: the Technical Board provides technical conclusions about compliance of the declared product with the methodology.
2. the public level: agreement on acceptance by the interested parties is issued by the Advisory Board; interested parties include customers, users, relevant producers, branch organizations, authorities, etc.
3. the licensing level: awarding of the license to the company; periodic review of the company; reconfirmation every three years of the company’s right to ecolabel its products; reviewing of methodologies by the same institution.

St. Petersburg State University of Refrigeration and Food Technology and its role

St. Petersburg State University of Refrigeration and Food Technology plays the role of the methodology developer for food products. It was founded in 1931, and since then has become a leading institution in the field of food technology and engineering. Every year the university trains 5000 students in the following areas: heat and power engineering and energy efficiency; machinery and equipment; automation; food technology; biotechnology; microbiology; economics and business; industrial ecology; cryogenic machinery; air conditioning; and life support systems. The University consists of 32 departments and 6 faculties. The full-time faculty members and staff number 353; over 80% of the academics have advanced degrees and ranks, and more than 40 fellows are academicians, corresponding members or academic consultants of the International Academy of Refrigeration, the International Academy of Higher Education, the Engineering Academy or other scientific organizations.

Major topics of scientific research of the University are:

- intensification and optimization of processes, cycles and elements of equipment, aimed at energy and resource conservation in machinery and units of refrigerating, cryogenic and air conditioning systems
- thermodynamic, physical, mechanical and chemical properties of ecologically safe working substances and materials
- intensification of processes and technological equipment for agricultural and food enterprises and environmentally friendly food production
- processes and technologies of water desalination, concentration and purification of technological products in the food industry and agribusiness; cleaning and utilization of effluent and wastes
- social, political, economic and environmental problems of northwest Russia.

To increase the degree of independence, the development of ecolabeling methodology should be done by one organization or person and verification by another certified (or accredited) organization or person. Therefore, independent institutions such as environmental auditors and accredited environmental laboratories are needed. The accredited laboratories and certified experts from the St. Petersburg Chamber of Commerce and Industry take part in the ecolabeling project. Thus, the third party verification by an institution approved by the program developer will be realized.

Proposed Guiding Principles and Important Methodological Aspects of the Ecolabeling Project for Food Products

The general principles or requirements of the ISO standards should be followed as far as possible in the ecolabeling program. These standards guarantee that the same basic principles have been followed in the performance of the LCA for all product groups and service types, even though the standards allow certain flexibility, such as in the definition of system boundaries.

The work to prepare ecolabeling methodology for a product or service requires cooperation among manufacturers, importers and representatives of industry, branch organizations and other stakeholders. It is important that the work be coordinated at the city level to ensure a broad consensus in the relevant business sectors as well as to ensure objectivity, credibility and comparability of the methodology developed for certified products.

An important part of the ecolabeling procedure is data verification. The data requirement is provided by the methodology.

The leading principles for the ecolabeling project are as following:

- The methods used should be scientifically and technically valid.
- The data used should be appropriate and reasonable in relation to the goal of the study.
- The interpretations should reflect the limitation identified and the goal of the study.

The development of the methodology must be seen in light of the overall goal of a product-oriented environmental strategy: to strengthen competition among different producers based on eco-efficiency. This goal can be achieved by improving the access to suppliers' environmental data.

The criteria of ecolabeling must be based on estimates of the environmental impact at all stages of the product's life cycle. Careful study of life cycle stages permits us to define criteria for environmentally dangerous factors. If the quality of the goods corresponds to the established criteria, then the goods may carry an ecolabel.

The proposed elements of the scheme include:

- control of actual material flow, record-keeping, etc. at the production site.
- control and selection of data
- control and fulfillment of the general requirements of ecolabeling methodology.

Requirements for creating ecolabeling methodology for different product groups

Specific parts in a methodology for certified products may differ when comparing two products or services even within the same product group. Therefore, it may be necessary to prepare different methodologies from case to case. The term "product group" has been used to clarify that the requirements concern a group of products, not just a specific product.

Within the scheme, the experts from the St. Petersburg State University of Refrigeration and Food Technology began to elaborate the ecolabeling methodology for meat, baked goods and bottled drinking water. Thirteen environmental criteria were developed for evaluation of the environmental quality of meat products, from "less discharges of toxic and polluting substances into water, soil and air" to special sanitary requirements, to the production process, use of chemicals and sustainable farming.

The first experience with the method at a St. Petersburg meat processing plant involved the company's self-declaration to be awarded the ecolabel. The list of criteria for meat products and assessment of the of the company's compliance are shown in Table 1. The value of every criterion was determined on the basis of national standard requirements for conventional food product quality and environmental quality and safety. The overall score was calculated by multiplying the values of the listed criteria. To be awarded the ecolabel, the overall score should be as high as possible, and no less than 0.6. Despite the high conventional product quality, this producer could not guarantee the ecological quality of the product and therefore was not awarded an ecolabel. This example demonstrates that strict definition of ecolabeling criteria imposes technical limitations on a company even though it is strong with regard to conventional production criteria.

Consumers' Awareness and Ecolabeling Scheme Development

The successful implementation of an ecolabeling project depends not only on the readiness of producers to be rewarded with the ecolabel but also on consumers' interest in and awareness of environmentally safe products. Manufacture of ecologically safe products demands additional expenses for preventive actions and certification. As a result the price of "green" food can be considerably higher. Therefore, at the stage of production planning it is advisable to carry out preliminary marketing research: analyzing the market for ecologically safe products and studying consumers' preferences and their readiness to pay higher prices for additional ecological quality.

Studying consumers' attitudes towards environmentally safe baked goods

A pilot investigation of consumers' attitudes towards environmentally safe baked goods was undertaken as

Table 1. Criteria for the ecolabeling of meat products, and values assigned in one example.

Criterion	Identification	Value
Quality of raw material	C_1	1
Usage of nonfood waste	C_2	1
Production waste	C_3	1
Used chemical substances	C_4	0.8
Conditions of production	C_5	1
Emissions into the atmosphere	C_6	0.8
Fresh water consumption	C_7	1
Wastewater cleanup system	C_8	0.97
Energy use	C_9	0.88
Quality of end products	C_{10}	1
Packing	C_{11}	1
Sanitary and hygienic measures of the enterprise	C_{12}	1
Environmental information and education of the personnel	C_{13}	0.75
Overall Score	C_0	0.41

part of the ecolabeling project. The research method was based on a public opinion survey. The study had several aims: to determine how the maximum prices consumers were willing to pay for environmentally safe products was correlated with their family income, sex, and age; to evaluate consumers' understanding of the term "ecological quality" for products; and to learn consumers' preferences regarding information sources related to environmentally safe products.

The study was intended to test the following hypotheses:

- The segment of the population most prepared to pay more for environmentally safe products is people with high incomes, mainly middle-aged women with higher education.
- Consumers are not sufficiently ready for an increase in the price of ecolabeled products.
- Consumers do not know what the "ecological safety" of a product means, and associate it only with a product's quality and safety regarding health, i.e., with conventional food safety.

The data were collected using a specially prepared questionnaire. Visitors at a St. Petersburg supermarket and students at St. Petersburg State University of Refrigeration and Food Technology were chosen as respondents. Data from a sample of 150 people were used; therefore the research should be considered as a pilot study whose conclusions are only rough.

Results of the survey

The respondents' social-demographic characteristics are shown in Table 2. The relationship between the level of family income and readiness to purchase ecolabeled baked goods is shown in Figure 4.

The most active group of buyers – women up to 28 years old – are prepared to buy environmentally safe bread if its price is 5% higher than conventional bread, whereas men of the same age category are willing to pay much more under the same conditions (Figure 5).

For the largest group respondents (45%) the highest acceptable increase in the price of ecolabeled products is 5%, compared with about 12% prepared to purchase such products only if their prices do not increase (Table 3). There also is a segment of buyers (7% of all respondents) prepared to buy these products at any price. A total of 88% of respondents are prepared to pay at least 5% more for ecolabeled bread and other baked goods, in some cases considerably more: the 7% most environmentally concerned said they are prepared to buy such products at any prices.

The respondents were asked to choose from a list of characteristics the ones that in their opinion characterize ecologically safe production. The answers included both traditional quality characteristics and environmental ones. As seen in Table 4, two environmental aspects were not taken into account by at least half the participants: whether the packaging is biodegradable and whether harmful substances were formed during production. More than 50% of the respondents in each age group selected "safe for health" and "no toxic materials used in manufacture." Besides environmental quality characteristics, they also frequently mentioned characteristics related to traditional concepts of quality.

The research also aimed at revealing the best communication tools for "green" marketing. Respondents were asked to select their preferences from the most widespread sources of information:

- A special label on the package
- Advertising in the shop
- Mass media (newspapers, magazines, radio, TV)
- Poster advertising (e.g., on transport, highways).

Table 2. Social-demographic characteristics of respondents.

Characteristic	Respondents (%)
1. Sex	
Female	62
Male	38
2. Age	
Less than 28	61.6
28-40	12.8
over 40	25.6
3. Family Income, RUR/month	
Below 5,000	29.4
5,000 to 7,000	23.5
7,000 to 10,000	21.2
10,000 to 15,000	14.1
15,000 to 20,000	4.7
above 20,000	7.1
4. Level of Education	
Secondary school	17.7
Professional education	16.5
Higher education	65.8

Table 3. Consumers' acceptance of a price increase for ecolabeled baked goods.

Acceptable price increase	% of sample
None	12
5%	38
10%	22
20%	21
Any	7

The most informative sources for consumers of baked goods are a special label on the package (noted by 40% of respondents) and poster advertising (14%) (Table 5).

Summarizing the survey results, we conclude that:

- Respondents are not informed enough on ecologically safe production. They do not distinguish notions of environmental and conventional food quality. The predominance of the health and safety aspects seems clear.
- To attract consumer's attention to and demand for ecolabeled food requires raising the level of consumers' knowledge about ecological quality. A large-scale advertising and educational effort and special labels on packages are needed.
- The majority of respondents are not prepared to accept a price increase of more than 5% for environmental quality of food products, and a significant portion refuses to pay any higher price.
- Of women up to age 40, the largest group, regardless of income, agree to a price increase of only 5%, although they are the most active and informed segment of consumers. Therefore, the first hypothesis was not confirmed.
- 81% of consumers consider the acceptable price increase to be between 5% and 20%; only 7% are interested in purchasing "green" bakery products regardless of price, while price is the overriding consideration for 12%.

Conclusions

The objective of environmental labeling is to permit consumers to choose those goods that impose the least harm on the natural environment. It also is intended to stimulate producers to make environmentally safe products. Ecolabels could be considered a way to gain a "green advantage" in the market if there is a demand for such products among the consumers. Therefore, relevant educational programs for

Table 4. Respondents associating various characteristics with the notion "Environmental Quality of a Product."

Characteristic	Respondents (%)
1. Environmental Quality	
No harmful substances formed during manufacture	43.8
Safe for health	60.7
No toxic materials used in manufacture	58.4
Grain comes from environmentally clean areas	58.4
Biodegradable packaging	38.2
2. Conventional Quality	
Beneficial for health	51.7
High quality flour and water used	48.3
Does not contain preservatives and artificial additives	51.7
Does not contain genetically modified products	34.8
Tastier than other kinds	16.9

Table 5. Consumers' preferences regarding sources of information about ecolabeled products.

Information source	**Respondents preferring (%)**
Special label on package	40
Advertising at shop	9
Mass media	5
Poster advertising	14
Label + advertising at shop	9
Label + poster advertising	9
Label + mass media	5
Mass media + advertising in shop	9

the public are needed and a wide range of marketing tools should be used for promotion of "green" products.

One ecolabeling tool is a communication program involving advertising, public relations and stimulation of sales by means of information establishing the connection between the enterprise and its environment. As activities for environmental protection are costly for the industry, the price of the end product is higher; this places special requirements on companies' marketing policies. The advertising information should emphasize the strengths of "green" products.

More likely, producers could attract St. Petersburg consumers' attention to "green" products if they could guarantee strict standards for both conventional food quality and environmental protection. Thus they can protect the consumers' rights to healthy, safe and environmentally friendly food.

Although for many Russian companies environmental protection and prevention activities are costly, they also have a positive economic effect. Therefore, the ecological and the economic point of view can support each other in the ecolabel project.

One of the theoretical frameworks of the environmental management paradigm is that environmental management is a function of quality of produced goods. Therefore, environmental management could be promoted through ecolabeling, and implementation of the ecolabel project will help to reduce the environmental impact of the rapidly growing local food industry in the city.

Acknowledgements

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Shirokov, N. 2002. Petersburg AIC results and prospects. St. Petersburg in the Mirror 3(10, Spring):15

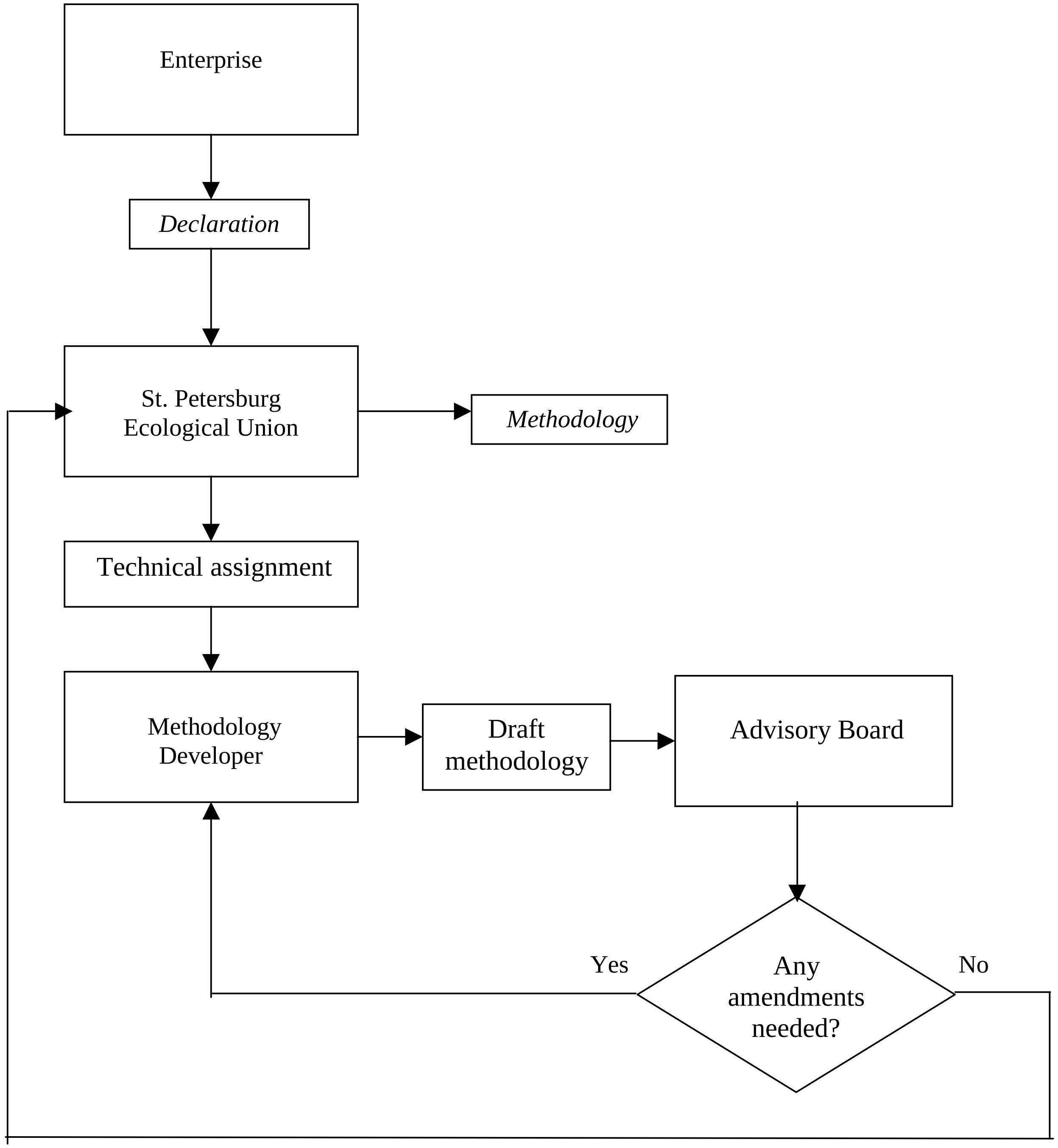
Enterprise
Declaration
St. Petersburg Ecological Union
Methodology
Technical assignment
Methodology Developer
Draft methodology
Advisory Board
Yes
Any amendments needed?
No

Figure 2. The roles of organizations involved in the development of the methdology (program) for certification of products to be marked by an ecolabel.

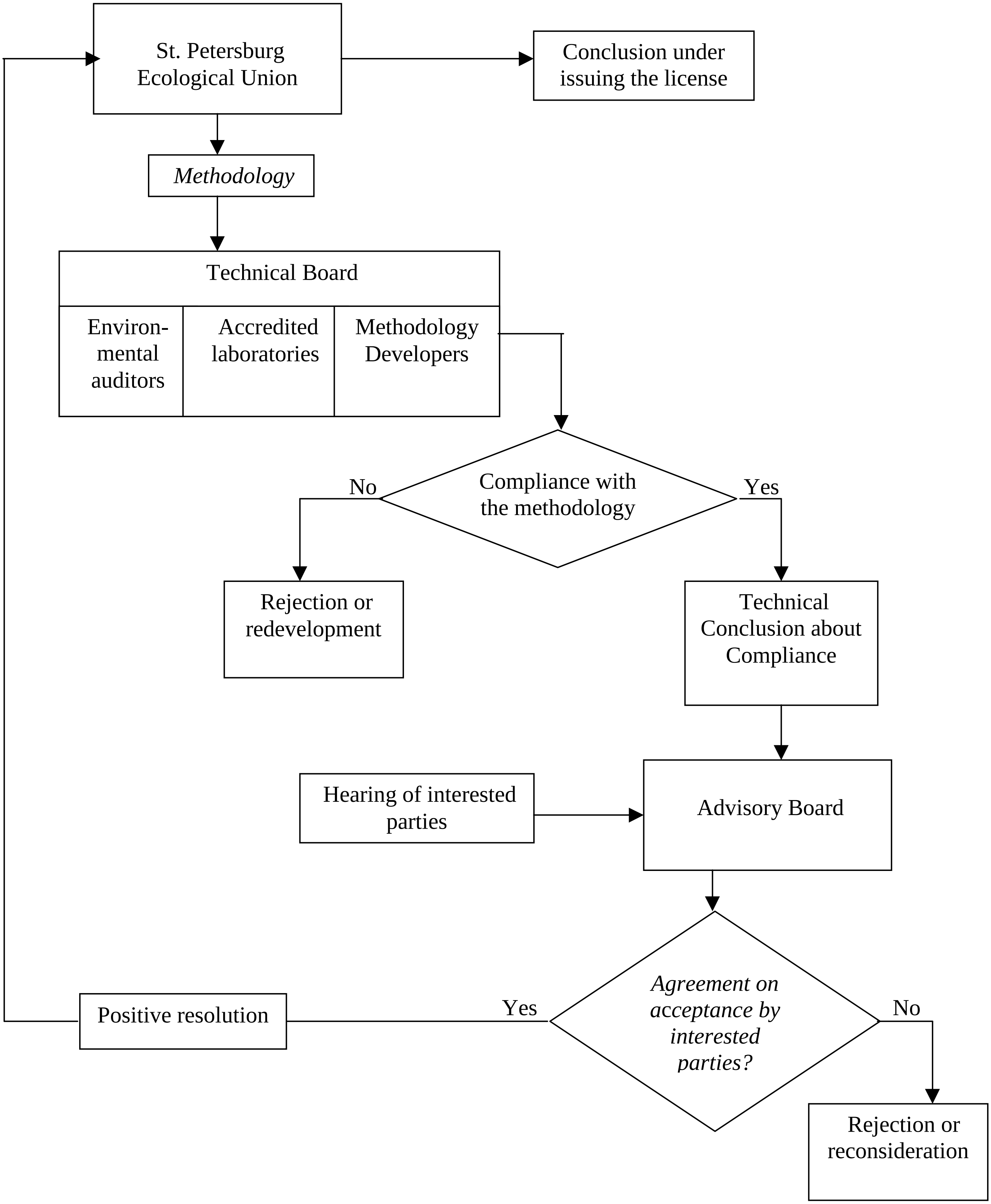
St. Petersburg Ecological Union
Conclusion under issuing the license
Methodology
Technical Board
Environ-mental auditors
Accredited laboratories
Methodology Developers
Compliance with the methodology
No
Yes
Rejection or redevelopment
Technical Conclusion about Compliance
Hearing of interested parties
Advisory Board
Agreement on acceptance by interested parties?
Yes
No
Positive resolution
Rejection or reconsideration

Figure 3. The roles of organizations involved in the procedure of ecolabeling.

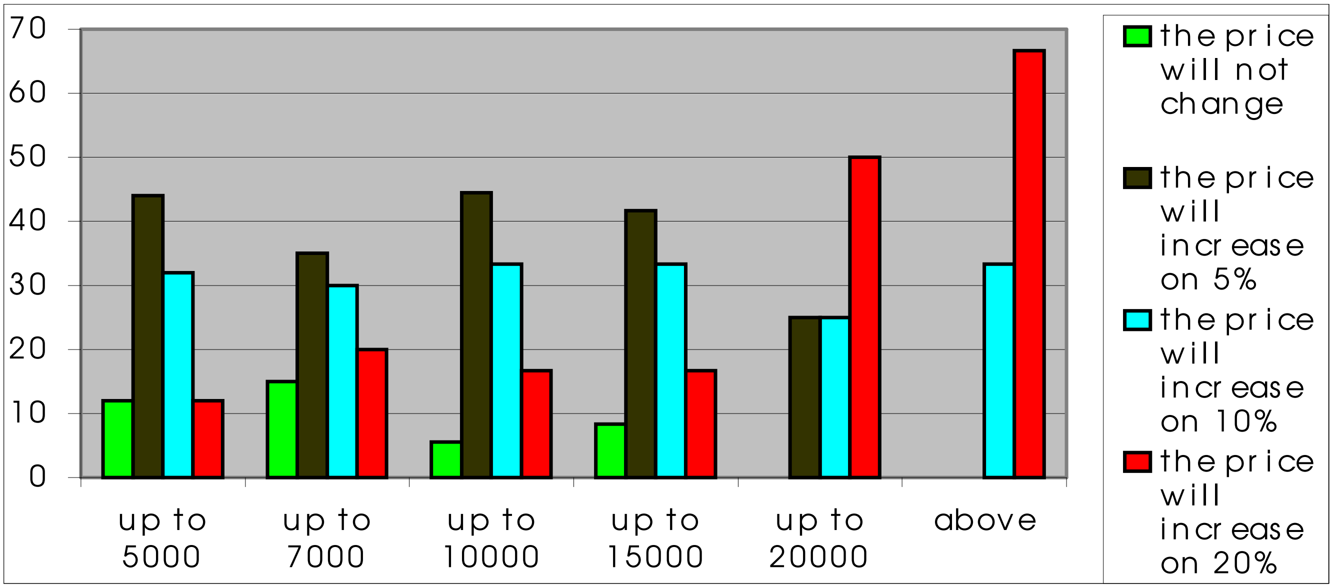

Figure 4. Relationship between level of family income and readiness to buy more expensive ecolabeled bakery goods.

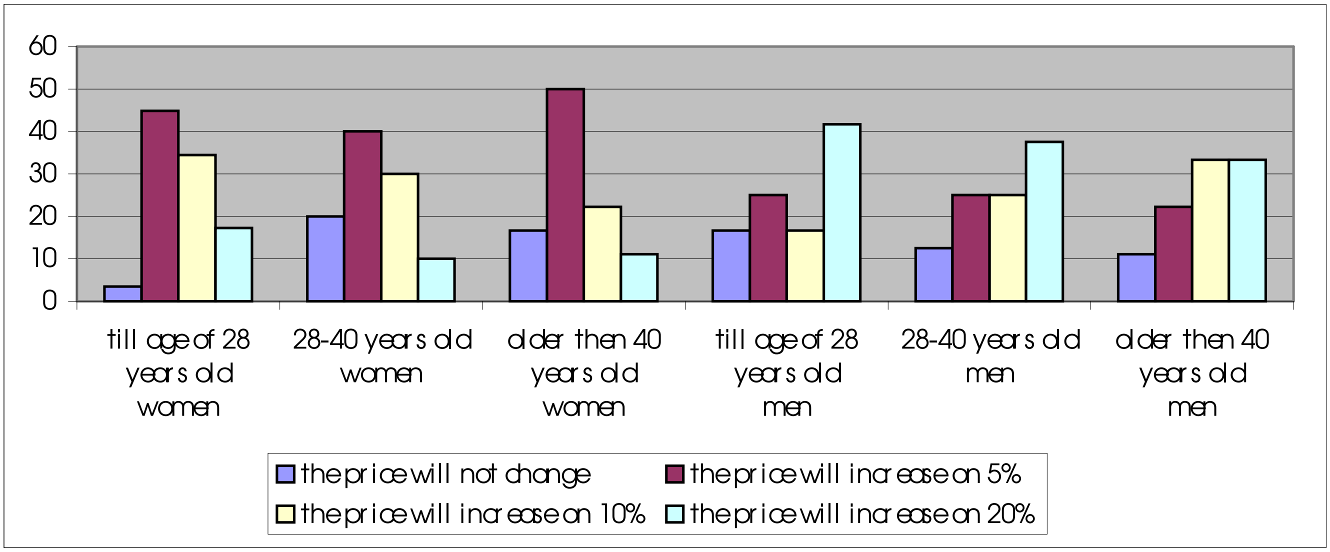

Figure 5. Relationship between sex-age characteristics and readiness for a price increase.

The Acceptance and Usefulness of the Term "Identity-Preserved" (I.P.) in the Sustainable Agriculture Community

Melissa Schafer[1]

"Identity Preservation" of grains is seen by the agricultural industry as the way of the future because of advances in agricultural production, processing, communication and marketing (Association of Official Seed Certifying Agencies, 1991; Narigon et al., 1991). The agricultural industry sees identity preservation as a way of meeting its customers' demands for specific end traits of grain. Farmers are signing contracts with agricultural corporations to grow identity-preserved grains because of the premium value they are offered for maintaining or preserving the "identity" or pureness of the crops at the farm level. Farmers also see identity preservation as an opportunity for diversifying or specializing their crops. Identity preservation of grains may allow both farmers and corporations to "market the farm" while also "farming the market" through the use of e-commerce. Because of the increase in the use of the Internet by farmers and corporations, it is now easier than ever before for buyers to find specific suppliers. Although the terms "Identity Preservation" and "I.P." are familiar to agricultural corporations and farmers, why is it that most consumers have never heard of the term? Also, why is it that the sustainable agriculture community has not adopted the use of this term for their food products more widely?

This paper will discuss what the term "Identity Preservation" or "I.P." means, who is using it, who benefits from it now, and who could in the future. It will also discuss the drawbacks of using the term "I.P." to market natural foods or sustainable agricultural products. Currently, identity-preserved food products are being sold, but few have the term "I.P." on their label. This paper will provide examples of products that use the term "I.P." on their labels, as well as those that are identity-preserved, but not labeled as such. This paper concludes that the sustainable agriculture community would be best served by identity preservation if it took a stand regarding whether it wants to use the term or wants to reject it altogether. Since the term is predominantly used by agricultural corporations that are not interested in sustainable agriculture, it might be in the sustainable agriculture community's best interest to chose not to use the term, so that consumers do not get confused about which products are grown using sustainable practices and which are not. The sustainable agriculture community could then market its own label with a different term, but that still fulfills the concept of identity preservation. This new label could be used in conjunction with other ecolabels, such as one for integrated pest management. One suggestion of a term that could be so used is "Quality Assured," (Q.A.) or "Quality Assured System," (Q.A.S.).

Identity Preservation (I.P.): The Term and the Concept

"Identity-preserved" grains are also called output trait grains, specialty, high value, premium or niche market grains. There is no universally accepted definition of "I.P." The term is primarily used by agricultural corporations and farmers to signify that a quality assurance program exists for the particular grain. The premium value that is earned from identity preservation is achieved through the successful fulfillment of one or more of these functions: demonstration of reliability of a product stream; meeting labeling requirements; maintenance of identity such as organic or non-genetically modified; and the control or capture of a value-added trait. Identity-preserved grains often are produced with a specific end use in mind, such as for human food, a specific kind of animal feed, or for cosmetics, pharmaceuticals, or industrial use. The value-added traits can either by physical, such as the size or color of the seed or hilum, or chemical, such as having a specific desirable content of protein, oil or sugar. The primary market for identity-preserved grains currently is large food processing companies that would like to use the new I.P. specialty oils because of features such as stability and functionality. Most identity-preserved grains currently being marketed are simply different varieties of federally subsidized commodities, particularly corn, soybeans, and wheat. Identity preservation is necessary for these specialty crops to keep them separate from the commodity varieties that do not earn a premium.

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Economic theory would predict that specialty items such as identity-preserved grains are only “special” when they are produced and sold in small amounts. Therefore, if any of the current identity-preserved grains were to be produced and sold in large enough amounts, they would no longer earn a premium, because competition leads to lower prices. According to economic theory, for a premium value to be obtained, new types of identity-preserved crops will continually need to be marketed, since eventually the current ones may become commonplace. In the future, these crops may not simply be different varieties of the current subsidized commodity grains. Instead they may be more exotic types of grains. In such a case, then farmers would be able to add these new crops to their rotations, resulting in a more sustainable agricultural system at the farm level. If there is enough demand for sustainable agriculture so that it is adopted to a large extent, then eventually it, too, will become commonplace. This is the ultimate goal of the supporters of sustainable agriculture. But even if most food is produced using sustainable practices, there would always be room for improvement. There will always be products that are “more sustainable” than the previous ones, and therefore there will always be a premium for these “new and improved” products.

A perfect example of the lifespan of an identity-preserved grain is high oil corn, one of the first identity-preserved grains to be grown under contract by farmers. High oil corn became so widely grown that it is hardly a specialty crop anymore, but nonetheless it is still identity-preserved, because it is stored separately from No. 2 yellow dent corn, the standard commodity grade. High oil corn is an example of a specialty crop that followed the law of declining profits, because so much is now produced that it no longer earns any significant premium. However, there currently is much more demand for identity-preserved grains than there is supply (Krawczyk, 1999). Examples of identity-preserved grains for human consumption are non-genetically modified corn and soybeans, tofu soybeans, blue corn, and white wheat (Freiberg, 1991a,b). The process of identity preservation will also be a requirement for all genetically modified pharmaceutical grains (Meagher, 1999*;* Schuff, 2002). Currently there are test plots in the U.S. growing genetically altered pharmaceutical corn, tobacco, barley, rice and sugarcane (APHIS, 2002).

Identity preservation of grains requires a systematic change involving the entire supply chain. Identity preservation is a quality assurance system that requires full traceability and transparency in the whole system. Documentation and auditing is done to ensure that the product is not contaminated at any level. The system starts either at the level of the seed company with the purity of the seed genetics or at the farm level, but is maintained all the way through transportation, storage, processing, to the shelf or to the end user. (This process is described in detail by Bullock et al., 2001.)

The term “I.P.,” meaning the “Identity Preservation” of a specific output trait in grains, is commonly used by the agricultural industry, but it is not familiar to consumers. Currently the sustainable agriculture community as a whole has not embraced the term, and it remains to be seen whether it ever will, or if the term will primarily still be used by agricultural corporations and farmers. The low level of acceptance of the term by the sustainable agriculture community may be due to the ambiguity of the term regarding whether I.P. grains are raised using sustainable practices.

The concept of “identity-preserved,” but not the term, is already being endorsed by the sustainable agriculture community as a market opportunity for family farmers to achieve a higher value for their products. Examples of products that use this concept are organic, hormone free, and free range. “Identity Preservation” is a broad, umbrella-like term, meaning it overlaps with terms such as organic. Organic can be thought of as fitting under the I.P. umbrella.

The Benefits of Identity Preservation

The sustainable agriculture community includes all the individuals and groups that are interested in sustainable agriculture, such as consumers, farmers, natural food companies, and sustainable agriculture organizations. Everyone should benefit from sustainable agriculture! Commodity-based agriculture is criticized for benefiting agricultural corporations and not the farmers or consumers. Another criticism of commodity agriculture made by the sustainable agriculture community is that because of the increase in mechanization and large corporate farming, there has been a homogenization of farming practices. As a result, the individual knowledge each farmer possesses about his land and how to grow best on it is being devalued and even lost. The industrialization of farming has been criticized because of the resulting deskilling of farmers. Now many farmers are not much more than appendages of the machines they use, without any special knowledge of their land. Identity preservation of grains is a possible avenue for family farmers to get off the technology and production treadmill that leads to the ever-increasing expansion of farms and expensive technology. Instead of following the "get larger or get out" motto, farmers can instead focus on identity-preserved crops that demand less land because of their premium prices. Thus, identity preservation is a way for family farmers to stay in farming and to prevent the deskilling of farmers.

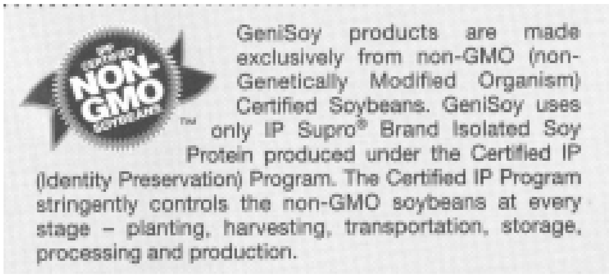
Identity preservation of grains has the potential to provide family farmers with a more equitable return for their production and to provide corporations and consumers with greater knowledge and trust of the quality of their product. Identity preservation is also a way to convert to a more sustainable form of agriculture, since many of the I.P grains are organic and non-genetically modified. In addition, identity preservation makes it possible for family farmers to convert to the use of sustainable agricultural practices by adding crops to their current rotations. Currently there is little incentive for many farmers to grow crops that are not subsidized by the government. However, since identity-preserved crops earn a premium, farmers may chose to diversify their crop rotations with identity-preserved crops that are not currently subsidized, such as oats. Increasing the number of crops in the rotation benefits the soil and prevents disease outbreaks; therefore, it is one of many sustainable agricultural practices.

The Term "I.P." on Food Labels

Currently there are very few food products that consumers can find easily on supermarket shelves that use the term "I.P." on their labels. However other products are being sold that fulfill the concept of "identity-preserved" even if they do not use the term on their labels.

The natural foods brand GeniSoy uses the term I.P. on its food products' labels. GeniSoy was one of the first companies to market its products as identity-preserved nationally at major grocery store chains and natural food stores. GeniSoy makes various types of soy protein products, such as soy protein shake powders, soy protein bars, soy nuts, and soy cakes, which are similar to the more common rice cakes. Although GeniSoy uses the term "I.P." to market its products, not all the labels define the term or explain why it is important to the consumer. GeniSoy's protein shake is the only one that defines the term I.P. The protein shake powder comes in a canister, and on both the front and the back sides the term "I.P." is used. On the front there is a symbol representing a seal that states "IPP Certified Non-GMO Soybeans^{TM}", and on the back there is a smaller version of the same seal (Figure 1).

Figure 1: GeniSoy Protein Shake Powder label.



GeniSoy products are made exclusively from non-GMO (non-Genetically Modified Organism) Certified Soybeans. GeniSoy uses only IP Supro® Brand Isolated Soy Protein produced under the Certified IP (Identity Preservation) Program. The Certified IP Program stringently controls the non-GMO soybeans at every stage – planting, harvesting, transportation, storage, processing and production.

In addition, on the GeniSoy Protein Shake Powder label, the first ingredient is listed as: "IP SUPRO Brand Isolated Soy Protein." The GeniSoy Soy Nuts! also have the same type of I.P. seal as the protein shakes, but the text is as follows: "Certified IPP Identity Preservation Program^{TM}" and the first ingredient in the list is stated simply as "IP Soybeans." The soy protein bars do not have the I.P. seal, most likely because of the smaller size of the packaging, but they also include the term "I.P." in their list of ingredients.

The natural foods chain Whole Foods also sells a soy protein powder that competes with GeniSoy's product. The container is identical in size to GeniSoy's, and also uses the term "I.P." On the front it has the following phrase above the title of the product: "Certified IPP Non-GMO" and the first ingredient under the list of ingredients is: "IPP SUPRO^{R} NON-GMO soy protein isolate." However, there is no description on the Whole Foods soy protein shake package explaining what the term "I.P.P." means. Nowhere on the package does it even state the full name "Identity Preserved Program" as on the GeniSoy packages.

Instead, the Whole Food package emphasizes several times that the product is "NON-GMO" and uses the term "Non-GMO" as part of the name of product. Under the directions it states: "Blend one heaping scoop … of NON-GMO Soy Protein Powder mix." Under the nutritional claim it states that "each serving of NON-GMO Soy Protein Powder provides 24 grams of soy protein." Clearly, Whole Foods is not emphasizing the fact that its product is identity-preserved, but instead that it is non-genetically modified. This makes sense, given that most consumers do not know what the term “I.P.” means. In contrast, consumers who would buy this product are likely to be aware of what genetically modified foods are and thus might want to buy a product that is non-genetically modified.

The term “Identity preservation” as such does not say anything about whether a product is or is not genetically modified. It simply is a quality assurance program. The products mentioned above are examples of how the term “I.P.” can be used on food products for consumers, but in these particular cases only conveyed that the products were non-genetically modified. Some members of the sustainable agriculture community could argue that these products are only moderately following sustainable agriculture practices, since they are not certified organic. However, they are non-genetically modified, and so are a step in the direction of sustainable agriculture.

Identity-Preserved Food Products with No I.P. Label

All certified organic products are identity-preserved, but currently no organic products are labeled as “I.P. Organic.” Organic products are identity-preserved because they are channeled into a separate product stream from non-organic products. This channeling starts at the farm level and continues throughout the transportation and processing stages, until the product finally reaches its end user or the market shelf. To label organic products as “I.P. Organic” would be redundant, because the term “organic” already implies separation, traceability and purity. Even though organic products do not use the term I.P. on their labels, there are some products that market their products using the identity-preserved concept. One such product is EdenSoy’s Organic Soymilk. On the back of the package it states: “Meticulous tracking and audited records guarantee the purity of this food from the farm to your table.” This explanation is identical to the type of explanation found on the GeniSoy package that explained what the Identity Preserved Program meant for its soy protein shake.

Low saturated fat soy oil is another product that is identity-preserved, but not labeled as such. Currently Hy-Vee, a Midwest grocery store chain, sells Low Saturated Fat Soy Oil under its private label called Grand Selections. Nowhere on the package does it say anything about the product being identity-preserved. The label looks essentially like any other cooking oil package except for the statement that it only contains one gram of saturated fat per serving, but it has no other health claims. From simply reading the label no customer would ever know the history of the development of this special oil. It received a lot of press coverage because its supply chain was viewed as a model for university-industry partnerships in new food product innovation and marketing. King (2000) uses the development of LoSatSoy$^{\text{TM}}$ oil as a case study on how to develop a value-added supply chain. Iowa State University developed LoSatSoy, the variety of soybean that the oil is made from. The Pioneer Hi-Bred seed company has a non-exclusive license for developing and marketing high-yielding varieties. Farmers sign contracts with elevators that will purchase the identity-preserved products. The soybeans are then sent to the crusher, the oil then is sent to the refinery, and finally the refiner sells the oil to a distributor. The distributor sells the low saturated fat oil to normal supermarkets chains such as Hy-Vee. There is nothing about this product that makes it a sustainable agriculture product, other than it is most likely being grown by some family farmers; the agricultural practices to grow the soybeans are no different from those of commodity soybeans.

Disadvantages of Using the Term “I.P.”

Although the future is bound to require identity preservation of grains, there are problems with the reliability of the current identity preservation systems and the current use of the term “I.P.” Although there are many benefits to identity preservation, it would be misleading to use the term “I.P.” synonymously with sustainable agriculture. Even though identity-preserved grains can be grown using sustainable agricultural practices, not all of them are. High oil corn is an example of an identity-preserved grains that differs from commodity corn only in its higher oil content. The production practices as are used to produce high oil corn are the same as those used to produce commodity corn, including chemical pesticides, fertilizers and monoculture. Thus, the production of identity-preserved grains may involve practices that are not sustainable. Also, some identity-preserved grains may use genetically modified seed, which most sustainable agriculture groups oppose.

Even more extreme, not only are some identity-preserved crops genetically modified for the purpose of ease in production and processing, but they may even be genetically modified to produce pharmaceutical compounds. When crops such as corn and soybeans are genetically engineered to contain pharmaceutical compounds, it is called “pharming.” This is strongly opposed by sustainable agriculture groups because of the risk of genetic contamination of food crops and other plants.

Major failures in the grain separation system have occurred in recent years. This has sparked interest in identity preservation systems for grains. The first major contamination occurred when StarLink corn contaminated corn for human consumption in 2000. Again in November, 2002, “volunteer” corn grown for pharmaceutical use contaminated commodity soybeans grown in the same field. This resulted from just one plant of genetically modified pharmaceutical corn being ground up in the combine when the soybeans were harvested, which meant that 500,000 bushels of soybeans had to be quarantined (Brasher, 2002). Even though the USDA was monitoring the identity preservation process, this major mistake still occurred, resulting in members of the agricultural industry arguing that pharmaceutical crops should be grown far away from food crops to prevent any contamination (Brasher, 2002). The sustainable agriculture community demands even stronger restrictions on these products – outright banning of genetically modified pharmaceutical crops.

Another drawback to using the term I.P. is that although it is possible to use more than one label on food products, it might confuse consumers if there are multiple labeling systems on the same product. The term I.P. also overlaps with some existing label terms that also have traceability requirements. One such example is the organic label. Examples of other ecolabels that could be combined with the term I.P. are integrated pest management (I.P.M.) and biodynamic. However, the term “I.P.I.P.M.,” standing for identity-preserved integrated pest management, may be too long for marketing purposes. One potential problem with the term I.P. is that it might not be “catchy” enough for marketing purposes and that people may not remember what the abbreviation stands for. In the agricultural industry itself and in other industries using patents, “I.P.” also means “Intellectual Property.” In the computer industry “I.P.” means Internet Protocol. Although there is no likely reason to confuse an acronym used in the context of computers with those for food, it is possible that since “Intellectual Property” is often used in reference to genetically modified foods, this could confuse consumers.

There are also some significant barriers at the farm level preventing the adoption of identity-preserved grains by farmers. The tolerances for genetic contamination of I.P. crops by other crops are very difficult to meet because they are set so low. The farm journal *Successful Farming* discussed the difficulties of meeting these tolerances and how they are leading farmers to become frustrated and lose interest (Holmberg, 2001). It is especially difficult to have low levels of contamination in I.P. corn crops because corn is an open pollinated crop and pollen drift from neighboring fields can easily contaminate I.P. corn. There is also a risk of contamination when the same combine is used to harvest I.P. crops and non-I.P. crops. It is very difficult to clean a combine thoroughly and it is too expensive for most farmers to own more than one.

Conclusion

Identity-preserved crops are seen by the agricultural industry as the next generation of crops, because they fulfill end users’ and consumers’ demand more closely than does the current commodity grain system. The sustainable agriculture community as a whole needs to become more aware of the meaning and the use of the term I.P. Then the sustainable agriculture community needs to take a stand and decide either to adopt the term “I.P.” into its their current labeling systems or to reject it. The primary reason for rejecting the term is that it originated with agricultural corporations that are not interested in sustainable agricultural practices; the sustainable agriculture community does not want to use a term that does not fit with its values.

However, this does not mean that the concept of identity preservation is flawed. Even if products embody the concept of identity preservation, they do not all need to be labeled as such. Since there are so many types of identity-preserved products, it might be in the sustainable agriculture community’s best interest to create a label that is based on the concept but uses a different term to distinguish the products of sustainable agriculture. It is essential, though, that the sustainable agricultural community publicize the differences between the new label and the original “I.P.” term used by agricultural corporations so that consumers are aware that the new term is only used for products that are both identity-preserved *and* sustainable. Therefore, the new term should never be allowed to be used for products that fall under the domain of the agricultural industry’s term “I.P.” such as non-food products, products for industrial or feed purposes, and genetically modified food.

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Linking Producer and Consumer: Rewarding “More Than Purely Price” Values in the Marketplace

Cathy Rozel Farnworth[1]

While social labels necessarily need to be simple in order to appeal to busy yet concerned consumers, they also need to articulate some kind of truth. This can be established by linking them directly to the producer’s well-being via a quality of life index, and second, by deciphering the ethical standpoints of consumers and then working with them to provide a label consistent with such views. This will enable consumers to act in the real world in line with their ethical reasoning. The focus throughout this paper is on social labels attached to organic produce. The context is that of northern consumers purchasing goods from the global South.

The paper is divided into six parts. The first introduces the main themes. The second discusses alternative ways of arriving at satisfactory social standards. The paper then moves from general discussion to my on-going research in Madagascar and Germany. The research approach adopted is presented briefly in part three while the research itself and its implications are discussed in parts four and five. The final section seeks to draw the various strands together.

Part One: Linking Social Labels and Social Standards

Social labeling is a means of providing consumers with information on the well-being of the producer by including these details as part of the packaging, or via other channels of communication such as the Internet. It is not quite the same as fair trade labeling, which is marketed to the consumer as a means of ensuring that a “fair price” is paid to the producers for their goods. Although fair prices also form part of social labeling, “more than purely price” values (i.e., nonfinancial and nonmarket) are given explicit weight in social labeling initiatives. Browne et al. (2000, p. 70) concur that fair trade labeling is not rich enough as a concept and suggest that ethical trading (with which social labeling may be aligned) embraces the idea of sustainable resource management as well as fair trade agreements and safe working conditions. Clearly, though, the boundaries can be blurred in practice: some “fair trade” organizations specifically choose to work with democratically run cooperatives and may apply other ethical criteria. Equal Exchange (*www.equalexchange.com*), the USA’s first fair trade tea and coffee company, is an example. However the chief focus remains upon financial fairness.

A social label must be simple to appeal to the consumer, yet behind it will lie a world of deep complexity. Its sole aim must be to enable consumers to act in line with their ethical reasoning. Yet to achieve this means establishing transparency all along the food chain, ensuring accountability, and most profoundly, providing the certainty that consumers, through their purchases, indeed are helping the producers create the world they seek – or, at the least, not actively harming the producers’ ability to do so.

There are further complexities to be considered regarding social labels, in particular that they represent one party to another party. In this they differ from other popular contemporary efforts to relink producer and consumer, such as farmers’ markets, in which different parties to the partnership can meet and talk.

In the case under consideration, in which the producers live in the global South and the consumers in the global North, direct personal contact clearly is not feasible. Social labels are therefore artifacts designed for consumer consumption. This is significant in terms of the balance of power it implies: actual decision-making power rests with the consumer on the basis of information given about the producer. This point raises complex and difficult questions of representation, only one of which can be discussed in this paper. This aspect, that of verification of claims, is discussed in the next section.

Part Two: Overview of Social Standards in Organic Agriculture

Social labels must draw upon verifiable social standards for their legitimacy. To date, however, no compulsory procedures exist to verify whether social standards have been met in the organic production

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process, although some groups, such as RAFI (Rural Advancement Foundation International), IFOAM (International Federation of Organic Agriculture Movements) and the UK-based Soil Association, are now seeking ways to meet this deficit.[1] A few private initiatives exist; for instance Rapunzel, a German fair trade food company, has set up a scheme entitled "Hand-in-Hand."[2] Such independently realized approaches can usefully inform efforts to bring social certification into the mainstream of organic agriculture.

Yet there is a potential mess in the making. The kind of farming envisaged by the actors who devised currently prevailing organic certification procedures is viewed by many farmers, particularly those in the global South, to be irrelevant to local conditions and, in essence, an imposition (Harris et al., 2001). Particularly from smallholders and some NGOs, the call is for bottom-up organic certification procedures that embrace locality, yet can be agreed to be part of the organic vision by a wide range of stakeholders.

Although compulsory social certification procedures remain to be framed and adopted by the mainstream organic world, the risk is high that such procedures will similarly be developed without real participation by producers. As such they may become a burden to smallholders and plantation workers, rather than representing a means of not only measuring, but also enhancing, well-being.

Devising social standards: how to proceed?

There are two ways to approach this conundrum. One way is to raise best practice standards across the board (such as a nationally applicable minimum wage set by the government for agricultural wage laborers). Such nationally adopted standards would necessarily have to met by all players.[3]

A second way is to certify best practice; here two strategies might be identified. One is to appeal to well-established internationally recognized standards, for example regarding codes of labor practice,[4] or to develop codes in situations where these do not already exist: IFOAM is in the process of developing codes of conduct for organic traders, for example. For the purposes of discussion, let us call these "hard standards."

The other strategy to enable best practice to be rewarded demands recourse not to external standards, but to those *defined and set by the producer community itself*. This is the approach discussed at length in this paper, since it raises several issues and takes the debate around certification into new ground. Standards derived from such a strategy can be called "soft." Table 1 compares the two strategies.

Devising social standards: the "soft standards" approach

The soft standards approach does not exclude the hard standards approach, but rather should be understood as complementing it. However, it differs in important and substantive ways because of its qualitatively different emphases in terms of content and process:

- The focus is on recognizing and supporting what local people value; there is an explicit recognition of the value of otherness/diversity. This is important because the fear is very real that an undue focus on "standardization" (via organic and social certification) in the organic world may unwittingly contribute to the erosion of local knowledge, local understandings of well-being, and those things precious to particular people and communities. In other words, the negative rather than the positive trends of globalization may be strengthened through the application of standardized measures.

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[1] Sligh and Mandelbaum (2003) describe RAFI's ongoing efforts with others on social stewardship standards in sustainable and organic agriculture. For more details on the other initiatives visit *www.ifoam.org* and *www.soilassociation.org*

[2] *www.rapunzel.de* (currently in German, site in English to be made available soon). Contact Rapunzel directly for details of "Hand in Hand" by using the contacts link on their website.

[3] It is worth considering best practice with respect to product quality in order to draw useful comparative data. National/international standards: in the European Union, "maximum permitted pesticide residues" in food are now effectively at zero for most active ingredients. Voluntary schemes: Benbrook (2003, this volume) contends that pesticide residues in the US pose "tough challenges" for ecolabeling programs.

[4] There is an array of such codes that share common ground, for instance ICFTU/ITS Basic Code of Labour Practice; the Social Accountability International SA 8000 Code; the Base Code adopted by the Ethical Trading Initiative and the Model Code of Labour Practices for the Apparel Industry adopted by the Clean Clothes Campaign.

- Such soft standards are rooted in the "felt and experienced world" of the producer, and this is the basis of their legitimacy.[1]
- Although financial fairness might emerge as a significant quality of life issue, the soft standards approach provides a vehicle to enable other "more than purely money" values to emerge easily, given the shift in focus.
- Not only the content but also the process of deriving soft standards is very different from that of hard standards. The producers themselves are involved in mapping and capturing their values, and they work to set the standards to which they aspire. The mechanism of a quality of life index is suitable, given that quality of life indexes are in widespread use and can be simple to use.

The involvement of other stakeholders at particular stages of the process is important (though careful attention needs to be paid to the constellation of power with respect to forming and taking decisions at any one time). Such involvement is required because the active participation of particular stakeholders will be necessary for certain aspects of a local vision to be realized. For example, if plantation workers want literacy classes, this can occur only if the management permits them to have time off, and perhaps arranges for such courses on site. Similarly, if smallholders are concerned about take-up of their produce, then traders will need to consider extending purchase guarantees.

Two things are important to bear in mind. First, since change in local concepts of well-being is certainly continual, and aspirations will feature strongly, such soft standards will need to be revised from time to time. Second, soft standards can also include tougher, more "objective" standards with regard to particular thresholds, for instance in health, below which human beings cannot be considered as living a "dignified life" (as discussed further in part five).

Part Three: Research Approach

Although the theoretical considerations might be complex, the task itself – that of devising a way to create and capture soft standards and then to weave these into a social label – dare not be difficult. Rather, simplicity is the goal, since a complex approach would not find any takers. The aims of my particular undertaking are therefore to contribute to the debate in two ways:

- by developing a "quality of life toolkit" flexible enough to be used anywhere, specific enough to produce unique meaning in a particular situation, and yet universal enough for the results to be understood and operationalized by other stakeholders, such as large organic retailers sourcing from small farmers; such a toolkit should be able to answer the questions: "Does involvement in producing certified organic goods bring about positive change in the lives of women and men producers? How can we know this?"
- by permitting the findings to flow into work centering on the development of "quality of life" criteria that can be attached to organic produce in the form of social labels; since the criteria need to be relevant to consumers as well as producers, consumer values need to be incorporated.

The undertaking faces a number of challenges: relevance to the actors/stakeholders involved; the ability to follow the unexpected while retaining the bounded objectives of the undertaking, and the acceptance and management of divergence and difference within a framework of coherence.

Furthermore, it is essential to be able to knit the producers and consumers together through using an iterative methodological framework. Such a framework is shown below in Figure 1.

Part Four: Work in Progress in Madagascar

Quality of Life Index: theoretical overview

How can we ascertain quality of life? Over the years there have been many attempts, including measuring gross domestic product, devising genuine progress indicators, a women's empowerment measure, and the human development index (see Murray, 1991; Hamilton, 1999; Neumayer, 2000; Kabeer, 2000 for comments). Work has also been done at the micro-level. Nazarea et al. (1998) aimed to correct the biases, as they saw it, of most mainstream development projects in the Philippines by measuring the target population's internally defined standards, many of which turned out to be qualitative, nonmonetary, nonmaterial, and long-term. Gender, age and ethnicity of the respondents significantly structured the responses.

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[1] The literature on localization is very extensive, and no adequate overview can be provided here. Cooper (1992) urges that we view the environment not as something that a creature or a human is merely *in*, but something that it *has*. That is, it has an intentional relationship to the environment. The environment thus forms a "field of significance" unique to that being. Further, items within that environment point to one another, thereby forming a network of meanings. It is this kind of uniqueness that we are considering here. Dauncey (1986), Shiva (1992) and Norton (1992) are also worth consulting.

Eckermann (2000), in a study of the Australian health sector, discusses the seemingly puzzling discrepancies between objective conditions of well-being and subjective perceptions. Eating disorders, high rates of suicide, and drug abuse among people having all the objective conditions necessary for "good health" point to the reality of people feeling deeply unhappy with the way the world is organized. She concludes that quality of life indicators need to reflect people's lived experience more accurately, which can only be achieved by abandoning universalistic assumptions. These and other studies (see Shepherd, 1995; Farlinger, 1996; Ahluwalia, 1997; Richmond et al., 2000) demonstrate that subjective perceptions of well-being sometimes have little to do with the provision of "objective" conditions of well-being.

However there are two frameworks, the functionings framework devised by Sen (1985 in Saith and Harriss-White, 1998) and the capabilities framework devised by Nussbaum (2000), that plead the need to assess basic levels of functioning and capability according to indicators everyone may agree are valid, below which truly human living is not possible. The functionings framework argues that it is not possession of a commodity or the utility it provides that is a proxy for well-being, but rather what the person actually succeeds in doing with that commodity and its characteristics. Saith and Harris-White (1998) use Sen's framework to discuss three basic functionings: being healthy, being nourished, and being educated. They assert that in developing countries, gender differentials may exist even at the level of such basic functionings. Their assumptions are first, that these three functionings are so elementary as to be necessary for well-being, and second, that a differential in any one of these functionings is assumed to result in a differential in well-being.

Nussbaum's capabilities framework is philosophical in tenor and promotes a cross-cultural normative account of human capabilities. This approach asserts that there should be basic constitutional principles respected and implemented by all governments. Such principles should focus on human capabilities, that is, what people are actually able to do and to be, in a way informed by an intuitive idea of a life that is worthy of the dignity of a human being.

Acknowledging the validity of all these insights made by researchers seeking to understand and measure well-being suggests that a quality of life index capable of eliciting subjective perceptions and also levels of basic functioning and capability could be very powerful.

Quality of Life Index: fieldwork in Madagascar and indicative findings

In collaboration with three Malagasy researchers familiar with participatory and other methods, I worked at two sites in 2001 on the rainy and fertile east coast. All work was carried out in Malagasy and translated into French. Attention was paid to gender issues throughout, since countless studies show that women and men react to, and shape, situations differently.[1] In the field this meant that women and men were usually interviewed separately on the same topic in amenable contexts, by a researcher of the same gender and at convenient times. Later, during the analysis and interpretation stages, data remained disaggregated by gender.

Research commenced with smallholder organic farmers in an isolated region near Brickaville. They harvest plantation and wild-sown cinnamon for Phaelflor, a small private Malagasy-owned organic company exporting essential oils to the USA and Europe. First order distillation of the cinnamon oil takes place locally, with further refinement in the capital Antananarivo. This endeavor is supported by the US Agency for International Development, since it is seen as a way of preserving important forest biodiversity by encouraging economic use of the buffer zone between the forest and farmland. Research continued with plantation workers at Plantation MonDésir, which is located close to urban centers and tourist resorts. This plantation produces organic oils, spices and black pepper chiefly for use in European pharmaceutical and charcuterie industries.

The findings did not resolve themselves neatly into a clear pattern. However distinct – sometimes complementary, sometimes contradictory – themes emerged as fieldwork progressed. I have identified the following clusters:

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[1] One such study examines the way women and men entrepreneurs reacted differently to the opportunities provided by cultivating organic crops for export in Uganda. See Kasente et al. (2000).

- the ways in which the respondents sought to achieve security in the context of chronic insecurity (for instance through land ownership or the possession of cattle)
- respondents' interest in upward mobility (through running a business, for example)
- a sense of "entitlement" among respondents (e.g., to basic literacy or affordable health care)
- affirmation of local values by respondents in a situation where such values are seen to be increasingly under attack due to a generally perceived worsening economic macro-climate and the promotion of entrepreneurial values by government and NGOs (respondents resist by promoting food self-sufficiency and rejecting wage labor in favor of personal independence, for example, even though this restricts cash income)
- methods the respondents used to manage the complexity of their lives. For example, both men and women plantation workers found their lives constrained by "clock time" – *de rigeur* at the plantation. This seriously limited their ability to accommodate other polycyclic rhythms governing their existence: the agricultural year, pregnancy, festivals, cooking, and childcare. Research showed that they developed many strategies to manage the complexity of their world.

Land and zebu cattle were seen by all as playing a central role in the achievement of well-being by virtue of the economic stability and cultural recognition they conferred, yet neither was in reach of the plantation workers. The research demonstrated that other culturally specific concepts of well-being could be discerned, some of which were highly personalized in expression, others more clearly structured by variables such as age and gender.

For the Malagasy respondents, well-being clearly was neither a unitary concept nor an end-state. Rather, it is constantly being achieved, it is in a process of becoming. As the situation changes, so do the strategies aiming to define and achieve well-being. Though local concepts of well-being are in flux, they are closely aligned with the particular circumstances prevailing in the research areas. The cultural expression of well-being in the local Malagasy culture is intertwined with multiple influences coming from elsewhere. (For a presentation of the findings, without analysis, see the two working papers [in French] by Farnworth et al. (2002a,b), available at *www.lbutv.slu.se/Publ./publications.htm.*

Quality of Life Index: next steps

The next step involves developing indicators with the respondents. The outcomes would have to be respected by other stakeholders in the process in order to enable their realization. Of course a "reality check" would also need to be built in, probably on the basis of a rights and responsibilities framework.

An interesting way to proceed might be to establish panels of producers, consumers and traders (and, if relevant, plantation owners) to discuss proposals put forward by a producer community to improve quality of life. Panel members, depending on their function in a particular process, would then commit to help realizing particular proposals.[1] Indicators would be established to enable progress to be measured against the baseline data provided by the quality of life index. A time frame would be essential. Details of these on-going strategies to improve local quality of life could appear directly on a social label attached, for instance, to organic coffee (which could be revised annually), or be made available on the Internet and updated regularly.

In the Malagasy case, basic literacy was much desired by the majority of adult respondents, particularly women, to reduce their fears of being exploited by literate people and to enable them to help their children with homework. They thought that classes could be established to enable a certain level of literacy to be attained.

Indebtedness was another great concern: some ideas among many suggested by the plantation workers to overcome food and financial shortfall included requesting the plantation owners to establish a rice bank, to which they could sell rice in times of plenty and buy back in times of need at the same price; education in chicken rearing[2] and a small facility to enable the processing of litchis and other fruits to give them higher market value. Rather than directly trying to establish an indicator with respect to changes in levels of indebtedness, proxy indicators could be established, such as level of usage of the rice bank or number of chickens successfully raised.

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[1] It is fair to say that societies are differentially fragile and vary in their capacity to assimilate and absorb influences coming from elsewhere. This is why the issue of power relations is so important – who is calling the tune. There is a need to have «enabling spaces" in which producers can formulate and realize their visions, and, in essence, become powerful enough to contend with other forces.

[2] The survival rate of chicks was only around 15%, yet an adult chicken could be sold for 17,000 to 22,500 Francs Malagasy (FMG). The daily wage on the plantation was 5000 FMG (about US$0.75) for daily workers, 7,500 FMG for permanent workers. Thus a chicken represents around three days work. Women are responsible for raising poultry.

It is clear from this brief list that once standards of literacy are raised or levels of indebtedness reduced, new aspirations will arise and new indicators will need to be developed. In the case of literacy, for example, some respondents might enjoy reading so much that they might aspire to a higher level of literacy, or some might want to start learning French.

Part Five: Work in Progress in Germany

Social label: theoretical overview

The aim of my intervention in Germany is to use the understandings gained through an analysis of the *Weltanschauung* or worldview of organic consumers and its systemic representation in the world through their agents (e.g., certification bodies and retailers). The intention is to create an idealized system in which this worldview is flexed wider to include a proper interest in the well-being of the producers of organic goods.

This demands reframing the issue at hand by exploring the potential for changed understandings. To provide an example: fair trade shoppers do not necessarily find environmental concerns important, and organic consumers do not always share the fair trade shopper's concern with farmer well-being (see Browne et al. [2000] for a discussion of this point). In such a situation, the task of the interventionist, or change agent, could be to find ways of altering boundary judgements by enabling stakeholders to relabel the concerns of the "other" as valuable.[1] This task is enabled by an understanding of ethics.

It is already known that a substantial body of consumers take into account "more than purely price" values when shopping. Browne et al. (2000, p. 79), in a UK study, distinguish between different tiers of ethical consumers, with "true" ethical consumers making up 2% of the population, and a further 20-30% semi-ethical, who are willing to pay a modest premium but do not go out of their way to purchase ethically. However, it is estimated that 80% of the population is willing to be ethical if no price premium is involved and if no special effort is required to shop ethically. The concerns identified by consumers in this study include:

- their own and their families' health
- the environment – how food is produced
- animal welfare – humane treatment of animals
- helping people in developing countries – not exploiting the people who produce the food.

Although the Browne study has gone some way towards disentangling the threads, to say that consumers have ethical concerns has undoubtedly become something of a lazy commonplace. Indeed, "ethical" seems almost to have become synonymous with "good," with other shoppers by implication "bad" and needing to be rescued. It would seem vital, if we are to better understand the complex world within which all consumers make decisions, that we refine our understanding of the ethical frameworks that consumers draw upon. These are most likely not coherently bounded frameworks, nor are they necessarily explicit to the consumer. However, quite literally *sense-making* in this muddled situation – disentangling the threads with consumers themselves – might help towards the development of a genuinely empowering social label: empowering in the sense that it will permit consumers to "act in the real world" in line with the way they ethically perceive the world.

Consumers draw upon a whole range of ethical frameworks, for example utilitarianism and rights.[2] These both have a strong presence in many societies, playing a significant role in informing understandings of democracy, for instance. Briefly expressed, utilitarianism considers that the right action in any one situation is the one that causes the most happiness, or at least minimal unhappiness, to those affected. Its proponents argue that utilitarianism enables individuals and their representatives to take moral decisions in a rational way. In this scenario, the consumer may be hoping to increase the happiness of, say, children in other countries through *not* purchasing particular makes of trainers, or, more positively, through buying a special brand of chocolate.

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[1] See the work of Midgley (2000), who provides a model of what happens when different groups of people have different ethics (values in purposive action) relating to the same issue, and therefore make different boundary judgements, resulting in conflict. His book concludes with a series of case studies discussing how changes have occurred in boundary judgements leading to new understandings of the "other."

[2] The definitions provided here are drawn from Wye College/Open University (2000).

Rights theories view individuals as moral agents, with duties and obligations to others. By the same token, each person has expectations of what others may, and may not, do to them (or should/should not do for them). These constitute their rights. Thus one person's right is another person's duty. In this scenario, consumers may view themselves as moral agents with particular duties towards the rights bearers, i.e. the producers.

The way another body of consumers lives may be infused, for example, with Biblical injunction. Here each purchase symbolizes solidarity with other human beings seen to be of tremendous intrinsic worth. A further group may be seeking to counter global capitalism through selective purchasing from cooperatives, for example, and still another group may simply be interested in sharing the goodness of the world equally, not only among members of the present generation but also those yet to come.[1]

Ethical purchasing is thus about the practical application of considerations of how one should live and how one should treat others. It involves an examination by the consumer of whom they consider to form part of the "moral community," and whether they are convinced that they can actively influence the well-being of members of that community.[2]

Ethical purchasing also very much demonstrates the point that the "local is created," and is not merely geographical in scope. To use Cooper´s (1992) language (see footnote 1, p. 99), fields of significance do not merely exist, but are actively created. Farmers´ markets or a social label are pertinent cases in point. The latter is indeed a particular expression of the belief that farmers in Mali are equally the neighbor of a consumer in Germany as the person living next door.

In the real world the patterning of these theories will be highly complex, and they are unlikely to be present in pure form. Rather, an intermingling will inform behavior. A useful image is that of various ethical standpoints converging to form a spotlight upon a particular issue.

Social label: fieldwork in Germany and indicative findings

A two-step process was devised, starting with a questionnaire-based survey of organic consumers regarding their willingness to consider producer well-being. This has now been completed. In the next few months a sequence of consumer workshops will discuss the findings of the questionnaires as well as the findings of the quality of life index. A central aim will be to puzzle out the reasons for any divergence. Further, participants will be asked to consider why those views they might hold as citizens do not necessarily translate into ethical consumer behavior.

A pilot survey was administered early in 2001 at the world's largest organic fair, the Biofach in Nuremberg.[3] Following revision of the questionnaire, research student Lilja Otto surveyed 223 organic consumers in Berlin and Braunschweig, both major cities in central Germany, during the summer of the same year. The questionnaire elicited, first, information on the degree to which consumers make specific choices with respect to fair trade items, and, second, their understanding of some components of quality of life with respect to the lives of Southern producers. It was hypothesized that the respondents already have taken up ethical positions with respect to particular aspects of quality of life, whereas they might be more open or uncertain regarding other aspects. Components of quality of life discussed were:

- improvement in the environment
- improvement in income
- improvement in social status of women farmers
- improvement in health status of the community
- improvement in access to education for children of producers
- purchase guarantees by retailers.

Detailed discussions with respondents refined our understanding and brought up new themes for consideration. Findings were analyzed according to age (under 30, 30-50, over 50) and gender of respondent

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[1] Please refer to Kavka (1978) on ´The Futurity Problem" and Howarth´s (1992) thoughts on "Intergenerational Justice and the Chain of Obligation."

[2] Readings on where to draw the line of the moral community, and who or what is ´morally considerable` (to be taken into account in its own right in ethical judgements) include Leopold (1949), Goodpaster (1978) and Elliot (1991).

[3] See *www.biofach.de* Please contact the author directly if you would like a copy of the report on this first consumer study.

(see Otto, 2002, for overview; contact the author for a short summary in German). The findings include the following:

- Information on the producer: 72% want to know more about producers and 62% would like a portrait/biosketch of the producer on the label.
- Regarding specific elements of well-being, young people find income levels less important than the environment, whereas older people reverse these priorities.
- People who purchase a great deal of organic produce (more than 66% of total food purchases) consider the status of women to be a crucial quality of life issue, but those whose shopping basket contains little organic produce (less than 33%) rate women's status as low priority, and consider children's education to be much more important.
- People whose shopping basket contains from 33% to 66% organic produce find health to be one of the most significant issues, while the other two groups rate health lower.

Discussions revealed important discrepancies with respect to how consumers view well-being, with some contending that Western norms, for instance with respect to education and health, actually worsen the well-being of producers in the South. Others consider that issues of personal freedom, child labor, state redistribution of wealth and global trading inequalities – to quote from a long list – substantially influence well-being in the South. It is also clear that most organic consumers want, hope and expect organic stores to pre-select goods for them according to social criteria.

Conclusion

Apart from the specific findings, the work to date with German organic consumers shows that some have picked up on how quality of life might be seen differently by people *in situ* and outsiders. On the other hand, some consumers appear to be relating quality of life concerns to issues they personally find important. At the same time, more "objective" concerns are also evident, for instance regarding the issue of child labor. This admittedly simple delineation roughly echoes the earlier discussion regarding the value of incorporating insider and outsider perceptions of well-being into a quality of life index. Furthermore, many organic consumers display a consciousness that they have some personal responsibility towards producers, but seek mechanisms to enable them to meet these duties with ease, via store preselection or indeed a social label. We might indeed fairly conclude that "more than purely price" or money values do inform the perspectives of both consumer and producer. It is therefore timely to devote attention not only to further conceptualizing such values in theory, but also to mapping, capturing, and building upon them in practice.

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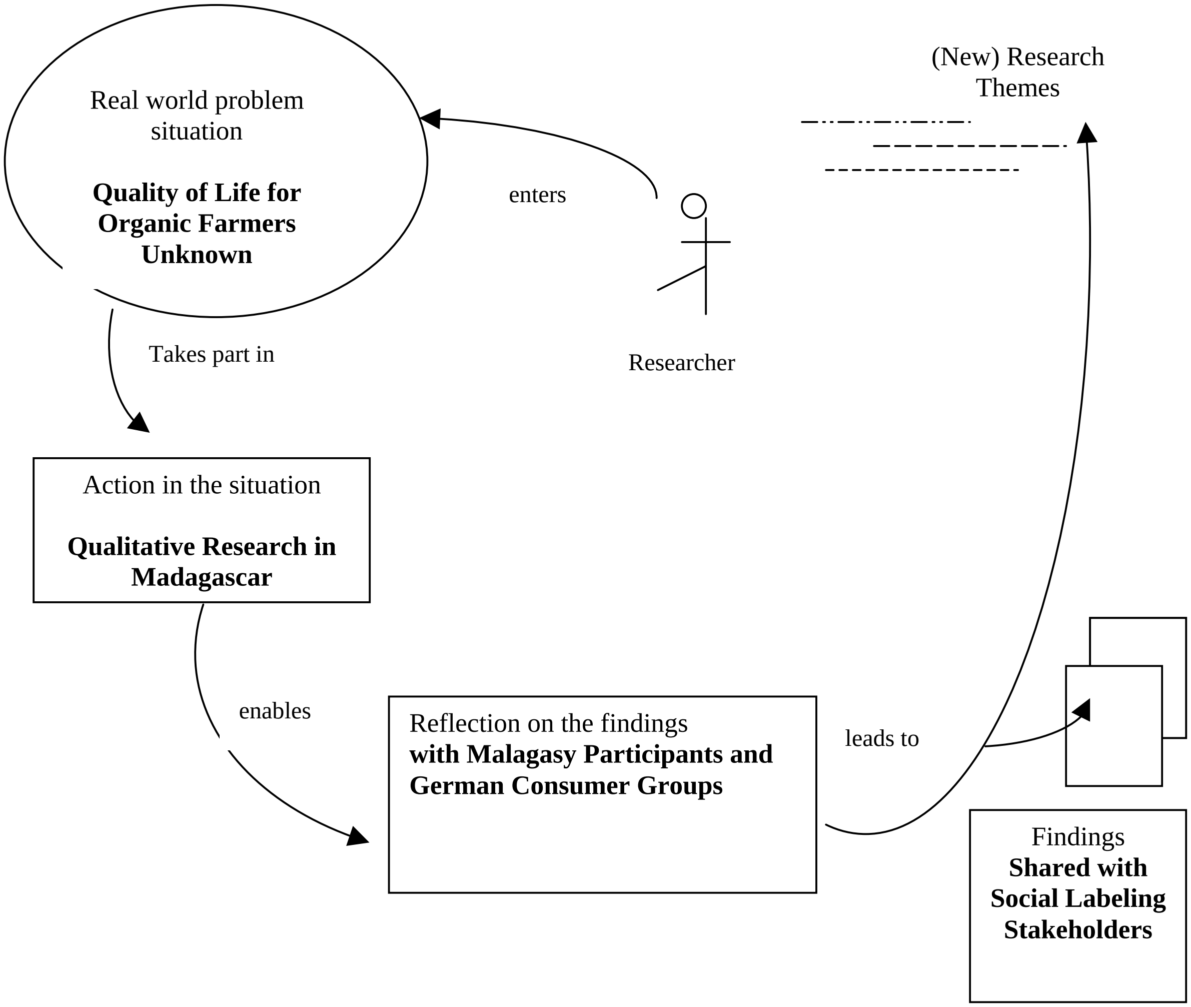
Table 1. Devising social standards: comparing soft and hard approaches.

	Hard Standards Approach	**Soft Standards Approach**
Type of Indicators	Qualitative and quantitative	Qualitative and quantitative
Source of Indicators	Codes provide indicators	Quality of life index provides baseline data; indicators are derived from these
Basis of Legitimacy	Nationally and internationally agreed codes of conduct	Local perceptions of well-being; indicators are internally defined
Nature of Comparison	Comparisons can be made horizontally, from farm to farm, country to country	Comparisons can only be made internally – within the producer community – across time
Stakeholders	Farmers, workers, trade unionists, plantation owners, traders, certifying organizations as well as consumers – these have differential responsibility for the implementation of targets	Farmers, workers, trade unionists, plantation owners, traders, certifying organizations as well as consumers – these have differential responsibility for the implementation of targets

Figure 1. Knitting producers and consumers together: the research approach (adapted from Checkland and Holwell, 1998).


Real world problem situation
Quality of Life for Organic Farmers Unknown
enters
Researcher
(New) Research Themes
Takes part in
Action in the situation
Qualitative Research in Madagascar
enables
Reflection on the findings with Malagasy Participants and German Consumer Groups
leads to
Findings Shared with Social Labeling Stakeholders

Toward Social Justice and Economic Equity in the Food System: A Call for Social Stewardship Standards in Sustainable and Organic Agriculture

Michael Sligh[1] *and Richard Mandelbaum*[2]

The National and International Contexts for Social Justice Labels

The success of "Organic," and its limitations

The timing is now right to address the issue of social justice as it pertains to ecolabels, since with the coming into force of USDA's National Organic Standards we have just passed another important milestone in the long history of US organic standards development. The organic label, the first mainstream marketplace-identified product of sustainable agriculture and "the mother of all US ecolabels," has much to be proud of:

- double-digit growth for over two decades
- strong consumer confidence
- standardized national and international environmental and humane food production and processing guidelines
- verifiable third-party non-governmental and governmental certification and accreditation systems
- marketplace rewards to farmers
- reduction in toxic pesticide use, which lowers farmers' and farmworkers' occupational health risks.

This is progress. We should take pride in the positive aspects of this achievement. Organic is the new benchmark to which all other labels will be compared. But with this success comes the challenges of dilution, cooptation, and concentration. This process of institutionalization also helps to focus our attention on the work that remains. Environmental and humane practices alone cannot achieve sustainability in our food systems. We must have social justice.

There is also concern about how organic, sustainable, fair trade, and other ecolabeling schemes can best cooperate in expanding the green and just marketplace. The Rural Advancement Foundation International (RAFI) is attempting to continue this consensus-building through the work of the Greener Fields Forum (Sligh, 2002) and its work towards forming an Agricultural Stewardship Council.

Finally, there is concern about how best to ensure that the early adopters, small farmers, farmworkers and indigenous producers in the global North and South can fairly benefit from the growth of both organic and ecolabeling strategies.

Rising public interest in and consumer demand for a socially just marketplace

The public is increasingly attracted to products produced under socially just conditions. This is evident in the growing popularity of both fair trade and certified sweatshop-free products. While both these programs have focused mainly on imported goods, chiefly from nations in the global South, the two concepts also can and should be focused inward on domestically produced agricultural products.

European consumers are increasingly demanding such products. Although the market is much smaller in the US than in Europe, it is growing. These products are primarily tropical goods from the South – coffee, tea, chocolate, and now rice – but the same principles can apply to all commodities.

Current projects in social justice ecolabels

There are an increasing number of initiatives aimed at promoting and developing aspects of social justice in agriculture. The Social Accountability in Sustainable Agriculture (SASA) project is a collaboration among the International Federation of Organic Agriculture Movements (IFOAM), Social Accountability International (SAI), Fair Trade Labelling Organizations International (FLO), and the Sustainable Agriculture Network (SAN). Some organic certifiers, such as the Soil Association in England and Certi-Mex in Mexico, have already developed some social guidelines.

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“A Call for Social Justice” Project

For these reasons several years ago we initiated the project “A Call for Social Justice in Sustainable and Organic Agriculture.” The project represents a collaboration of RAFI, Comité de Apoyo a los Trabajadores Agrícolas (CATA), the Peacework Organic Farm CSA of Liz Henderson, and Oscar Mendieta of la Asociación de Organizaciones de Productores Ecológicos de Bolivia (AOPEB), a Bolivian organic producers association primarily representing indigenous farmers.

Our goals have gone through a collaborative and participatory drafting process and a series of forums to develop a universal baseline for such standards that can help define and set the scope for the use of a social justice label claim. The project’s draft standards have gone through several revisions based on a series of extensive public comment periods. The standards are currently in their fourth draft (Henderson et al., 2002).

Our goal is to build a model of an alternative food system by creating an economic incentive for social equity and just working conditions through the establishment of a “social justice” food label. The vision of this alternative food system is one of vibrant small family farms that provide well-being for the farm family and dignified work to wage laborers. The standards for such a label are based on the two complementary principles of economic equity for the farmer and just working conditions for the farmworker, resulting in a win/win scenario in which both workers and farmers benefit.

We recognize that the development and implementation of such standards will depend on the equal involvement of buyers, farmers and farmworkers. Consistent with this vision, our goal is to build and maintain a mutually respectful and supportive relationship among the various parties (buyers – farmers – farmworkers), rather than an antagonistic one. We envision a symbiotic relationship in which despite occasional differences and disputes, the farmer, farmworker, and buyer can live full and rewarding lives. In this scenario, the farmer can count on a fair agreement or contract with at least minimum fair prices, and a well-trained and consistent work force. The worker can count on stable, dignified work and just treatment. The buyer can rely on getting high quality food products with added value.

The fundamental link needed to support such a program would be between a supportive public (consumers) and those who work the land (farmers and farmworkers). In general, the standards are intended to be consistent with and to build on IFOAM principles on Social Justice, and the work of the International Labor Organization (ILO).

Farmers’ rights and buyers’ responsibilities

The standards outlining farmers’ rights are based on the principle that *all contracts between farmers and buyers will be fair and equitable.*

These standards ensure the following:

- good faith negotiations on any contract with a buyer, with payments to the farmer that cover the cost of production of the farm products plus a fair return on the farmer’s investment and a living wage for the farmer. Should the buyer not be able to afford to pay an adequate price, full disclosure of financial records would be required, as well as steady improvement as finances improve.
- freedom of association and the right to collective bargaining
- fair grievance procedure
- contract specifications such as recapture of capital investment, anti-discrimination clauses, prohibition of the termination of contracts without just cause, and profit-sharing incentives.

Farmworkers’ rights

The standards outlining farmworkers’ rights are based on the principle that all workers have the right to safe working conditions, just treatment, and fair compensation.

These standards ensure the following:

- adherence to international laws protecting workers, including ILO Conventions and UN Charters
- freedom of association and right to collective bargaining

- fair grievance procedures
- living wages
- safe and adequate housing
- health and safety protections, including access to adequate medical care and a “right to know” clause regarding pesticide use, with the expectation that the least toxic alternative is always used.

Interns and apprentices

In addition, there is a short section pertaining to interns and apprentices, in recognition of the vital role that interns have played in organic and sustainable agriculture. The standards are based on the fact that interns are inherently distinct from wage laborers, and therefore have distinct rights and responsibilities.

These standards require:

- a clear, mutually agreed to, written contract laying out the expectations and assuring the intern/apprentice that the farmer will provided the desired teaching
- a fair stipend to cover living expenses.

Indigenous rights

Most of the world’s farmers are indigenous peoples. An ecolabel that makes claims regarding social justice in agriculture needs to address their unique concerns. The current draft of the Call for Social Justice standards includes a section on indigenous peoples’ rights; this section, as with the other sections of the draft, will be revised and reworked in accordance with public comment.

Implementation and verification

A crucial issue that the project has not yet addressed is verification and implementation. Strong standards become meaningful only when strictly adhered to. A key issue will be enforcement of contracts, including both buyer-farmer contracts and farmer-worker contracts. For instance, how will a labeling program ensure that the farmer or worker in question will be protected from any retaliation? What sort of effective and timely conflict-resolution process or grievance procedure will be put into place?

Intended outcomes of the project

Our hope is that the project will achieve the following:

- To positively influence the ongoing discussions concerning adoption of social stewardship standards, through the development of specific language (these standards) that is representative of a broad spectrum of constituencies, as described above. We hope that through collaboration and friendly dialogue, our work can have this positive impact on other programs currently in development, such as the SASA project (IFOAM-SAI-FLO-SAN) and that of the Soil Association. We believe that our standards address certain issues and areas that either have not been addressed, or not been addressed in as much detail, by some of these other efforts, and that we therefore can provide them with valuable and complementary insight.
- To encourage existing certifying agencies, including organic certifiers, to adopt social stewardship standards and to use our standards as a baseline. To this end, we have had preliminary discussions with several organizations and agencies that might be interested in using these standards as a basis for a pilot project. Such a pilot is the logical next step for this project, as only an on-the-ground trial will provide us with the information needed to improve and clarify the standards. We invite any certifying agency or other organization that may be interested in conducting such a pilot to contact us.
- To encourage organizations or communities that do not already have certification programs currently in place to consider the potential value to their members of implementing such a program, using these standards as a baseline.

Conclusion

At one and the same time we are both heartened by and concerned about the current proliferation of food labels. Heartened, because of the tremendous benefit that labels can bring to achieving environmental and economic justice in the agricultural arena. Concerned, because comprehensive community-derived labels will, and to some degree already do, share the marketplace with labels that are far less stringent and not necessarily representative of the communities they claim to represent.

With the distribution of these standards we aim to add our voices to “setting the bar” for such claims:

What does it mean when a label makes claims regarding workplace justice for agricultural workers, respect for the rights of indigenous communities, or economic equity for small scale farmers? *These are powerful claims, and they need to be backed up by comprehensive standards that are adequately implemented and verified.*

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Can Ecolabeling Mitigate Market Failures? An Analysis Applied to Agro-Food Products

Douadia Bougherara[1] *and Gilles Grolleau*[1]

Because of their economic properties, environmental characteristics embedded in products are frequently not provided at an efficient level. The "invisible hand" of free markets fails to provide them at a Pareto optimum, notably because they are public goods and credence attributes. In the literature, ecolabeling is frequently proposed as a market-linked tool addressing the asymmetrical information problem by conveying information to consumers on products' environmental impacts. However, ecolabels also face two other problems capable of disrupting the market mechanism: the limited abilities of consumers to process increasing flows of information, and the public nature of environmental characteristics. Our contribution extends the analysis by considering the ecolabel as a way to simultaneously overcome information asymmetry, informational overload, and public goods problems.

The first section of our paper shows how environmental attributes turn out to be a source of market failures. Because of their credence properties, environmental attributes may lead to adverse selection. Adding complex environmental information on products may exacerbate informational overload. The public goods properties of environmental characteristics may entail problems of free riding and assurance. These obstacles can partially explain why declared willingness to pay does not necessarily correspond to effective purchases. In the second section, we analyze how market failures may be mitigated by emphasizing private benefits, providing accurate and credible information, adding attributes verifiable by consumers and used as proxies for credence attributes, and designing the ecolabel as a cognitive support for consumers. In the third section, we provide a qualitative study of several existing ecolabels on agro-food products to stress how to a greater or lesser degree they succeed in simultaneously attenuating these several sources of market failures.

Environmental Attributes of Agro-food Products: A Source of Market Failures

> Eco-labeling can provide the missing market information about production process attributes and be used as a mechanism revealing consumer valuation of environmental attributes of agricultural commodities (Moon et al., 2002, p. 88).

Ecolabeling is frequently considered as a way to overcome the market failure resulting from asymmetrical information between the producer and the consumer. But this view seems restrictive, because marketing of ecofriendly agro-food products generates other market failures that also determine the success of ecolabeling schemes.

Asymmetrical information between producers and consumers

Environmental characteristics of agro-food products correspond notably to impacts of farming and processing practices in environmental areas such as water, soil, air, and biodiversity, which are dissociated from product consumption. These environmental attributes frequently are credence goods according to the typology of Nelson (1970) and Darby and Karni (1973). The economics of information classifies goods or attributes into three categories. For *search attributes*, consumers can get the information on quality before purchase just by inspecting the product. For *experience attributes*, consumers get the information only after purchase. *Credence attributes*, in contrast, cannot be accurately evaluated even after purchase or consumption. In most cases, credence attributes are well known by the producers, but are hidden from consumers. Frequently the most cost-effective way is to give credence to a third-party assessment, e.g., an ecoseal of approval that constitutes a proxy, instead of having to get information by more direct means. Credence costs are the costs of

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getting the proxy, which allows consumers to give credence to the seller's promise.

This informational asymmetry leads to adverse selection. Adverse selection corresponds to hidden information, e.g., the environmental characteristics are already determined, but producers can cheat by providing false information (Akerlof, 1970). If consumers are unable to check environmental characteristics, fraudulent sellers can market bad products with a green image. Fraudulent sellers want to capture the premium that consumers are willing to pay for environmental attributes. But purchasers anticipate sellers' temptation to cheat and then reduce their willingness to pay for environmental friendly products. Ultimately, this situation can lead to the elimination of true ecofriendly products.

Informational overload as a source of market failure

Informational asymmetry corresponds to an unequal partition of information between two agents that allows the better-informed agent, typically the seller, to profit from his advantage, whereas informational overload arises because of limited cognitive abilities of agents. Even in a world characterized by symmetrical information, agents can be overwhelmed by increasing flows of information, and their attention becomes the scarcest resource. H. Simon, quoted by Varian (1995), stresses the need for a switch from an "economy of information" to an "economy of attention":

> What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it.

This situation requires more than solving an asymmetrical information situation, that is, providing accurate and credible information. In a first approach, competition for consumers' attention arises in a rich informational context, because the label itself provides too much information or because of competition between several sources capable of capturing consumers' attention, such as other labels or the store environment. New information and communication technologies reinforce this situation by providing "huge amounts of information, but most seekers of information face constraints that are tight enough for them to rely mainly on sources with an established reputation for credibility" (Andersson, 2002, p. 716). For example, In a well-documented study on different kinds of ecolabels, Wynne (1994) shows that environmental "report cards" establish symmetrical but useless information because of information overload and technical inability of consumers to process it. (An example of an environmental report card is Green Cross in the US, which provides a detailed graphical information about performance and environmental impacts of the product, based on a cradle-to-grave study of the product, without value judgement. The report card resembles a nutritional label and aims at allowing the purchaser to compare the environmental burden of one product relative to another.)

Environmental characteristics of agro-food products are public goods

The environmental improvement (or degradation) generated by the environmental characteristics of ecofriendly (conventional) products frequently has properties of public goods. Indeed, the consumption of such attributes by an individual A does not reduce the quantity available for another individual B (non-rivalry), and when these characteristics are produced, it is almost impossible to prevent someone from consuming them (nonexcludability). These two features imply that the purchase of ecofriendly products does not guarantee to the purchasers an exclusive utility from the environmental improvements generated by their purchases. Frequently, it is not feasible to exclude those who do not consume ecofriendly products, such as those produced without degrading air quality, from the benefits generated by environmentally conscious purchasers. Moreover, environmental benefits may be intangible. Environmental impacts are often global, and consumer verification of the impacts is impossible, for example the state of the ozone layer. Other environmental characteristics become tangible only after a long time, longer than a typical consumer's life expectancy, for example the exhaustion of natural resources.

Moreover, individual consumers frequently cannot evaluate the real benefits of their contribution. Consequently, public goods lead to a misallocation of scarce resources because the decision-making process does not take into account all the costs. However, we recognize that some environmental characteristics can provide private benefits, such as less consumption of energy during the consumption phase, longer durability, less packaging, and lower pesticides residues in food products.

In the following sections, we consider environmental characteristics that have public properties. The private production of these environmental characteristics can generate two distinct problems:

The free riding problem: Since the good is available to everybody, the free riders consume it without providing a contribution corresponding to their consumption. This problem is well documented, and the presumption of neoclassical economics is that the public good will be under-provided by private and decentralized markets.

The assurance problem: In this case, the agent does not contribute to the production of a public good because he believes that the good will not be produced anyway. Indeed, the production of certain public goods requires a minimum contribution. If these contributions are insufficient, the good will not be produced and the individual will think he has squandered his contribution, corresponding to the "sucker" payoff (Schmidtz, 1991). For example, a consumer can renounce purchasing an ecofriendly agro-food product that preserves ground water because he is convinced that his sole contribution is too weak to induce a perceptible environmental improvement in ground water quality. Consumers are willing to contribute if they are convinced that an adequate threshold of contributions will be reached. Note that the free riding situation arises because of opportunistic behavior, while the assurance problem does not presuppose that agents are self-interested.

There are then three sources of market failure. Between consumers and sellers, there is a two-sided informational asymmetry. Consumers face a multi-sided situation because of the free riding behavior and the assurance problem among themselves. Lastly, an informational overload can lead to the need to allocate consumers' attention.

How Could Ecolabeling Contribute to Mitigating Market Failures?

Ecolabeling was originally proposed as a voluntary market-linked tool for addressing market failures resulting from environmental characteristics of products. But at the same time ecolabels need to mitigate the other causes of market failures previously identified, namely the problems generated by public good and informational overload. To overcome these barriers, we propose to design ecolabels as a mix of solutions to each of the previous market failures. We select some solutions that are frequently cited in the theoretical and empirical literature.

Providing accurate and credible information by third party certification

It is well known that producers suffer from a credibility deficit about the environmental information of their products. To solve the adverse selection and cognitive problems generated by credence attributes, participation of credible third parties is generally necessary to manage three things: 1) the definition of an ecofriendly food product, i.e., the criteria allowing use of the ecolabel; 2) the monitoring of previously defined criteria to check product conformity with the specifications according to a previously elaborated procedure; and 3) the efficient signaling of an ecofriendly product (Grolleau and BenAbid, 2001). An efficient signal allows consumers to distinguish true ecofriendly products from conventional ones (and possibly to rank them by levels of ecofriendliness) at a non-prohibitive cost, i.e., to get a separating equilibrium. Indeed, in some circumstances, the transaction costs can be excessive and swallow up consumers' willingness to pay a premium, which in their decision-making was intended to cover the ecofriendly product's higher production costs. Generally, this signal is a third-party certified ecolabel (Caswell and Modjuszka, 1996).

Designing the ecolabel as a cognitive support for consumers

In an environment overloaded with information, the success of an ecolabel depends on its ability to capture the consumer's attention rather than only providing factual, correct and complete information unprocessable by consumers (Grolleau and Ben Abid, 2001). This cognitive support can be "markers and knowledge summaries" capable of capturing the consumer's attention without requiring excessive transaction costs (Valceschini, 2000). Barzel (1982) argues that people will use proxies "because the alternative is more costly." Doussan (1998) provides anecdotal evidence that a direct measurement of environmental impacts of farming can require excessive transaction costs. Indeed, a direct measurement of environmental characteristics can require a "sworn inspector monitoring continuously the farmer in each field, with all technical means capable of verifying specific environmental data" (Doussan, 1998). Instead of spending excessive money in direct measurement, the consumer searches for a cognitive support, such as an ecoseal of approval, that synthesizes the previous conditions.

Understanding the limited abilities of consumers can help ecolabel designers realize that the success of ecolabeling requires both capturing attention and providing an informational summary. Some empirical studies argue that effectiveness of capturing the consumer's attention depends more on the reputation and status of the third party than on a precise knowledge of the methods of its intervention. For example, the use of names and logos of well-known environmental associations such as WWF and Green Peace increases the visibility as well as credibility of green claims (Leubuscher et al., 1998).

Reducing free riding by emphasizing private benefits

In the real world, it seems that people may contribute to public goods at levels that exceed the predictions of the neoclassical theory (charity, donations, etc). Several explanations have been provided, such as the "warm glow" concept, that is, the increased utility from the act of giving rather than receiving (Andreoni, 1990), or the "Veblen effect," for which consumption may be conspicuous, thereby having a status value (Leibenstein, 1950). A solution to the assurance problem is "assurance contracts," defined as contractual agreements that contribute to a collective good project (Schmidtz, 1991). These contracts guarantee to all parties that their contributions will not be wasted, for example by money-back guarantees, if the collective good is financially under-supported.

A solution to the public good problems is to add and emphasize private benefits, such as health or taste, to the collective benefits of preserving the environment (Grolleau and Caswell, 2003), as some environmental labels for green food products already do. This association between environmental attributes of goods and private ones can come from labeling, but may also already exist in the consumer's mind. Intuitively, we understand that low-chemical production (fertilizers and pesticides) may result in low pesticide residues in food, although it is not scientifically supported. For example, the purchase of organic products seems more motivated by self-benefits, that is, safer products, rather than public environmental benefits, which constitute a secondary driver. By associating private benefits with public ones, ecolabel designers can reduce free riding and the assurance problem by creating excludability. The market switches to a quasi-conventional one with private goods, where environmental attributes are provided as additional public benefits. The purchase driver remains conventional private benefits, and environmental attributes are bundled in the product. People are willing to purchase ecofriendly products not only for themselves, but also because they primarily enjoy the private attributes resulting from environmentally friendly production. For example, Moon et al. (2002, p. 96) show that "respondents who are more concerned about food safety associated with vegetables are more likely to be willing to pay a premium for the environmental attributes of agricultural products."

Many consumers expect that food products from an ecofriendly process will taste better than conventional products. According to several experimental studies (Deliza et al., 1999; Johansson et al., 1999), provision of information about environmental impacts of farming methods influences the quality perceived by consumers. For example, a perceived better taste allows consumers to mitigate the free riding and assurance situations by emphasizing private benefits, to attenuate information asymmetry because consumers infer, or at least do not invalidate, the achievement of an ecofriendly process, and to reduce information overload by focusing consumers' attention on a conventional dimension of food quality.

Marketers and designers of ecolabels will try simultaneously to switch from focusing mainly on public attributes to emphasizing private ones, and from credence attributes to proxies perceived as search or experience attributes by consumers. Examples of these strategies are provided in the following section, where we show how several ecolabels attempt to take into account these potential sources of market failures.

How Do Existing Ecolabels Alleviate the Problems of Supplying Environmental Characteristics?

We proposed to design ecolabels that mitigate the problems analyzed in the previous sections. Existing ecolabels have often focused on ways to overcome some of the following problems: asymmetrical information, informational overload, and public good problems. Some ecolabels help alleviate one problem, while others simultaneously mitigate two or three. The International Standard Organization (ISO) distinguishes three types of ecolabels according to the presence or absence of third party verification and the type of characteristics certified (Table 1). We follow this classification to analyze how each type of ecolabel can mitigate market failures.

Type I ecolabeling

In the late 1970s, several countries and groups of countries set up ecolabeling programs (Type I ecolabels, Table 2) aiming both at encouraging the supply of ecofriendly products as well as enabling consumers to express their preferences for these products. Thus, they were first designed to mitigate the informational asymmetry. A logo identifies products that are less harmful for the environment than other products in the same category. Type I ecolabels help to mitigate the informational asymmetry through the mechanism of third party certification. For consumers, credence attributes become search attributes through the use of credible third parties (Caswell and Modjuszka, 1996). Moreover, the use of logos as informational summaries as well as means to capture the consumer's attention may aid in mitigating the informational overload problem. However, problems related to the public properties of environmental characteristics remain.

Type II ecolabeling

For Type II ecolabeling, we applied our analysis to agro-food products in France. Indeed, the French seal of approval NF Environnement and the European Ecolabel exclude food products (Bougherara et al., forthcoming). France constitutes a favorable field for the development of self-declared ecolabeling (Type II). We did a survey and collected ecolabels on agro-food products in 2001-2002 in several representative French stores. We qualitatively analyzed how they help mitigate the three problems we identified (Tables 3 and 4). Our sample is too small to draw any accurate quantitative analysis, so the percentages given are only indicative.

The analysis shows that Type II ecolabels of food products especially add health or taste to environmental attributes to overcome the public goods problem (through added private attributes) and the informational asymmetry problem (through added search attributes). This may be specific to food products for which the link between the two kinds of attributes often is already in the consumer's mind. A confusion, sustained by marketers' efforts, exists between the impact of the product and its production process on the environment on one hand, and on the other the impact of the environment on the food products, e.g., safety attributes. For example, on certain mineral water it is claimed that "the spring … benefits from a natural preserved environment." That this water comes from a preserved environment says nothing about the environmental performances of the producer. Rather, it refers to the absence of contamination of water by the production site. It is well known that environmental claims are frequently spurious and generate confusion among consumers' between a "preserved area" and an environmentally friendly process of production. Many claims are narrowly focused and respond more to safety concerns than to environmental ones (Leubuscher et al., 1998).

Other mechanisms enabling consumers to trust ecolabels appear through the analyzed ecolabels. Indeed, most of the products are branded. Brands may transfer their reputation to the environmental attributes, making them more credible. Moreover, some ecolabels refer to sponsors. Organizations such as WWF or ONF (French National Forest Agency) can reinforce the credibility of the seller's claims.

Type III ecolabeling

The third party certification in Type III ecolabels helps mitigate informational asymmetry, but the consumer is left with the task of processing the information provided with each product to determine which is least harmful for the environment. Besides, information overload can occur, depending on the quantity of environmental data given and the other information sources, such as other labels and the store environment. Ecolabels can cover a large spectrum between two extremes. At one end, they might be concerned with only one environmental area or one step of the production process, while at the other end with the entire life cycle. Comparing products according to one variable might be easy. However, comparing products across many variables and making a trade-off among them may be a time-consuming and demanding effort requiring expert abilities. Wynne (1994, p. 95) claims that

> Simply making information available to consumers in no way assures that they will process it. One must distinguish between "information provision" and "information impact", because there is no one to one relationship between information provided and the impact, if any, of this information on the recipient.

The goal of Scientific Card Certification in creating the Environmental Report Card was to reestablish consumer sovereignty by leaving to consumers the right to fully compare products themselves. The transaction costs it raises may be much higher than the expected benefits. Thus, Type III ecolabels may be more suited for certain categories of products for which purchase frequency is rather low and for which consumers take time to choose, such as durable goods like cars or washing machines (Allison and Carter, 2000). Type III ecolabels may be less suited for agro-food products.

Concluding Remarks

An important implication of our analysis of ecolabel success is to design ecolabels as providers of mixed solutions to the several market failures. Indeed, the market failures caused by environmental characteristics create an extra social cost for society, and ecolabels try to attenuate this situation. But a careful analysis seems necessary to be sure that the attempt to mitigate these failures is not more costly than the market failures themselves. Indeed, in some cases we may just waste money shifting from a market failure to an ecolabel failure. Consumers' willingness to pay a premium may be wasted in high transaction costs rather than used to improve environmental quality. In a new institutional framework, the use of ecolabels as an alternative to another policy tool is efficient if the cost of designing and implementing ecolabeling policies is lower than both the cost of the other solutions to mitigate market failures and its expected benefits. Other factors should also be taken into account, such as rights to use environmental claims, anti-deception laws, level of enforcement, credible sanctions that influence the level of transaction costs, and the efficiency of ecolabeling.

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Table 1. A classification of ecolabels (ISO 14020, 1998).

Type of ecolabel	**Definition by the ISO**
Type I: Environmental labeling program	Voluntary, multiple-criteria-based third party program that awards a license which authorizes the use of environmental labels on products indicating overall environmental preferability of a product within a particular product category based on life cycle considerations.
Type II: Self-declared environmental claims	Environmental claim that is made, without independent third-party certification, by manufacturers, importers, distributors, retailers or anyone else likely to benefit from such a claim.
Type III: Environmental declaration	Quantified environmental data of a product under pre-set categories of parameters set by a qualified third party.

Table 2. Some Type I ecolabels (EPA, 1998).

Name	**Year**	**Location**	**Governmental or Non-Governmental**	**Number of Product Categories**
Blue Angel	1977	Germany	Governmental	88
Nordic Swan	1989	Denmark, Finland, Iceland, Norway, Sweden	Governmental	42
Green Seal	1989	USA	Private Non-Profit Association	88
European Ecolabel	1992	European Community	Governmental	11
NF Environnement	1992	France	Governmental	6

Table 3. Type II ecolabels on agro-food products in some French stores.

	Product name	**Product type**
1	Bonduelle	Salad
2	Jordans	Cereals
3	Mac Cain	French fries
4	Coopérative Nangica	Potatoes
5	Mas de Nans	Wheat
6	Trilégumes	Potatoes
7	Fermiers de Loué	Turkey
8	Gerblé	Biscuits
9	Casino	Fresh vegetables
10	Carrefour	Fresh vegetables, Meat
11	Auchan	Fresh vegetables, Meat
12	Cora	Fresh vegetables, Meat
13	5ème Saison	Salad
14	Les Crudettes	Salad
15	Florette	Salad
16	Candia	Milk
17	Thonon	Mineral water
18	Saupiquet	Tuna
19	Paul	Bread
20	La Mie Câline	Bread
21	Point Chaud	Bread
22	Bret's	Chips
23	Peyronnet	Salad
24	Nactalia	Milk
25	Milka Alp action	Chocolate

Table 4. How Type II ecolabels are designed to mitigate market failures.

	Type of market failures and mechanisms attenuating them			
	Public goods problem	*Informational asymmetry*		*Informational overload*
Product	Adding private benefits	Adding experience attributes	Third party certification	Logo
1				X
2	X	X	X	X
3	X	X		
4	X	X		
5	X	X		
6	X	X		
7				X
8	X	X		X
9	X	X	X	X
10	X	X	X	X
11	X	X	X	X
12	X	X	X	X
13	X	X	X	
14	X	X	X	
15	X	X	X	
16				X
17				X
18				X
19	X	X		X
20	X	X		
21				
22				
23				
24				
25				X
	15 products out of 25	15 products out of 25	8 products out of 25	13 products out of 25
	(60%)	(60%)	(32%)	(52%)

Giving Credence to Environmental Labeling of Agro-Food Products: Using Search and Experience Attributes as an Imperfect Indicator of Credibility

Gilles Grolleau[1] *and Julie A. Caswell*[2]

Some consumers derive utility from buying and using products produced under specific processes, such as environmentally friendly practices. Means of verifying the use of these practices are frequently necessary in order for markets to function efficiently and without fraud. This is because the consumer usually cannot evaluate whether ecologically sound practices were used to produce a product, neither before nor after its purchase and use.

Analysis of ecolabeling has focused to a large extent on the operation of markets for environmental attributes without adequately addressing the total food product. Our analysis differs in that it treats eco-friendliness as a component of a product's overall quality rather than as a stand-alone attribute. We explore the extent to which the credibility of environmental claims can be supported by a product's other quality attributes. If consumers perceive a correlation between the process attribute and other product attributes that they can evaluate, the quality levels of such supporting attributes can be a substitute for direct verification of environmental attributes, or a complement to it. Thus, verifiable attributes that can be inspected before purchase or evaluated after use can be indicators of the credibility of the process claim, without strictly proving its truthfulness.

We argue that the credibility of an environmental claim that signals that a product is eco-friendly can be damaged by a failure to provide adequate levels of other verifiable attributes. We suggest that the market success of environmentally friendly agro-food products requires a mix of environmental and other verifiable attributes that together signal credibility.

An Overall Model of Quality Perception and Quality Assurance

Consumers' perception of quality is influenced by the product's intrinsic attributes as well as by extrinsic indicators and cues provided by the seller of the product. Intrinsic attributes relate to a broad array of attributes, including food safety, nutrition, convenience, composition, and process attributes such as eco-friendliness. As shown in Figure 1, the information environment for different intrinsic attributes may be search, experience, or credence in nature. In other words, the consumer can learn about the quality level prior to purchase (search) or after purchase and use (experience). For some attributes, the consumer cannot verify the quality level (credence). Extrinsic indicators, such as certification or labeling, and cues, such as brand name, packaging, or price, convey search information to the consumer since they are available before purchase. The consumer's perception of quality is a blend formed by information from these multiple sources.

Solutions to Informational Problems Generated by Search, Experience, and Credence Attributes

Although consumers' perceptions are a blend of information, the analysis of problems related to their ability to accurately judge information frequently takes an attribute-by-attribute approach to evaluating and correcting such problems. For search attributes, for example, "the consumer's problem of determining quality is confined to that of inspecting the goods before purchase" (Lancaster, 1996, p. 159). According to the seminal work of Stigler (1961), consumers will gather information up to the point where the cost of doing so exceeds the value of further information. Competition in markets will encourage companies to provide search information, at least for desirable product attributes. If this mechanism is strong enough, the market will be self-regulating and little external intervention will be required. However, even with search attributes, governments or private certifiers may play a role in influencing the range of search information available or in making it easier for con-

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sumers to use, thus lowering their cost of acquiring information.

Problems of adverse selection and moral hazard can occur where important product attributes are experience or credence in nature. An adverse selection situation arises when consumers cannot detect a fixed attribute of the product before purchase, while this information is available to sellers (i.e., information is asymmetric). Adverse selection could occur, for example, where some producers provide false labeling about environmental attributes and underlying production practices, causing consumers to chose products that do not in fact have the attributes they want. A moral hazard situation arises, on the other hand, when the producer is tempted to not carry out all the practices necessary to achieve a certain quality level because the consumer cannot or finds it difficult to check whether the actions have been taken. In both cases, the market will not fully reward high quality producers or adequately punish low quality producers.

While moral hazard is a real issue in environmental certification, it may be mitigated to some extent by the need for producers to make significant initial investments in knowledge, skills, materials, and time to become certified. We focus here on the consumer end of the market, where adverse selection, of the type first analyzed by Akerlof (1970), remains a significant problem.

Several mechanisms can mitigate adverse selection generated by experience goods; governmental intervention may be required in some circumstances. The operation of firm reputation can ensure market efficiency. For example, in the case developed by Bagwell and Riordan (1991), if consumers enter the market sequentially, then informed consumers could share information about experience characteristics with those who are not yet informed. In addition, consumers repeatedly purchase agro-food products, giving them the opportunity to sanction a fraudulent seller by choosing another seller for their next purchases. The credibility of this threat depends on the likelihood of future interaction between seller and purchaser (Nelson, 1970; Klein and Leffler, 1981). Efficient quality signaling through use of extrinsic indicators and cues such as seals of approval, labeling, warranties (e.g., “Your Satisfaction Guaranteed or a Full Refund”), and advertising (Kirmani and Rao, 2000) also can mitigate adverse selection linked to experience attributes.

For experience attributes, government intervention to correct market problems frequently is limited (Leland, 1979), for example to setting minimum quality standards or enforcing anti-deception laws. However, if the probability of future interaction between the seller and buyer is very low, as in purchase of a used car, the threat of earning a bad reputation is not credible enough to affect the seller’s behavior. For example, to correct this type of situation French laws require a third-party intervention to disclose the true quality (i.e., the mandatory “Contrôle Technique”) before sale of a used car. However, setting minimum standards can lead to anticompetitive effects (Scarpa, 1998).

Credence attributes, such as environmental friendliness, pose more problems in markets because the cost of defining, measuring, and verifying them can be high, along with the temptation to cheat. A potential remedy to the measurement problem is to use a proxy or a signal. For example, because safety output may be too costly to measure (e.g., the absence of pesticides residues), it may be more cost effective to measure management practices (e.g., organic farming) instead of the final product characteristics. Barzel (1982) argues that the proxy is presumably used because the alternative is more costly. At the end of the agro-food chain, consumers can search for the organic label, which is a signal for the proxy, and thereby avoid excessive transaction costs (e.g., costs of finding and evaluating products). Of course, the proxy and signal may convey information about multiple attributes.

Caswell et al. (2002) argue that both firms and consumers use extrinsic indicators and cues to determine the quality of product attributes. Consumers will use the cues readily available to them, such as eco-seals of approval, logos of well-known environmental associations, price, and brand name. For companies in the supply chain, the range of indicators and cues that are available and efficient to use is larger than for the consumer. For quality assurance, Caswell et al. (2002, p. 57) state that

> firms are likely to examine the level of quality management systems adopted by their suppliers, look at supplier records, and check whether the supplier is certified by a third-party to adhere to specific quality standards. For example, HACCP adoption or ISO 9000 certification are strong signals to buyers that the supplier closely monitors product quality and will be able to deliver the agreed-upon quality. Additionally, establishment of extrinsic indi-

cators and cues makes it easier to verify when quality standards have been met.

Similarly, examination of environmental systems and certification such as ISO 14001 are used within the supply chain to verify environmental quality.

Insuring the credible operation of markets for credence attributes may require external intervention to allow consumers to choose products that correspond to their preferences, and honest producers to credibly signal their products. Research on the economics of information by Macho-Stadtler and Perez-Castrillo (2001) suggests sufficient conditions for a market for credence attributes to function effectively (or, in the economist's technical term, for a separating equilibrium to exist). An effectively functioning market would allow eco-friendly producers to label their products at a nonprohibitive cost. To do so they may support the cost of an ecoseal of approval to signal more effectively the environmental quality of their products. Of course, the cost of acquiring the ecoseal has to be lower than the expected profit from having it. On the other hand, the ecoseal must be prohibitively priced for conventional producers in order to prevent them from cheating and free riding on the environmentally friendly producers. If it is not, consumers will face the same adverse selection problem because they will not be able to distinguish the truly eco-friendly products.

Stated more formally, the conditions for a well functioning market are the following:

- Eco-friendly producers can acquire the eco-seal at a lower cost than conventional producers.
- The expected profit with an eco-seal is greater than the cost of acquiring the seal for eco-friendly producers.
- The expected profit with an eco-seal is less than the cost of acquiring the seal for conventional producers.

If successful in designing and supporting the costs of signaling through a labeling program, eco-friendly producers transform the market for consumers from one of adverse selection due to asymmetric information (i.e., producers know the real quality but consumers do not) to one of successful selection by consumers through the provision of reliable, symmetric information.

The market improving mechanisms discussed above (information sharing, repeated purchases, and signaling) are generally inefficient because their effectiveness depends on the consumer's ability to detect a cheat after the purchase. In the case of credence attributes, consumers cannot verify the quality but can only deduce it from the cues they receive on credence quality. They "believe" or "give credence" to the signals without being able directly to test or verify the credence quality itself. To avoid a market failure, consumers often need government or a credible third party. According to Caswell and Modjuszka (1996, p. 1251), "quality signaling may still be used but requires a reputable certification agent whom consumers can trust." Governmental intervention or credible third party intervention can mitigate market failure and guarantee fair-trading. However, such intervention will be efficient only if its costs are lower than those of alternatives capable of correcting the market failure *and* lower than benefits expected from the intervention.

Even though information about credence characteristics may be disclosed, consumers may have difficulty in processing it because of time constraints or a lack of specific skills. Government or third party intervention can be considered to be a partial delegation by consumers of their power to define quality prior to its monitoring and signaling to the consumer. Such intervention is intended to generate consumer trust and influence purchase choices. Its effectiveness depends on the following factors (Grolleau and BenAbid, 2001):

- *How quality is defined.* For example, the claim "GMO free" supposes a previous definition of a GMO product itself, the choice of a detection threshold, and the precision of the measurement at different levels into the agro-food chain (e.g., what are the labeling requirements for milk from a cow fed with GMO products?). Frequently, public authorities directly or indirectly define the terms in order to avoid a proliferation of criteria (see, for example, Caswell, 2000).
- *How quality is monitored.* For example, credible monitoring can require an appeal to an independent expert, who checks the product's conformity with specifications according to a previously defined procedure (the certification system).
- *How quality is signaled.* Quality signaling requires more than solving the asymmetrical information problem (i.e., providing accurate and credible information to consumers). Such signaling also requires cognitive support. This

> support may be provided, for example, through markers and knowledge summaries, or certificates capable of capturing consumers' attention in a context of informational overload without requiring excessive transaction costs. In brief, ecolabel design matters.

The third point is particularly important for the labeling of the process attributes of agro-food products. Simon (quoted in Varian, 1995, p. 200) recognizes that

> what information consumes is rather obvious: It consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it.

Some empirical studies argue the effectiveness of consumers delegating quality definition and monitoring depends more on the reputation and status of the government or third party than on a precise knowledge of the methods of its intervention (Steenkamp, 1989; Leubuscher et al., 1998). In addition, ecolabel design matters because of information problems. For example, Wynne (1994) shows that environmental report cards (graphical presentation of environmental performances without value judgments) establish symmetrical but useless information for consumers who lack expertise to process them. Well-designed ecolabels can serve as cognitive supports that economize on the attention of consumers and on transaction costs (Valceschini, 1999; Wynne, 1994). Cognitive support means that the information is conveyed in simple statements that are easy to read and easily understandable without being too time-consuming or requiring high technical abilities.

Overall, more or less external intervention in markets is likely to be necessary depending on whether key attributes of the product are search, experience, or credence in nature. In most cases, market mechanisms can be self-enforcing for both search and experience attributes, while credence attributes will frequently require an increased level of external intervention in order for markets to function effectively.

Using Search and Experience Attributes as Indicators of Credence Attributes

Products are bundles of attributes, and in real markets information on some of these attributes may serve as indicators of the quality of others. Similarly, extrinsic indicators and cues can be used to provide signals about the level of intrinsic quality attributes. To market their products more effectively and to avoid high measurement and signaling costs, producers may use the level of and information on search and experience attributes, which consumers can verify, to reinforce signaling about the quality level of credence attributes. For example, consumers are generally unable to measure intrinsic process attributes such as the impact of production practices on animal welfare or the environment, but may make inferences about these attributes from extrinsic quality indicators and cues such as eco-seals of approval or brand names.

For example, Doussan (1998) notes that the direct measurement of the environmental impacts of farming can require excessive transaction costs because of the need to use a sworn inspector who monitors each field using all technical means available to verify quality data. Especially at the consumer end of the supply chain, such an investment is prohibitive and consumers must use an array of information to give credence to claims about process quality. These include labels that represent testing efforts by other parties in the supply chain as well as inspection and verification of the other quality attributes of the product.

In practice, most certification systems tend to be oriented toward one-dimension of quality, such as quality control (e.g., ISO 9001), environmental soundness (e.g., ISO 14001), or safety (e.g., HACCP and the future ISO 18000). Of course, product quality is frequently multidimensional, and firms or consumers search for optimal tradeoffs among different attributes. In a multi-attribute/multi-signal atmosphere, certification systems interact and can reinforce or attenuate each other's effects.

The precise dividing line between experts in different fields is admittedly fuzzy at the consumer level, particularly for credence attributes. For example, fair trade certification can reinforce the credibility of an environmental certification. Many fair trade labels, such as Max Havelaar, include environmental requirements and vice versa because final consumers in developed countries are sensitive to a range of issues regarding methods and conditions of production (Zadek et al., 1999). From another perspective, the co-existence of several certification systems tends to increase the consumers' transaction costs in acquiring and processing information, making it more difficult to capture their attention. As a result there has been some evolution away from one-dimensional to multi-dimensional certification systems, such as integrated quality-environment-safety systems. Such systems facilitate simplified signals to consumers that synthesize several attributes, allowing for lower transaction costs. The success of these consolidated systems in conveying specific information about particular quality attributes needs further evaluation. However, the precision of specific information may be less important than the overall quality perception delivered to consumers.

We particularly focus on how the quality levels of search and experience attributes and information on them influence the consumer's evaluation of the credibility of an ecoseal signals the credence attribute of environmental friendliness. Figure 2 presents a simplified sequence for this interaction:

1. The producer signals the credence attribute of environmental friendliness through use of an eco-seal of approval. The level of this credence attribute is essentially a promise made by the producer that is unverifiable by consumers.
2. Consumers form expectations on the levels of related search (e.g., less packaging) and experience (e.g., better taste) attributes, which will be associated with the eco-seal. Consumers may also form expectations about extrinsic indicators (e.g., other types of certification) and cues (e.g., higher price, higher quality brand name).
3. Consumers assess by inspecting the product or buying and using it whether their expectations about the product's search and experience attributes are met.
4. Consumers are either satisfied with or disappointed in the degree to which the quality of the search and experience attributes corresponds to their expectations.
5. If satisfied, consumers will give more credence to the truthfulness of the producers' signal regarding the credence attribute of environmental friendliness (positive feedback). If disappointed, consumers will be suspicious of the truthfulness of the producers' signal regarding environmental quality (negative feedback).

The key link in the above sequence is the second, which links expectations and eventual product evaluation across quality attributes. These expectations may not be scientifically proven and objective; they frequently correspond to subjective beliefs. They are well documented in several empirical studies. For example, Søndergaard (1999) surveyed consumers of ecological fish in Spain, Germany, and Denmark. She found that among the most important reasons for purchasing ecological food were that these products were believed to be of higher quality, tastier, and healthier than conventional food products. Similarly, CEC (1999) found that the interest of Canadian, Mexican, and American consumers in shade-grown coffee was most influenced by the perception that this type of coffee is superior in taste and quality.

The interaction of information on the different types of attributes will influence the subsequent purchasing decisions of consumers. Note that the credibility of the claim about the credence attribute is reinforced or undermined without the consumer directly assessing its veracity. While these related search and experience attributes might be imperfect (perhaps very imperfect) indicators of the credibility of the credence signal, consumers will use them to form their overall quality perceptions. This suggests that certifying agencies, producers, and marketers must be cognizant of the multi-dimensional quality of the products they seek to sell.

When consumers make repeated purchases over time, they can use inferences across attributes, cues, and indicators to evaluate attributes that they cannot verify. Doing so reduces the consumer's information and transaction costs by serving as a substitute for an expensive process of gathering and processing complex information, or acquiring costly information from disinterested third parties. A common inference by consumers regards the extrinsic cue of price. Many consumers distrust environmental claims on low priced products because they perceive a dissonance between a low price and an environmental promise. This is the case even though, objectively, it is sometimes possible to produce ecological products at lower costs than conventional ones.

Defining a Credibility Area for Eco-Friendly Agro-Food Products

Defining a credibility area for eco-friendly agro-food products depends on how the different attributes of a product are differentiated in a particular country or among particular market segments. Differentiation can be vertical, where if products were offered at the same price, all consumers would rank different quality levels in the same way. For example, pesticide residues in apples would presumably be vertically differentiated because all consumers would prefer lower levels (Caswell et al., 2002). Other attributes might be horizontally differentiated, where, again at the same price, some consumers would prefer one quality level and others would prefer other levels. For example, apple varieties are usually horizontally differentiated.

The level of a product's environmental soundness or environmental stewardship may be vertically differentiated, although perhaps only weakly among some consumers. Other attributes may be vertically or horizontally differentiated and how they are differentiated is likely to vary, particularly among countries.

Lancaster (1979) extended economic modeling of product quality to define these dimensions of differentiation within a group of goods. According to him, an increase or decrease in the absolute quantities of all characteristics per unit of the good corresponds to vertical product differentiation. A relative increase or decrease in the quantities of characteristics corresponds to horizontal differentiation.

Our conceptual definition of an eco-friendly product corresponds to a conventional product with additional environmental attributes. It can be considered to be vertically differentiated according to Lancaster's perspective. This environmental attribute can interact with several other dimensions of product quality. These interactions can be objective or perceived. For example, an increase in certain environmental characteristics may have a negative effect on other qualities, such as taste or color. In other cases, the interaction is just perceived by the consumer.

Ecolabels themselves correspond to different bundles of environmental criteria, selected according to the judgment of governments, certifiers, or producers that can diverge from the individual preferences of market participants. As observers have noted, greenness is a confusingly multidimensional concept. Indeed, environmental friendliness may rarely be the dominant driver in consumers' product choices, but instead be an additional secondary consideration. In this case, environmentally friendly products are horizontally differentiated. Moreover, as noted above, product differentiation is frequently defined according to a specific group, and the classification can vary among different subpopulations within a given country at a specific time. In several ecolabeling programs, producers maintain or improve conventional properties while at the same time providing environmental attributes.

Using these concepts of differentiation, in Figure 3 we define a simplified two-dimensional attribute space for agro-food products. The vertical axis indicates the level of environmental characteristics, while the horizontal axis indicates the level of conventional attributes (e.g., taste, food safety, appearance).

In the characteristic space at time t, eco-friendly food products must have environmental characteristics with a minimum level A_e. At the same time, to be credible, eco-friendly food products should have quality levels for conventional attributes at least as high as A_c. This A_c threshold corresponds to the levels of related search and experience attributes expected of eco-friendly products by consumers. A product with high levels of conventional quality attributes may not meet the A_e standard for environmental friendliness. The credibility area for environmental friendly food products is the shaded space where $(x, y) \exists (A_c, A_e)$. From a conceptual point of view, all the products in this area could be successfully labeled as eco-friendly.

An ecolabeling program involves continuously updating the product attribute criteria. At (t+1), the thresholds A_c and A_e can correspond to new consumer requirements. For example, consumer requirements for taste and food safety are thought to be continually increasing. The thresholds for environmental soundness may shift as well, so that the credible area will be revised regularly.

Indeed, the market success of eco-friendly agro-food products is closely linked to their position in the credibility area. This takes into account not only environmental attributes but also conventional attributes and, notably, related search and experience attributes (Grolleau, 2000). In a context where consumers have limited processing time and abilities, the credibility of environmental labeling is linked to the transaction environment. This transaction context includes characteristics of the eco-seal itself but also other search and experience attributes of the product, such as its packaging and ambience. Ambience, as is well documented in the marketing literature, can include several diverse variables, such as brand reputation and store design. Consumer perceptions of these variables can work together to mitigate or reinforce informational asymmetry and overload.

The provision of conventional and environmental attributes can be analyzed as an implicit contract between producers and consumers. A high level of conventional attributes detectable by consumers before or after the purchase can support the credibility of environmental claims by mitigating two distinct sources of market failure. First, these high levels will support the credibility of the credence claims regarding environmental attributes. Second, an expectation of high conventional quality can attenuate the potential for free riding (i.e., fraud) linked to most environmental attributes. Indeed, most environmental attributes are public goods and associating private with public benefits allows the alleviation of free riding.

Conclusions

Our central point is that the credibility of ecolabels among consumers is influenced by the accompanying search and experience attributes of the labeled product. Consumers form expectations about the levels of search and experience attributes based on the presence of an ecolabel. Their subsequent evaluation of these attributes then influences the credibility of the environmental claim and their interest in repeat purchase of the product based on its environmental soundness.

Environmental differentiation of food products requires that levels of related search and experience attributes be taken into account. Honest environmental differentiation can fail if it does not consider the multi-dimensional character of quality perception. An important further step is to identify which attributes are most likely to reinforce the credibility of environmental claims in different market segments. While private and public authorities can define and enforce standards for ecolabeling, only products with the right array of accompanying quality attributes are likely to be fully credible and successful in the market.

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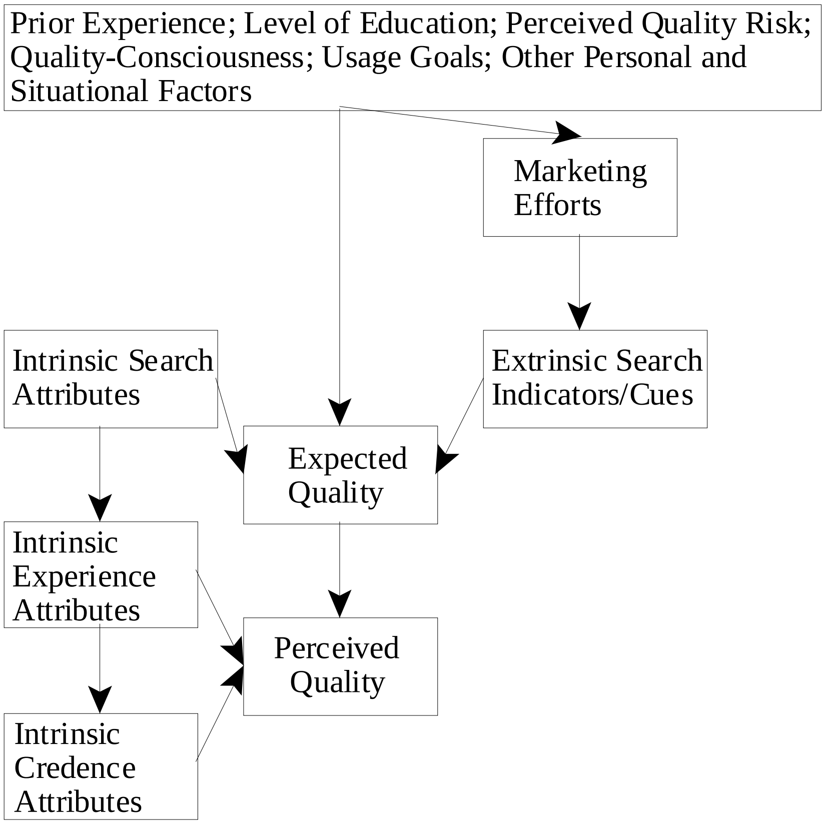
Prior Experience; Level of Education; Perceived Quality Risk; Quality-Consciousness; Usage Goals; Other Personal and Situational Factors
Marketing Efforts
Intrinsic Search Attributes
Extrinsic Search Indicators/Cues
Expected Quality
Intrinsic Experience Attributes
Perceived Quality
Intrinsic Credence Attributes

Figure 1. A unified model of quality perception and quality assurance (Caswell et al., 2002).

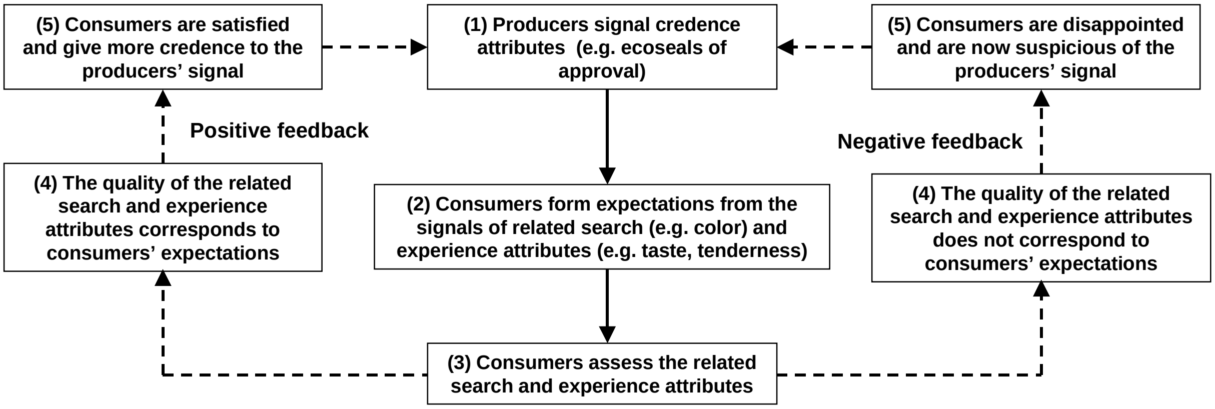
(5) Consumers are satisfied and give more credence to the producers' signal
(1) Producers signal credence attributes (e.g. ecoseals of approval)
(5) Consumers are disappointed and are now suspicious of the producers' signal
Positive feedback
Negative feedback
(4) The quality of the related search and experience attributes corresponds to consumers' expectations
(2) Consumers form expectations from the signals of related search (e.g. color) and experience attributes (e.g. taste, tenderness)
(4) The quality of the related search and experience attributes does not correspond to consumers' expectations
(3) Consumers assess the related search and experience attributes

Figure 2: Impact of search and experience attributes on the credibility of signaling for credence attributes.

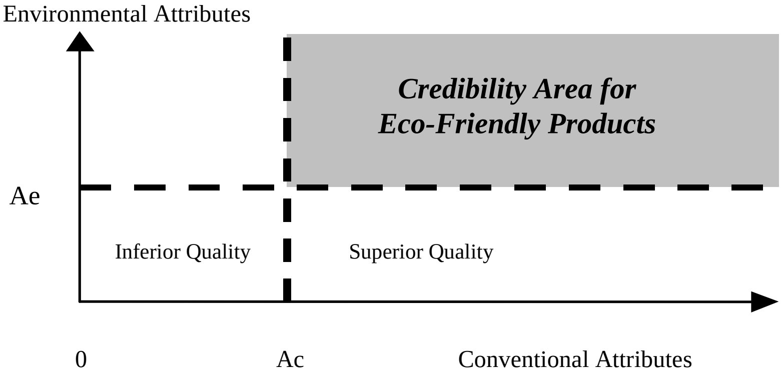
Environmental Attributes
Credibility Area for
Eco-Friendly Products
Ae
Inferior Quality
Superior Quality
0
Ac
Conventional Attributes

Figure 3. Credibility area of eco-friendly products in the attribute space.

Adding Credibility Beyond Ecolabels

Ulrich R. Orth[1]

Ecolabels are quality signals that serve as easily recognizable cues for consumers by communicating the product attribute “environmentally friendly production.” The intended audience includes consumers whose purchase behavior is greatly influenced by social-altruistic, biospheric or egoistic motivation (Uyeki and Holland, 2000). With no analytical means available to unambiguously discriminate between organically and conventionally grown produce, buyer trust and supplier credibility become key issues in the purchase process. Attempts to create trustworthy and credible ecolabels are numerous, ranging from third-party certification marks that are awarded only after a thorough and sophisticated review process, to flashy imitations with little justification.

From a consumer behavioral perspective, “environmentally friendly” production can be further classified as a trust as well as a search attribute. Search attributes are usually accessible prior to purchase and are employed by consumers to identify relevant offers (evoked set). Trust attributes cannot be evaluated at all by consumers, or only at high costs (Darby and Karni, 1973). Moreover, environmentally friendly production is an intrinsic product attribute (Olson and Jacoby, 1973), again not readily available for consumer evaluation. An ample body of research demonstrates that consumers in this case employ extrinsic cues, such as labels, brand names, and store names, to decide regarding intrinsic attributes (Rao and Monroe, 1989).

In many retail environments, products are displayed and chosen without personal contact. Here, ecolabels are the major extrinsic cue available to environmentally conscious customers. However, large quantities of ecoproducts are bought in environments characterized by frequent buyer-seller interactions, such as supermarket service counters, farmers’ markets, specialty stores, or product demonstration stands.

This paper deals with the interaction between those communicators and consumers in the context of ecolabeled products. Personal characteristics of communicators affect how recipients perceive their credibility and consequently the credibility of the promotional message (Wilson and Sherrell, 1993). Physical attractiveness is considered to be among the most important personal characteristics (Kelman, 1961; Patzer, 1985; Reingen and Kernan, 1994; DeShields et al., 1995). Abundant research evidence in advertising, sales promotion, and social psychology attests to the potential effects of employing attractive rather than unattractive spokespersons and models (e.g., Baker and Churchill, 1977; Reid and Soley, 1983; Bloch and Richins, 1992; DeShields et al., 1995; Onodera and Miura, 1998).

Despite a number of studies contributing to a better understanding of the question, nothing has been found on how communicator attractiveness works in conjunction with environmentally friendly products (Chaiken, 1979; Caballero and Solomon, 1984; Caballero et al., 1989). No systematic examination could be found that looks at the conditions for positive and potential negative effects of attractive communicators: Should less attractive models be employed in cases of a high product class involvement? May competent communicators be attractive, or does that impair their perceived competence?

Consequently, this contribution examines how the attractiveness of communicators affects recipients´ attitudes for an ecolabeled product. Both direct and mediating effects are considered. The empirical study also investigates conditions that may affect the influence of attractiveness.

Literature Review

Trustworthiness, competence, and physical attractiveness are considered major characteristics of an informing individual (communicator) for efficiently generating and shaping attitudes of an informed individual (recipient) (Janis and Hovland, 1959). No study could be found that examines this issue with regard to organic products. Theoretically, communicator attractiveness can affect recipients’ attitudes directly as well as indirectly.

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Direct effects of attractiveness

A direct positive effect of an attractive communicator on consumer attitudes is supported by various streams of research. Recipients seek to be more involved with attractive communicators. In those cases, the physical attractiveness either represents a stimulus that increases recipients' attention (Kahle and Homer, 1985) or motivates a recipient to maintain closer contact to this person (Berscheid and Walster, 1974).

Another stream of research interprets the effect as an attempt on behalf of the recipients to identify themselves with attractive communicators (Kelman, 1961). During this process, recipients strive for a reward by imitating role models. The respective reward usually is an improved self-perception. Imitating the demonstrated behavior (here: product choice) provides the recipient with the comfortable feeling of becoming similar to the attractive communicator (Zinkhan and Hong, 1991).

A third line of thought is based on the affect transfer model and the dual mediation hypothesis (MacKenzie et al., 1986). It assumes that positive feelings generated while watching an attractive model are being transferred to the promoted object, resulting in positive attitudes toward this object (i.e. ecolabeled product). Accordingly, hypothesis H1 for this study is: communicator attractiveness has a positive direct effect on recipients' attitudes toward ecolabeled products.

Mediated effects

In addition to the previous considerations, communicators' attractiveness might affect recipients' attitudes indirectly by affecting their perceived trustworthiness and competence. This is suggested by the beauty-is-good stereotype (Dion et al., 1972; Eagly et al., 1991): Attractive communicators are believed to have more positive characteristics than unattractive ones, a thought that is supported by halo and learning effects as well as dissonance theory. Halo effects exist when a global evaluation is based on easily available characteristics; this global evaluation then affects the future evaluation of attributes (Shapiro, 1982; Huber and McCann, 1982). Recipients develop a superficial image of a person based on his or her attractiveness that then affects the perception of other characteristics like competence and trustworthiness (Baker and Churchill, 1977). Dissonance theory postulates that incongruent perceptions generate an uncomfortable situation that the recipient strives to resolve (Maheswaran and Chaiken, 1991). Hence, attractive communicators are expected to send positive messages and to have positive characteristics.

Furthermore, learning effects may explain mediating effects (Greenwald, 1968). People observe that attractive individuals frequently are more appreciated and treated more friendly (Patzer, 1985; Reingen and Kernan, 1994). They appear to be better liked, and they are assumed to be more sociable, independent and exciting, more successful in business, with a happier family life and a higher status (Brigham, 1980), while less attractive people are assumed to be deviant and are often stigmatized (Jones et al., 1978; Unger et al., 1982). As a consequence, the audience associates attractive individuals with positive attributes (Solomon et al., 1992). This leads to hypothesis H2: Attractive communicators are perceived as more competent and trustworthy than unattractive ones: attractiveness affects attitudes toward ecolabeled products indirectly.

Conditioning variables

A number of studies suggests that the attractiveness of a communicator does not affect the attitudes of a recipient equally under all circumstances. Conditions for the effects of attractiveness include product category involvement and the gender of the communicator.

A widespread assumption is that compared with a high-involvement situation, attitudes are more easily affected under low-involvement conditions by pleasant but otherwise minor stimuli (Assael, 1984; Papavassiliou, 1989; Maheswaran and Chaiken, 1991; Lord et al., 1995). The physical attractiveness of a communicator could be considered a stimulus that is not necessarily relevant for the promoted object. The logical conclusion would be to employ attractive models under low-involvement conditions only and not in high-involvement situations. Empirical studies for consumer products (Reingen and Kernan, 1994), however, found strong effects of communicator attractiveness on recipients´ attitudes in low as well as in high involvement situations. Accordingly, hypothesis H3 is: The effect of communicator attractiveness on recipients´ attitudes does not depend on the product class involvement.

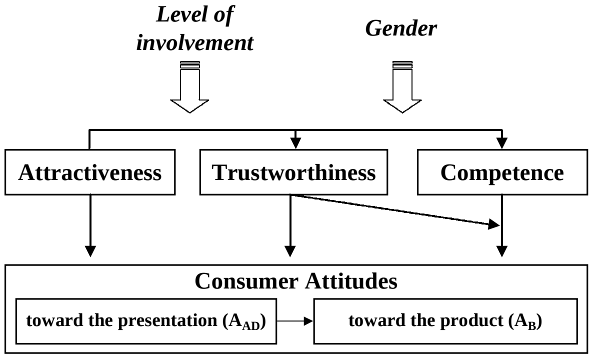
Some researchers point out that attractiveness is more important when communicator and receiver are of different genders (Baker and Churchill, 1977; Dion, 1981). According to the affect-transfer model and the dual-mediation hypothesis, an attractive promoter would be a special stimulus that pleases the recipient and increases his or her willingness to interact. On the other hand, this would be contradictory to the earlier mentioned motivation to imitate. Empirical studies also have yielded inconsistent results: Baker and Churchill (1977) found that attractive communicators affect the attitudes of significant others more for "romantic" products such as eau de toilette than for "everyday" products such as coffee. They concluded that a "pleasing" effect was involved. However, follow-on research yielded contradictory findings (Chaiken, 1979; Caballero and Pride, 1984; Caballero and Solomon, 1984; Caballero et al., 1989). This leads to hypothesis H4: Gender is not relevant to the effect of a communicator's attractiveness.

Summarizing previous fundamental and empirical research on the effects of attractive communicators, it can be stated that:

- Direct effects can be explained by a willingness-to-interact, by attempts of the recipient to identify with the communicator, by the affect-transfer model, and by the dual-mediation hypothesis.
- Mediating (indirect) effects that work through competence and trustworthiness are theoretically founded on beauty-is-good stereotypes, halo effects, dissonance theory, and learning.
- The validity of those findings appears not to be limited by the level of involvement, and gender.

Figure 1 provides an overview of variables and linkages.

Figure 1. Study variables and their expected linkages.



Method

Design and procedure

These hypotheses were tested for an organic apple juice. Competence and trustworthiness of communicators appear to be key factors since organic juice has attributes that can be experienced (e.g., taste) and others that simply have to be trusted by the consumers (organic method of fruit and juice production as signaled by ecolabels). Hence, competent and trustworthy communicators could reduce respective uncertainties and doubts.

The empirical study employed eight communicators that had been screened for differences in physical attractiveness, competence, and trustworthiness. While the communicators were selected for some reasonable familiarity with the product (professionally or by private use) they were not celebrities or familiar to the audience, so that potentially distorting effects of familiarity and esteem were avoided (Ohanian, 1991). Different cover stories anchored on profession and age (grandmother, fashion model, professional athlete, children nurse, student, juice producer, promotion professional) were designed to manipulate competence and trustworthiness and had been selected after a pre-test. To exclude as many potential effects of personal style as possible, all communicators introduced the product with a standardized text. Each group of respondents evaluated only one presenter under the guise of a new product test.

Sample

Respondents were 186 students between 19 and 26 years (balanced gender ratio, median age: 22 years). This narrow segment has been selected to exclude additional potentially distorting factors. The product presentations took place in a realistic setting (supermarket product demonstration).

Measures

Following established procedures, perceived competence, trustworthiness and attractiveness were measured on a 7-point bipolar scale (Ohanian, 1991) using a pre-tested questionnaire. The corresponding items were assigned to common factors by principal component analysis with oblique-angled rotation (KMO = .880, explained variance = .613). Eigenvalues greater than 1.0 were used as a cutoff criterion to identify three factors labeled competence (competent, experienced, educated, intelligent), trustworthiness (trustworthy, honest, sincere, frank, selfish, open, reliable), and attractiveness (attractive, beautiful, likable, interesting, pleasing, appealing). Positive correlations among the factors confirm expected linkages.

Two independent variables were employed to measure promotion effects: recipients' attitudes toward the presentation and toward the promoted product (Brown and Stayman, 1992). Both constructs were measured through five items on a 7-point bipolar scale (Holbrook and Batra, 1987). Again, the items were assigned to common factors by factor analysis with oblique-angled rotation (KMO = .902, explained percentage of variance = .773). Analysis of the statements indicates that both variables correlate quite strongly. This suggests an A_{AD} effect: individuals develop an attitude toward communication media (A_{AD}) that in turn affects their attitude toward the product (A_B) (MacKenzie et al., 1986; Homer, 1990). Regression analysis with A_B as the dependent and A_{AD} as the independent variable yielded a significant effect ($R^2 = .400$; $F = 121.86$; $p < .001$). Hence, the results of this study are consistent with those of previous studies (Homer, 1990). Accordingly, only the A_{AD} variable has been further considered in the analysis.

Another objective of the study was to investigate product class involvement as a potential condition for effects of attractiveness. Measurement of this variable was conducted according to Zaichkowsky (1985). From suitable items that she identified, three were selected and adapted. The statements were: 1) I prefer a particular apple juice; 2) I am very interested in information about different apple juices; and 3) there are many differences between apple juices. Cronbach´s α was .607, the eigenvalue 1.640, and the factor loadings .791, .787, and .629. Although those quality parameters are sufficient, it is acknowledged that the employed measures are not without problems. However, since further applications only require a categorization in two groups (high and low involvement), the scale has been accepted.

For each construct (competence, trustworthiness, attractiveness, attitudes, involvement), mean values have been computed based on the associated items for further use in the analysis.

Results

Effects of competence and trustworthiness

An adequate model for the interaction of the mediating variables (competence and trustworthiness) and the dependent variable (attitudes) needed to be identified before mediating effects of attractiveness could be examined.

If one were to assume a linear-additive relationship between attitudes as the dependent variable and trustworthiness and competence as independent variables (further referred to as model A), data analysis could be performed employing a causal model (e.g., Lisrel). However, this reference model contradicts mechanisms derived earlier during the literature review. There it was assumed that trustworthiness should be considered the moderating variable for effects of competence (here: model B). Applying either model would have serious consequences for the examination of direct and mediating effects of attractiveness on attitudes. Hence, it appears appropriate first to examine the interrelations between competence, trustworthiness and attitudes before further hypotheses can be tested. This has been done by examining three alternative models: Models A and B were supplemented by an alternative model C that considers competence the mediating variable (Baron and Kenny, 1986).

To identify the most probable constellation, a series of regression analyses was conducted. The mediating variables in models B and C were each split into three dummy variables. Since the models have different degrees of freedom, the most appropriate model can be identified considering (high) R^2_{adj} and (low) Akaike Information Criterion (AIC, Akaike, 1987). The following regression equations have been examined:

Model A:

$$Y = ß_0 + ß_1 C + ß_2 T$$

Model B:

$$Y = ß_0 + ß_1 CT_{low} + ß_2 CT_{medium} + ß_3 CT_{High} + ß_4 T$$

Model C:

$$Y = ß_0 + ß_1 CT_{low} + ß_2 CT_{medium} + ß_3 CT_{High} + ß_4 C$$

with

Y = Attitudes
C = Competence (metric)
T = Trustworthiness (metric)
C_{low} = 1 if competence is low, 0 else
C_{medium} = 1 if competence is medium, 0 else
C_{high} = 1 if competence is high, 0 else
T_{low} = 1 if trustworthiness is low, 0 else
T_{medium} = 1 if trustworthiness is medium, 0 else
T_{high} = 1 if trustworthiness is high, 0 else.

The results for the model evaluations are listed in Table 1. Considering R^2_{adj} and AIC, model B, which was derived from the literature review, proves to be the best: in addition to the significant effect of trustworthiness, the magnitudes of the parameters for the interaction effects appear to be in the right order ($\exists_1=.358 < \exists_2=.441 < \exists_3=.448$). Hence, model B has been selected for the analysis of the mediating effect of attractiveness.

Effects of Attractiveness

Direct and mediating effects of attractiveness were evaluated by performing three regression analyses. Subjects of the evaluation are: 1) the effect of the independent variable (attractiveness) on the mediator (competence and trustworthiness); 2) the effect of the independent variable on the dependent variable (attitude); and 3) the effects of the independent variable and the mediator on the dependent variable:

Model 1: (a) $C = ß_0 + ß_1A$; (b) $T = ß_0 + ß_1A$

Model 2: $Y = ß_0 + ß_1A$

Model 3: $Y = ß_0 + ß_1A + ß_2CT_{low} + ß_3CT_{medium} + ß_4CT_{high} + ß_5T$

The direct effect of the independent variable becomes apparent when models 2 and 3 are compared. A mediating effect of the independent variable could be stated if its effect were smaller in regression model 3. The regression analyses results are listed in Table 2.

The results indicate that model 3, which contains the independent variable (attractiveness) as well as both mediating variables (competence and trustworthiness), is superior to model B (see Table 3), which contains only the mediating variables: AIC decreases from -57.26 (model B) to -71.90 (model 3) and R^2_{adj} increases from .507 to .552. Moreover, the parameter for the effect of attractiveness in model 3 (.372) is highly significant. These findings strongly support the postulated direct effect. Analysis of model 1 shows evidence for the positive effect of attractiveness on the mediating variables. A further comparison of the results for models 2 and 3 confirms the mediating effect of attractiveness descriptively by considering the respective parameters of the regression equation (model 2: .783 > model 3: .372). This confirms hypotheses H1 and H2.

Conditions for effects

Hypothesis H3 asserts that involvement with the product class does not influence the effect of attractiveness on attitudes. To evaluate this hypothesis, models 1 through 3 have been computed separately for two groups of individuals that differ in their involvement. Using the median, the total number of 184 cases has been split evenly into one group with low product class involvement and one group with high product class involvement. Table 3 gives the parameters by involvement.

The results are very similar for the two groups. However, R^2 is consistently lower for individuals displaying a relatively low involvement than for the second group. A simple explanation could be that less involved individuals devoted less attention to answering the questionnaire. Product class involvement did not influence the effect of attractiveness on recipients' attitudes, confirming hypothesis H3.

Hypothesis H4, finally, asserts that gender has no effect on how the communicator's attractiveness affects recipients´ attitudes. The results of a simple bivariate ANOVA with the promotion effect (attitude) as dependent and communicator gender and attractiveness (dichotomized on the median) as independent variables contradict this hypothesis.

As expected, attractiveness has a significant main effect ($F=96.46$, $p<0.001$), but so does gender ($F=3.43$). The interaction effect between attractiveness and gender is not significant ($F=0.7$). R^2 is .349, a remarkable value for an ANOVA model that includes an independent variable with a significantly reduced variance (the attractiveness has been dichotomized). These results suggest that female communicators affect attitudes more, which supports hypothesis H4.

Conclusions

A key objective of this study was to identify whether communicator attractiveness can reinforce credibility and trustworthiness of ecolabels. There is evidence from this study for positive direct as well as indirect effects. The logical conclusion is that marketing managers responsible for organic product promotion should not only choose communicators for their perceived competence and trustworthiness, but also try to employ highly attractive individuals. The assumption that in cases of high product class involvement the effect of attractive communicators is weaker than with low involvement has been rejected. Notwithstanding the product class involvement, attractive communicators should be employed to favorably influence recipients´ attitudes. Considering that in most families it is still the mother who chooses and prepares food, the finding that female communicators were more effective in promoting the product apple juice is not surprising.

Further questions arise as to what are determinants of perceived attractiveness, trustworthiness and competence. Identification of how details like clothing, hair style, and cosmetics contribute to the perceived attractiveness of individuals (Englis et al., 1994) allows marketing communication practitioners to adequately "design" communicators for maximum effects.

An additional area for future research lies in investigating how attractiveness affects not only attitudes in the first stage but preferences and product choice in further stages. While the examination of respective mechanisms clearly is more difficult, retailers already have expressed a great interest in establishing a link between communicator characteristics and sales.

Finally, this study did not compare alternatives for promoting organic products. Examining different means of adding credibility, such as third-party certification marks, endorsers, or ecolabels, will significantly contribute to more efficient and persuasive communication of environmentally friendly production.

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Table 1. Effects of communicator competence and trustworthiness on recipient attitudes.[a]

	Model A		**Model B**		**Model C**	
	Parameter	t-value	Parameter	t-value	Parameter	t-value
Constant	.113	.49	.418	1.13	.374	1.06
C	.402	6.98^{***}	-	-	.322	3.39^{***}
T	.553	6.83^{***}	.424	2.96^{**}	-	-
$C\ T_{low}$	-	-	.358	5.36^{***}	-	-
$C\ T_{medium}$	-	-	.441	6.70^{***}	-	-
$C\ T_{high}$	-	-	.448	5.90^{***}	-	-
$T\ C_{low}$	-	-	-	-	.516	4.83^{***}
$T\ C_{medium}$	-	-	-	-	.527	6.31^{***}
$T\ C_{high}$	-	-	-	-	.610	6.66^{***}
F	82.87^{***}		46.96^{***}		47.01^{***}	
R^2; R^2_{adj}	.484; .478		.518; .507		.490; .479	
AIC	-55.40		-57.26		-55.50	

[a] $^{*}p < 5\%$, $^{**}p < 1\%$, $^{***}p < 0.1\%$

Table 2. Direct and mediating effects of communicator attractiveness.[a]

	Model 1a		**Model 1b**		**Model 2**		**Model 3**	
	Dependent variable							
	Competence		Trustworthiness		Promotion effects		Promotion effects	
	Param.	t-value	Param.	t-value	Param.	t-value	Param.	t-value
$\exists_0$	1.468	6.28^{***}	1.137	7.91^{***}	.813	4.16^{***}	.426	1.21^{***}
$ß_1$	.671	8.78^{***}	.481	12.92^{***}	.783	12.17^{***}	.372	4.34^{***}
$ß_2$	-	-	-	-	-	-	.260	3.85^{***}
$ß_3$	-	-	-	-	-	-	.365	5.60^{***}
$ß_4$	-	-	-	-	-	-	.384	5.21^{***}
$ß_5$	-	-	-	-	-	-	.141	3.94^{***}
F	77.15^{***}		166.93^{***}		148.15^{***}		45.17^{***}	
R^2; R^2_{adj}	.300; .296		.481; .478		.449; .446		.565; .552	
AIC	22.373		-151.75		-33.88		-71.90	

[a] $^{*}p < 5\%$, $^{**}p < 1\%$, $^{***}p < 0.1\%$

Table 3. Direct and mediating effects of attractiveness for high and low product class involvement.[a]

	Model 1a		**Model 1b**		**Model 2**		**Model 3**	
	Dependent variable							
	Competence		Trustworthiness		Attitude		Attitude	
	Product class involvement							
	Low	High	Low	High	Low	High	Low	High
$\exists_0$	1.610^{***}	1.251^{***}	1.120^{***}	1.243^{***}	$.875^{***}$	$.786^{***}$	$.338^{*}$	$.520^{*}$
$ß_1$	$.605^{***}$	$.778^{***}$	$.641^{***}$	$.530^{***}$	$.776^{***}$	$.775^{***}$	$.319^{**}$	$.419^{***}$
$ß_2$	-	-	-	-	-	-	$.292^{***}$	$.232^{**}$
$ß_3$	-	-	-	-	-	-	$.405^{***}$	$.330^{***}$
$ß_4$	-	-	-	-	-	-	$.407^{***}$	$.363^{***}$
$ß_5$	-	-	-	-	-	-	$.199^{*}$	$.081^{*}$
R^2	$.275^{***}$	$.334^{***}$	$.331^{***}$	$.388^{***}$	$.428^{***}$	.449	$.548^{***}$	$.566^{***}$

[a] $^{*}p < 5\%$, $^{**}p < 1\%$, $^{***}p < 0.1\%$

Ecolabeling: What Does Consumer Science Tell Us about which Strategies Work?

Mario F. Teisl[1], Brian Roe[2] and Alan S. Levy[3]

The environmental characteristics of products have become increasingly important to consumers (USEPA, 1994). Firms have responded by placing information on products that highlight the product's environmental attributes and by introducing new or redesigned "green" products (USEPA, 1991). Governments and nongovernmental organizations have also responded by organizing, implementing, and verifying environmental labeling programs (hereafter, ecolabeling) that cover thousands of products in more than 20 countries (USEPA, 1993).

One function of ecolabeling is to improve the flow of information to consumers (Mitra and Lynch, 1995), who in turn change their information search or product purchase behaviors. These changes may lead to changes in producer behaviors (see Moorman, 2001 for a list of studies looking at firms' responses to changes in information policies). Importantly, to alter markets, not all consumers need to be affected by the information program; only a subset of consumers need to respond to affect producers' behavior (Moorman, 1998).

When it is effective, labeling may allow for the correction of market failures in product production. The market failure here is that consumers with preferences for (or against) specific production outputs lack the information to reward (or punish) a product manufacturer through their market decisions (see Haener and Luckert, 1998 for a nice presentation of this issue). Firms that are better able to take advantage of the labeling programs will be rewarded with a comparative price or market share advantage (Mitnick 1981; Moorman and Slotegraaf, 1999).

The widespread use of ecolabels suggests that they are perceived as an effective method of altering consumer behavior. However, few studies have attempted to identify the effectiveness of alternative ecolabeling programs (Thogerson, 2000). Market-based research investigating other types of labels (e.g., nutrition labels) has demonstrated that labeling can change market behavior. The apparent effectiveness of these other labeling programs may not be applicable to ecolabeling because non-ecolabels provide information about the use characteristics of the product, whereas ecolabels differentiate products with respect to non-use characteristics.

Even if consumers prefer products indicating that they were produced in a more environmentally benign manner, several communication issues may delay or derail the potential benefits of an ecolabel. Because the promise of improved production practices is impossible for most consumers to verify, the success of ecolabeling uniquely hinges on companies being able to credibly communicate to the consumer that production practices have been altered. We present results from several experimental data sets that shed some light on how ecolabels can be made more effective.

Literature Review

Several attributes seem to affect the impact of information policies: compulsoriness, explicitness, and standardization (Teisl and Roe, 1998).

Compulsoriness denotes the degree to which all firms are required to provide product information. At one extreme, labeling restrictions are mandatory – all firms must display certain pieces of information. At the other extreme, labeling restrictions are voluntary; most environmental labeling programs fall into the voluntary category.

Voluntary information disclosure policies often yield an information environment in which consumers lack data concerning key product attributes. As a result,

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attention has been devoted to the process by which consumers infer a value for missing information or the process by which missing information affects choice (see Lee and Olshavsky, 1997, for a recent review of this literature). This research suggests that consumers look at equivalent attributes from other brands (Ross and Creyer, 1992; Jacard and Wood, 1988), or other attributes of the same product (Johnson and Levin, 1985; Ford and Smith, 1987). Others suggest that consumers may not infer missing values at all, but merely pay less attention to a product with missing information (Simmons and Lynch, 1991).

Explicitness denotes the degree of detail presented to consumers. For this paper we define two types of labels that are differentiated by the level of information detail. Ecoseals, such as seals of approval issued by certification programs, communicate little detail concerning attribute values. Only consumers who are intimately familiar with the certification agency and its standards understand the full meaning of the symbol. At the other extreme are disclosure labels that provide the most detailed information. Information is disclosed about several product attributes, such as nutrition labels on food, and the disclosure typically involves continuous or categorical information about each element, such as grams of fat, or high/medium/low risk. Disclosure labels are generally considered the most objective of the label categories, while ecoseals are often considered the most normative.

Consumer scientists have long understood that more information is not always better because of the possibility of information overload (Scammon, 1977) and of distraction from more authoritative information sources (Roe et al., 1999). A recent contribution in this area (Bei and Widdows, 1999) explores how disclosure of simple (summary ratings) versus complex (attribute-level ratings) information differentially affects consumers with different levels of experience and involvement in the product decision-making. They find that both simple and more detailed information improved respondents' efficiency, but respondents with previous knowledge of the product category benefit more from the more complex information.

The third major component of labeling policies is ***standardization***: the degree to which information is required to appear in a format that is uniform across products. At one extreme, a labeling policy can require a specific format, where the firm has no discretion over the presentation. For example, warning labels typically have wording, font size, font typeface and message location prescribed by regulation. Alternatively, the content of the information may be regulated but the firm has some discretion over how the information is presented. Studies suggest that standardized displays provide the largest benefit to consumers (Schkade and Kleinmuntz, 1994) because they increase the number of products or attributes considered during choice, allowing for more accurate choice decisions (Coupey, 1994; Winneg et al., 1998).

In the experiments analyzed in this paper we contrast simple information disclosure, in the context of ecoseals, and complex information disclosure in the context of detailed price and environmental information panels. Both types of information currently appear in the consumer goods marketplace; the prevalence, content and use of each type of disclosure is often the subject of public discussion and governmental regulation.

Approach

Two data sets are examined in this paper; one was collected during 1997 as part of a project studying labeling alternatives for deregulated electricity suppliers. This survey was administered as an in-person interview to a sample of 1,000 respondents intercepted at malls in eight U.S. cities (for more detail see Winneg et al., 1998). The second data set was collected during 2000 to help develop environmental labeling strategies for forest products. This survey was administered by mail to 3,254 pre-recruited US adult residents, of whom 1,948 responded, a 60% response rate (for more detail see O'Brien, 2001).

In both surveys, respondents viewed different environmental labels and were asked to perform a series of experiments (Experiments I and II are from the first survey, and Experiments III and IV are from the second). These experiments were designed to measure the performance characteristics of the different labeling strategies. Various statistical techniques (ANOVA, multivariate regression) were used in the data analysis. (For more information contact the first author.)

Experiment I

We tested how marketing materials, ecoseals and labeling affect respondents' perceptions of and uncertainty about product attributes and purchase intentions. Respondents were required first to rate a single electricity supplier on price, environmental impact and purchase likelihood after reading marketing bullet points. After rating the products, the respondents were then shown the product's accompanying label. After viewing the label, respondents were asked the same sequence of rating questions. Respondent uncertainty is measured by the inability to provide a rating; that is, whether the respondent answers "Don't Know" to a ratings question.

The bullet points and labeling regimes were experimentally manipulated; participants saw marketing bullets that emphasized either the environmental benefits of the product or the product's low price. Under some treatments they also saw an ecoseal. Respondents saw a label with information on either: 1) price, fuel mix (the fuels used to generate the electricity; e.g., coal, solar, and nuclear), and emissions; 2) fuel mix and emissions; 3) fuel mix; or 4) emissions.

Experiment II

We tested the impact that information has on consumers' ability to correctly identify product attributes and on their perception of whether they had enough information. We also estimated the market share impacts of the various labeling regimes.

Respondents were shown mock brochures representing three competing electricity products (A, B, and C). Each brochure contained marketing and label information that was experimentally manipulated. After viewing the products, they were asked which product they were most and least likely to buy, which was the cheapest, which the most environmentally friendly, and whether they felt they had enough information to make an informed decision.

We manipulated three key elements of the product information: 1) the strength of marketing bullet points; 2) the explicitness of label information (seven different levels: no disclosure, disclosure of an ecoseal, or detailed labeling of either: price; fuel mix; emissions; fuel mix and emissions; or price, fuel mix and emissions; and 3) the compulsoriness of the disclosure regimes (three possible levels: no disclosure; some products disclose information – voluntary; or all products disclose information – compulsory).

All respondents viewed brochures with four marketing points. The marketing points were stronger in wording for some groups while other groups saw marketing points that mainly involved puffery. Product A is the product with the lowest price, the highest air emissions, and the greatest proportion of fuel from fossil fuels. Product B has the highest renewable energy sources and is mid-range in price and air emissions. Product C is the cleanest in air emissions, highest in price, and mid-range in fossil fuel use.

Experiment III

We tested whether adding more detailed environmental information or altering the organization certifying the environmental information affects respondents' perceptions of the label or product. Respondents were presented with a single environmentally labeled generic wood product. After viewing the label, they were asked to: 1) rate the credibility of the label; 2) rate the environmental friendliness of the product; 3) rate their level of satisfaction with the amount of information presented; and 4) rate the likelihood that they would buy the product if the price and quality were the same as the brand of wood products they currently purchase.

The labels varied by explicitness, with four possible levels of information: 1) an ecoseal logo; 2) an ecoseal with contact information (phone number and website); 3) an ecoseal with contact information and a summary score; or 4) an ecoseal with contact information, summary score and a detailed table listing the five components of the environmental summary score. The scores also were manipulated.

The labels also differed by the organization certifying the environmental information. The organizations included the US Environmental Protection Agency (EPA), the Forest Stewardship Council (FSC), and the Sierra Club (SC).

Experiment IV

We tested if environmental labeling affects respondents' choices of wood products and if there are significant differences between: less explicit ecoseal approaches versus more detailed environmental disclosure; compulsory versus voluntary labeling; and standardized versus nonstandardized labeling.

Respondents were asked to picture themselves in a store looking to purchase a generic wood product, and finding three different brands of the product: A, B and C. The price and environmental attributes for the three products were such that C was the cheapest and least environmentally sound product, B was the most expensive and most environmentally sound product, and A was mid-range for both attributes. The price of the product was always disclosed, but the disclosure of environmental information was experimentally manipulated. Respondents were asked to assume that the quality of the three brands was identical except for the attributes disclosed above. After viewing the products, respondents were asked which product they would buy.

We manipulated three key elements of the product information:

- the ***explicitness*** of the information disclosure; three levels: no disclosure; an ecoseal with contact information; or an ecoseal with contact information, a summary score and a detailed table listing the five components of the environmental summary score
- the ***compulsoriness*** of the disclosure could assume three levels: no environmental disclosure; products A and B disclose environmental information (voluntary); or all three disclose environmental information (mandatory)
- the ***standardization*** in the organizations used to certify the environmental information: either the same certifier across labels; or different certifiers across labels.

Results

Experiment I

Effect of marketing on perceptions and intentions. The results indicate that products marketed as lower in price are seen as more damaging to the environment than those marketed as better for the environment. People seeing environmentally marketed products are more likely to buy those products than products with price marketing. This indicates that the type of marketing seen by the respondent influences perceptions of the product and the intention to buy.

Adding an environmental seal to a product marketed as low price did have a positive effect on the perceived environmental quality of the product, although the environmental rating was lower than products exhibiting environmental marketing only. Adding an environmental seal to products exhibiting price marketing increased the likelihood to buy. In fact, the effect is strong enough to make products exhibiting low price marketing and an environmental seal to be viewed similarly to products exhibiting environmental marketing alone.

Effect of marketing on uncertainty. The results indicate that marketing affects individuals' uncertainty about eco-attributes. Those viewing ecomarketing are less uncertain about the environmental quality of electricity. Adding an ecoseal to price marketing decreases uncertainty about the environmental quality of electricity. However, the effect is less than that of environmental marketing alone. However, with respect to the intention to buy question, there is no difference between price and environmental marketing, or the presence of an ecoseal.

The results indicate that labeling can affect respondent uncertainty and that marketing can influence the effect of labeling. In general, ecolabeling following price marketing does not affect an individual's price uncertainty. However, fuel mix labeling following low-price marketing actually increases an individual's price uncertainty.

Individuals viewing environmental labels after low-price marketing are less uncertain about the environmental quality of electricity. Ecolabels provide no significant effect when viewed after environmental marketing. Finally, with respect to the intention to buy question, adding a price label to an environmentally marketed product significantly reduces the individual's uncertainty about their intent to purchase. Environmental labels have no effect on intent to buy.

Experiment II

Correct ranking of eco-attributes. One potential measure of the effectiveness of an information disclosure policy is if consumers can adequately rank competing products by key attributes. Such rankings can be an important input into the consumer choice process (Lee and Geistfeld, 1998). Respondents' ability to correctly identify an environmentally friendly product was only marginally improved by providing ecoseals or fuel mix information. Compulsory disclosure of both fuel mix and emissions significantly improved performance, while such disclosure of emissions had no effect.

Hence it appears that if correct ranking of products on the basis of environmental attributes is the key aim, only compulsory disclosure of environmental information would achieve it.

Stated satisfaction with the level of information. In general, respondents are more likely to be satisfied with full, compulsory disclosure than nearly any other disclosure policy. Even though the objective performance of respondents under the compulsory, full disclosure policy is not always significantly better than voluntary or no disclosure policies, respondents generally reported greater satisfaction with the full disclosure policy.

Market share impact. In terms of firm-level strategies, the firm marketing product A experiences greatest market shares when price is directly comparable via detailed disclosure, though this is less essential when the marketing points are strongly worded. Apparently price is such an important attribute that a strategy of avoiding the disclosure of A's relatively weak environmental record would not be rewarded. This may be a manifestation of Johnson and Levin's (1985) observation that disclosure of only a product's best attributes (e.g., price) may induce an inference about missing information (e.g., environment) that is more damaging than direct, credible revelation of the negative attribute. In other words, it may be better for the firm to confess its negative attributes because consumers may draw their own conclusions about the missing data that are more damning than the actual data.

The results also suggest that the firm marketing product A should avoid the compulsory disclosure of only environmental information. In such cases market share shifts quickly to firm B, particularly if fuel mix is disclosed, or to firm C if emissions are disclosed. This conclusion might be altered, however, if there were multiple firms with weaker environmental records that intended to base marketing on price attributes. In such a case, compulsory disclosure of standardized pricing information may lead to cutthroat price competition. Drawing on standard arguments from the economics of imperfect competition, we might conclude that firms in such a situation would rather try to establish some type of nonprice product differentiation so that prices above marginal cost can be sustained and profits enhanced.

The strategic implication for the firm marketing the highest-priced product C is simple: avoid compulsory price disclosure and focus on environmental attributes. From a state of no disclosure in a market of similar products, a policy of compulsory disclosure of all information would erode product C's market share, while compulsory disclosure of only environmental attributes would typically increase its market share. No doubt this result will be sensitive to the relative price of C and consumers' willingness to pay for environmental attributes. If products are distinct, disclosure is less likely to affect market share, though product C might benefit if only B and C disclose information.

Hence full, compulsory disclosure of all information does not appear to harm a firm's market share if it holds a unique and distinct advantage with respect to price. A firm with a high-priced product and a strong environmental record would likely prefer regimes with compulsory disclosure of standardized environmental information and no mention of price information, while a medium-priced, environmentally sound firm's market share seems relatively robust to disclosure policy but may benefit from disclosure that focuses on environmental attributes.

Experiment III

Credibility. Altering the amount of information on the label significantly altered the credibility of the label. In all cases, adding contact information to the seal significantly increased the credibility rating.

Adding summary score information *decreased* the labels' credibility, even when the environmental scores are high. Seemingly, adding the summary score increased the respondents' level of skepticism about the overall information. This type of response has been observed in other contexts; simplified, positive information can *negatively* affect consumer perceptions (Levy et al., 1996; Teisl et al., 1999). Similarly, it may be that respondents here distrust the presentation of quantitative information that is accompanied by only vague information on how that quantitative information was derived.

In general, adding the table of environmental scores increased the labels' credibility. In all cases the most detailed label is seen as more credible than the simple ecoseals. However, in two of the three cases the most detailed label is not significantly more credible than the ecoseal with contact information. Thus there may be little credibility benefit in providing more detailed information (over the ecoseal with contact information).

There are significant differences in the credibility scores across certification organizations for the simple ecoseal. In general, the SC label is seen as the most credible and the FSC label as the least credible. This effect may be due to differences in respondents' familiarity with the organizations; psychology research indicates that the credibility of an information source is greatly influenced by a person's familiarity with the source (Brown et al., 2002). In addition, studies indicate that consumer uncertainty about certifiers reduces ecolabel credibility (Thogerson, 2000). Importantly, there are no differences in credibility across certifiers for the case of an ecoseal with contact information. Thus, it seems that any differences in credibility due to this familiarity effect can be effectively mitigated by the presence of contact information.

Eco-ratings. Adding contact information to the ecoseal increased the perceived ‘ecofriendliness’ of the product; however, this effect was significant only for the FSC case. Adding relatively low summary scores significantly decreased the perceived “ecofriendliness.” In all cases, adding the table of environmental scores significantly altered respondents’ ratings of the products in the correct direction from the summary score situation. That is, respondents viewing a table of higher (lower) environmental scores correctly provided a relatively higher (lower) environmental rating.

One goal of economic and consumer science research is to understand how consumers evaluate products when faced with incomplete or imperfect information. In this experiment, the ecoseal with contact information does not provide any explicit environmental score. However, we presume that respondents form some *a priori* expectation of what the ecoseal means regarding such a score. Analyzing significant differences in respondents’ reactions between the ecoseal case and the cases where environmental scores are provided indicates that respondents viewing only an ecoseal expect that the ecosealed product has obtained a score centered in the mid-eighties.

When only looking at an ecoseal, respondents view the SC-certified product as the best environmentally and the EPA-certified product as the worst. Note that this is different from the familiarity effect found earlier, where EPA was rated relatively high in credibility. It appears that respondents view EPA as a credible source of information, but may not view the agency as necessarily ensuring the most environmentally sound product. In the results for ecoseal with contact information, the EPA-certified product was still viewed as the least ecofriendly, but the other certifiers were seen as equivalent. Adding the contact information mitigated the differences across the other certifiers observed under the ecoseal baseline case. In general, when summary scores or more detailed tables are displayed, respondents are able to correctly use the more detailed information to rank products by their environmental profiles.

Satisfaction with information. Adding contact information to the ecoseal increased satisfaction with the level of information. In general, summary scores did not alter satisfaction. However, in all cases, adding the table of environmental scores increased satisfaction. When we compare the most detailed labels with all the alternative information treatments, we find that respondents were most satisfied with the most detailed labels, irrespective of certifier.

Respondents viewing only ecoseals were most satisfied with the information provided by the SC. This is interesting, given that the actual amount of information on the ecoseals was the same. When contact information is added, respondents were least satisfied with the EPA label and most satisfied with the SC label. In general, when summary or table scores are displayed, the respondents were most satisfied with the SC labels and products displaying higher scores.

Likelihood-to-buy. In general, adding contact information to the ecoseal did not increase the likelihood-to-buy, whereas adding low summary scores decreased it. In all cases, adding the table of environmental scores significantly altered the respondents’ likelihood-to-buy from the summary score situation. Products with relatively low (high) scores had lower (higher) likelihood-to-buy ratings compared to the summary score case.

There are significant differences in respondents’ environmental perceptions of the product across certification organizations for the simple ecoseal treatment, for the summary score treatment, and for the detailed table of scores treatment. However, there are no differences across certifiers for the ecoseal with contact information treatment. Again, comparing the ecoseal with contact information treatment against the simple ecoseal treatment seems to indicate that adding contact information mitigates any initial differences in respondents’ ratings of products.

In general, when summary scores or more detailed tables are displayed, then products that display higher environmental scores, or are certified by the SC, are more likely to be bought. For the more detailed labels, the likelihood-to-buy decision seems to reflect a joint effect of the label’s perceived credibility and the perceived environmental rating. For example, except for the SC label, the likelihood-to-buy score generally reflects the environmental ranking of the products. With the SC label, the likelihood-to-buy score is higher, even though the EPA labeled product actually displayed a higher environmental score; this reaction may reflect the relatively higher perceived credibility of the SC label.

One should not necessarily interpret the relatively low ratings of the EPA labels as implying that respondents generally dislike or disapprove of all government-sponsored certification schemes. In another section of the survey we found that certification programs sponsored by federal agencies were preferred over alternative organizations (e.g., industry or nongovernmental). However, we also found that most respondents who favored a federal approach preferred that the U.S. Forest Service administer the certification scheme rather than the EPA.

Experiment IV

In all but one case we find that presenting environmental information to respondents significantly affects their choice of product. When no environmental information is presented (i.e., only prices are given) then most respondents choose the low-price product. Except for the case when Products A and B both exhibit an FSC ecoseal, presenting environmental information reduces respondent choice of the low-price, least environmentally friendly product. The above comparisons also indicate that the effect of an ecoseal may be contingent upon the certifying organization. The EPA and SC ecoseals had an impact on choice, whereas the FSC ecoseal did not. This may be due to the EPA and Sierra Club being either more familiar to respondents or seen as more credible.

When we compare the voluntary standard ecoseal treatments with the equivalent non-standard treatments we find that having standard certifiers increases the purchases of Product A but does *not* alter purchases of Product B. However, having nonstandard certifiers increased the choice of Product B. Apparently, when respondents view multiple products bearing a common environmental seal and different prices, they assume that the environmental characteristics of the products are similar, and are not willing to pay a price differential between the two certified products. However, when respondents view a similar situation with competing environmental seals they assume that the environmental characteristics of the higher priced product are better, and at least some of them are willing to pay the higher price. When we make a similar comparison among more detailed label treatments, we do not find a similar result. The increased level of detail cancels any differential impact between standard and nonstandard certifier.

This impact of increased detail is also evident in comparisons within the voluntary standard and nonstandard treatments but across level of detail. That is, detail is less important with nonstandardized certifiers but important when certifiers are standardized. Increased label detail allows for greater differentiation in product choice. More detailed labels assist consumers better than simple ecoseals; the ecoseal format simply did not allow identification of the most environmentally benign product except when certifiers and prices are different and positively correlated.

When we compare similar voluntary and compulsory label treatments we find that the move from voluntary to compulsory labeling did not significantly alter choice. Apparently, respondents were able to correctly infer that the lack of environmental information provided on Product C was a signal that this product performed relatively poorly on this characteristic.

Market implications. In terms of firm-level strategies, the firm marketing product A, the mid-priced, mid-environmental product, experiences greatest market share when the environmental characteristics of the product are disclosed only through a standardized ecoseal. Under this regime Product A can be differentiated from Product C, the low-price, least environmentally benign product, but not differentiated from Product B, the high-price, most environmentally benign product. A medium-priced, environmentally sound firm's market share seems to benefit from environmental labeling as long as the disclosure is standardized and relatively less explicit.

In contrast, the firm marketing product B experiences greatest market share when the environmental characteristics of the product are directly comparable via detailed disclosure. Apparently the environmental characteristics of the product are important enough that a strategy of disclosing B's relatively strong environmental record would be rewarded. A high-priced firm with a strong environmental record would likely prefer regimes with detailed disclosure of standardized environmental information. At a minimum, they would advocate the development of nonstandardized ecoseals.

Finally, the firm marketing product C experiences greatest market share when the environmental characteristics of the product are not disclosed at all. The strategic implication for the firm marketing the low-priced product is simple: avoid compulsory environmental disclosure and focus solely on price. Moving from a state of no disclosure to any policy of environmental disclosure erodes product C's market share. Again, this result will be sensitive to the relative price of the products and consumers' willingness to pay for environmental attributes.

Conclusions

In debates surrounding certain ecolabeling programs, some have argued that the lack of consumer response to these products may indicate that consumers don't really care about, or at least are not willing to pay more for, such products. Although this explanation may be valid, it is not necessarily true. One alternative explanation is that consumers do care about and are willing to pay for more environmentally benign products, but the current state of labeling these products is slowing the development of this market. Research in other markets has indicated that well-designed health (Teisl et al., 2001) and environmental (Teisl et al., 2002) labeling can significantly alter consumer and producer behavior.

The results described here suggest that US consumers do value the environmental benefits of more environmentally benign products. Thus, consumer-driven purchases could potentially support an ecolabeled market. However, the results also suggest that the current state of some ecolabeling, where firms can (voluntarily) label their products with simple ecoseals from a variety of organizations, may not be the most effective method of communicating the environmental attributes of products to consumers. Parties interested in the long-run success of these programs need to consider altering current labeling approaches.

The results indicate that labels that display detailed information about environmental attributes would be more beneficial for consumers (and environmentally sensitive forest product manufacturers) than simple ecoseal policies. Among the labeling approaches studied here, ecoseals are the least credible, provide individuals with the lowest level of satisfaction, and in general do not give consumers an adequate basis for product differentiation. However, we also find evidence that seemingly marginal changes (e.g., adding contact information) can significantly improve the performance of simple ecoseals across several different measures (e.g., credibility). In general, ecoseals did not affect individuals' perceptions nor their choice of products.

An alternative approach to providing more detail on labels is for certifiers to administer an informational campaign to educate consumers as to the goals and means of the certification program. Currently, many respondents are not familiar with ecolabeled products and are unfamiliar with some of the certifying organizations. An informational campaign can increase the number of people familiar with the organization (Thogersen, 2000), thus increasing the credibility of a simpler label. The campaign may also increase Americans' desire to put a specific organization in charge of product ecolabeling programs.

Our results also suggest that some voluntary labeling regimes can yield benefits similar to compulsory disclosure, but we failed to consider scenarios in which the voluntary disclosure of information by a firm did not perfectly correlate with the actual environmental profiles of the products. Hence, we do not know how consumers would fare under voluntary labeling programs in the presence of vague marketing claims. It is unlikely that individual firms or certifiers would ever find it privately beneficial to organize and display product information in a standardized format that would also benefit consumers. One might envision a broad set of consumer reactions to missing disclosure data in the presence of vague and contradictory marketing claims; this would be an excellent avenue of future research.

Although we failed to consider alternative scenarios, it is reasonable to assume that voluntary labeling schemes may not perform as well as mandatory labeling schemes when products display vague or misleading marketing claims. In fact, because they do not provide an objective basis for comparisons, the use of seals-of-approval and voluntary labeling schemes may encourage such claims. The use of misleading environmental claims is not trivial; approximately half of environmental advertising is misleading or deceptive (Kangun et al., 1991). Mandatory, detailed environmental labeling may help restrict the seller's ability to make these claims.

Regarding firm-level impacts of disclosure, we find that a lack of ecolabeling will generally benefit the low-price firm. Firms with sounder environmental records (and higher prices) generally gain market share when labeling offers more detailed environmental data. We do note that market-share dynamics of disclosure policies will be very sensitive to the number of firms in the market and the relative strengths of each firm (see Roe and Sheldon for an exploration of firm dynamics after the introduction of labeling).

In total, the results suggest that policies that require compulsory display of detailed information about price and environmental attributes would be more beneficial for consumers than simple ecoseal disclosure policies and than most voluntary regimes. However, one should also be mindful of the hypothetical nature of the experiments. First, using survey approaches may have allowed respondents to evaluate the labels more fully, and with potentially fewer distractions, than they would in an actual purchase setting (see Russell and Clark, 1999, for an overview of instances when ecolabels may be less effective in a market setting). Second, externally validated experiments indicate that when respondents do not face a real budget constraint they are not as sensitive to price differences as they are in real markets.

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In-Store Demand for Ecolabeled Fruit

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Almost every study of consumer response to ecolabeling has been based on surveys or purchasing experiments. While such studies frequently indicate that some consumers would select ecolabeled products over a standard product and that they might be willing to pay more for it, to date there has been only one analysis of regular store sales (Teisl et al., 2002). The objective of this study is to analyze regular in-store purchasing behavior for an established ecolabeling program to see if an ecolabel has shifted (increased) demand for the ecolabeled products in the store.

The study sample consists of four stores of a single, regional food retailer that has promoted a specific third-party ecolabel in their fresh produce department. Thus, this study examines ecolabeling impacts among a population that has had the opportunity to learn about the ecolabeling program through information displayed at the stores. For this reason, the consumers there may be as well informed as any random set of consumers. Unlike previous research based on new or even hypothetical programs, the analysis is based on actual demand within an operating market. A year of weekly sales information for a group of related fresh fruits was collected. Information collected includes prices and quantities, as well as promotion, display, and ecolabeling information.

An econometric analysis was undertaken to examine the impacts of this ecolabel on demand for apples. This paper presents the results for the impact of the ecolabel on specific apple varieties offered in this sample of stores. This information is important for both retailers and producers in determining strategies for advancing the goals of the certifying organizations and those that support those goals, including consumers interested in eco-friendly products who will benefit from being able to accurately identify their preferred produce selection.

Literature

A few studies have examined the overall impact of ecolabeling certification, considering label confusion (Lohr, 1998), market inefficiencies (Swallow and Sedjo, 2000) and benefits. These studies derive results based on various assumptions about the effectiveness of the ecolabel in selling products. A number of studies have examined which consumers will purchase products with ecolabels based on survey results (Govindasamy and Italia, 1998; Nimon and Beghin, 1999; Gumpper, 2000; Loureiro et al., 2001). While such studies frequently indicate that consumers may prefer ecolabeled to standard products, and in some cases are willing to pay more for them, there is only one study of actual store sales that evaluates whether these programs can be effective in raising demand (Teisl et al., 2002). As the authors of other studies recognize, “a stated preference approach may result in upwardly biased estimates of consumer willingness-to-pay” (Johnston et al., 2001).

The recent study by Teisl et al. (2002) that used regular sales data examined the impact of the dolphin-safe label on tuna and found that the implementation of the label increased market share for canned tuna from substitutes of other canned fish and sandwich meats and fresh fish. However the analysis of the impact of the label was limited by the near simultaneous adoption of the label by all major canned tuna brands. While interesting, a more extensive look at store sales of ecolabeled products is still necessary, in particular for product categories with competition between like products with and without the ecolabel.

Louriero et al. (2001) provide a particularly relevant analysis for the research reported here, as they examined the same ecolabel during an in-store survey designed to elicit consumers’ preferences among conventional, ecolabeled, and organic apples. They used a multinomial logit model to examine the choice among the three labels based upon demographic characteristics and consumers’ attitudes regarding environmental issues. In effect equalizing the price among offerings, they examined the nonprice factors that influenced customers to purchase the ecolabeled product or the organic product rather than the standard product. Survey questions were designed to elicit preferences for food safety vs. appearance and the environment vs. jobs. The choice of organic produce increased with income, having a child in the household, relative importance of the environment, and food safety concerns, while family size increased the choice of standard apples. Ecolabeled apples shared the direction of impacts with organic products only for the environment and family size, though the effect was weaker for both. In addition, the respondents rated the ecolabeled product's quality as highest, and the quality rating of the respondents was a significant factor in eliciting a choice of the ecolabeled apple.

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Their evidence indicates that given equal price and quality, most of the respondents would have chosen the organic apple over the ecolabeled one. As respondents moved towards the environmental end of the environment vs. jobs continuum, organic products were preferred over ecolabeled products and ecolabeled products were preferred over standard products. The authors concluded that The Food Alliance ecolabel is an intermediate choice between organic and regular apples. However, as part of the study, the researchers provided a paragraph of information describing The Food Alliance, arguably influencing the respondent's subsequent behavior with respect to produce purchases.

However, further information is necessary to determine the place of the ecolabel in the market. There is a large chasm between stated preferences and actual purchases. The consumer must not only prefer the attributes of the ecolabel, they must also recognize that the ecolabel represents those attributes, they must know how to identify and locate it in the market, and the ecolabeled product they find must be sold at a price compatible with their degree of preference for it and the prices of substitutes. If all those conditions are met, they will buy it. The analysis reported here focuses on the final achievement of ecolabel marketing by examining the label's impact on in-store demand, without directly considering all the steps necessary in between. However, our observation of the environment in which the labeled products are being sold, and the results of a companion analysis (Johnson et al., 2002), will be used to shed light on the gap between a label's existence and its market impact.

In summary, realizing the benefits of ecolabels requires appreciation and recognition, relative preference, and purchasing activity. The objective of the study reported here is to analyze the final activity of regular in-store purchasing with an operating ecolabeling program to see if it has accomplished all three of these stages. It is not, however, a comprehensive treatment of all three of the steps.

Ecolabels in the United States

The earliest ecolabeled products in the United States were certified organic fruits and vegetables. The organizations behind these first ecolabels were nongovernmental: the earliest may have been an organic program begun in California in 1973. Organic programs were initiated in Oregon and Vermont in the early 1980s. The State of Washington was one of earliest governmental organizations to certify organic products, starting in 1988. The Consumers Union has developed a set of Web pages reviewing ecolabels, which recently listed 88 different ecolabels (Consumers Union, 2002). Thirty-seven of these are for organic products and seven others are for sustainable agriculture. Of these, two are targeted at tropical agriculture. Two were developed in the Pacific Northwest. The most recently developed is Salmon Safe, which certifies agricultural producers whose practices protect streams and wetlands. The other Northwest-based program is the label analyzed by this study.

The Label

The Food Alliance (TFA) organization was formed in 1994 with the help of a Kellogg Foundation grant. A non-profit organization was formed in 1997 to implement the program. The group promotes "sustainable agriculture," which they define as a system that emphasizes protecting and enhancing natural resources, using alternatives to pesticides, and caring for the health and well being of farm workers and rural communities. Producers are evaluated in three primary areas:

- pest and disease management
- soil and water conservation
- human resource development.

There are now two TFA regional groups. The Northwest TFA has 60 approved producers, two processors, 30 retail store partners, four wholesale distribution partners, and one restaurant (The Food Alliance, 2002). A number of the producers are vertically integrated into processing, for example, two are wineries. Some of the Northwest TFA's approved producers are located outside of the Northwest; they include a Florida and a California citrus grower and a Hawaiian banana producer. A recent expansion of the TFA program into the Midwest now has 12 retail partners in Minnesota, as well as 55 approved producers.

Data and Model

Data used in this study was collected at four stores in the metropolitan area of Portland, Oregon over a one-year period. Two of the stores were near the city in middle to upper-middle-income suburban neighborhoods, and two in middle to lower-income areas, one of which was near the metropolitan fringe. At the end of 2001 all these stores displayed overhead Food Alliance banners in various numbers, and all sold products with Food Alliance stickers for varying amounts of time over the course of the year. The amount of point-of-purchase signage alerting the buyers about which products were TFA approved varied from only the small sticker on the fruit, through displays of either a small seal approximately 3x5 inches, a similar but larger seal approximately 6x10 inches, or a poster approximately 8x11 inches. Seals were either attached to price signage or dangled in front of or behind the fruit. For various reasons the amount of background signage (the overhead banners and posters) declined or was gradually eliminated over the course of the year in all but one store.

Analyzing demand for fruit at a disaggregated level is a difficult process. The produce choices available to customers at the retail store level are vast, and modeling the demand for these products is complicated by variation in availability and quality. As an example of this difficulty, based on the PLUs (codes used by almost all food stores to track produce sales) observed in printouts, each of the stores in our sample offered between one and five types of fresh Galas each week. The possibilities include two sizes of the regular Galas, two known as Royal Galas (though marketed simply as Gala by these stores), and one that might come in a 5-pound bag. One of the Gala choices could also have been organic, either in bulk or in a bag. Thus, 7 different PLUs for Gala were observed during the course of the year.

Issues are further complicated by the somewhat loose use of PLUs by the stores. A typical situation is that while the two PLUs for regular Gala apples refer to a smaller and larger apple, when only one is available either code might be keyed at the store register, and often a display bin contains both kinds though these are displayed for sale at a single price per pound. It is clear that under these circumstances, stores try to assign the same price for each PLU of that variety. Some errors were observed in this regard, as were some discrepancies between signage and the price registered in the computer. The data was carefully examined and corrected to be consistent with the retail signage and display observations recorded on weekly trips to each location.

Because of our research goals, the demand analysis undertaken is at an unusually disaggregated level. While typical practice in measuring demand even for a particular fruit might be to aggregate all fruits of that variety and take a weighted average price, that would not allow examination of the impact of a specific label on one of them.

The varying availability of the closest alternatives of the same variety and the closely related products makes choice for consumers a many-faceted and constantly changing one, and the estimation process complicated. Because of this complexity, at present our analysis is limited to a subset of those choices – bulk apples – split into the three leading apple varieties by sales in the subject market (Fuji, Gala, Red Delicious), and all other bulk apples.

By careful examination of the data it was found that the bulk PLUs observed in a particular variety could be aggregated into one or two categories, for example only one Fuji bulk apple category was displayed in any store in any week. Both small and large Gala and Red Delicious apples frequently were available at different prices in the same store. Because only the large fruit PLU was used for the ecolabeled products, and because the larger fruit was more frequently offered, it formed our base category for each variety. The method for incorporating the availability of a small alternative, also for bagged alternatives, is discussed later.

A system of demand equations is used to estimate the relationships between quantities and prices, ecolabeling, other promotional factors, and market conditions. Clearly, there are substitutes in fruit choice among the many types of apples as well as between apples and other fruits; however, at this stage the analysis has focused on bulk apples. For modeling purposes, bulk apples are treated as a subset of fruit choices among which consumers allocate their apple expenditures. In addition to own and substitute prices, factors generally assumed by retailers to impact the quantity of a particular apple variety demanded at retail are display size, advertisement in weekly flyers, condition, and size.

Individual equations are estimated for the three leading varieties sold in the market: Fuji, Gala, and Red Delicious. All other bulk apples are aggregated and a weighted average price for them is calculated for inclusion as an explanatory factor. In addition, promotional variables are calculated for the rest of the bulk apples as factors promoting the sale of those apples as opposed to those of all other apples in the system.

Availability of the same variety in a bag is included as a 0-1 dichotomous variable, as is the availability of a second size in the same variety. These two variables only appear in their own variety equation; the implicit assumption is that they only offset purchases of the same variety.

Promotional factors influencing choice other than the ecolabel are total display size and advertising. Total display space is entered as 100s of square inches of space allowed for the fruit (shelf space). This number includes the amount of extra space in bins in the produce area and in outside display areas when they occurred. Advertising was a dichotomous variable and represented whether the variety appeared in the weekly circular advertising supplement in the market; this is the same in all of the stores.

Finally there is the variable for the ecolabel information. The variable reported, though not the only one tested, was an index based on the level of ecolabel information: 0 is for no information (this should be fruit that is not produced under the ecolabel); 1 is for the sticker on the fruit only; 2 is for a Food Alliance seal about 3x4 inches placed either behind or dangling in front of the fruit; 3 is for a descriptive Food Alliance poster (8x11 inches) directly behind the fruit. The design of this index implies that each of these pieces of information increases the identification of the product by consumers (the implicit assumption is that the larger the display size, the more noticeable it is). However, any combination of these three signals could occur and could impact demand in other ways, so other variations on how information identifying ecolabeled product can impact demand were also examined. These variations included individual dichotomous variables for each of these three display levels, a dichotomous variable for the sticker and another index for the two types of signage.

The linear approximate almost ideal demand system (LA/AIDS) model is used to estimate bulk apple demand. The AIDS (Deaton and Muellbauer, 1980) model is derived from a model of consumers' minimizing cost relative to their purchasing desires and generally meets the desired theoretical properties for demand. In the linear approximation of the AIDS model, a Stone Index is used to formulate the expenditure component.

Results

From the perspective of demand estimation the estimation results are quite satisfactory. The R^2 for the LA/AIDs model is 0.80, indicating that the model explains a large part of the variation in bulk apple market share. More basic analysis with individual estimation of demand equations in a double log formulation using the SUR (seemingly unrelated regression) technique is similarly successful.

The parameters estimated in the version of the LA/AIDS model used for this analysis directly measure the impact of the explanatory variables on the share of that variety in the sales in the bulk apple group. The results from the model are given in Table 1. Prices are entered in natural logs as explanatory variables and the relationship between quantity and price is calculated as a function of the parameters estimated in the system. These relationships are reported as elasticities at the bottom of Table 1.

The elasticity represents the percentage change in quantity demanded for a one percent change in a price. Own price elasticities are fairly elastic with respect to own price, ranging from -2.35 for Galas to -0.98 for Red Delicious. Quantity demanded is less elastic with respect to cross prices, the highest is 0.64 for the impact of a 1% increase in the price of Galas on the demand for Red Delicious apples. Symmetry was not imposed on the cross price parameters, given that the demand group was limited to bulk apples.

Display space, as expected, has a consistently positive impact on share or quantity demanded; more space draws more attention to the product. Advertisement seems to be a weaker though positive factor. It appears to be most significant in the Gala equation, where the circular was most often announcing a substantial price savings. Availability of direct alternatives to a product are negative if significant, as expected. These results are strongest for the availability of small Red Delicious apples with its availability decreasing the sales share of large Red Delicious apples by 4% (average share of Red Delicious was 14%). This larger impact may be due to the regular availability of small Red Delicious apples in most of the stores, which is not as common for Gala. The regular availability of small Red Delicious apples may create an expectation on the part of consumers leading them to search for the small Red Delicious alternative; therefore it is more likely to have an impact. Availability of a small Fuji alternative was not included in the model because small and large alternatives almost never occurred.

Seasonality was tested in early versions of the model, but lost its explanatory power when display size information was added. Since stores increase and decrease display size for fruit according to season, its capture of seasonal effects is not surprising.

Quality measures were developed during the course of this study but did not cover a sufficient period of time to be included in this analysis. Further work is needed on quality elements such as size and fruit condition. Quality may be particularly important for understanding consumers' acceptance of ecolabeled products.

None of the variations in how the ecolabel information was included in the model was found to cause a significant effect on the sales share of the individual apple variety. While this contrasts with positive perceptions by at least some consumers regarding the characteristics of this ecolabel, at some level it appears that these perceptions fail to translate into increased demand.

Results from the accompanying study (Johnson et al., 2002) and Loureiro et al. (2001) indicate that while a certain portion of the public does consider these characteristics as desirable, this desirability is not being translated into purchasing activity at present. Johnson et al. (2002) reported that approximately 25% of their survey respondents were aware of The Food Alliance, and an even smaller portion recognized which products were actually certified. Without that recognition consumers will not be able to preferentially select these products even if they prefer to support them. Even with this recognition, shopping habits may not be such that consumers are seeking out these products.

An important promotional factor may be responsible for the lack of consumer response: the extensive use by the stores in our study group of decorative photographic banners depicting the ecolabels mission. These banners show pictures of farmers and farm workers in the field, and make general statements about goals of the group. Other banners just show the seal itself. These banners may confuse consumers about which products are Food Alliance approved. This implication is supported by the survey results of Johnson et al. (2002).

On the other hand these banners and the overall adoption of the program by the store may increase consumer loyalty to that store and their produce sales, but not provide a direct demand incentive that could be realized individually, or statistically discerned, for the specific fruit that has the ecolabel certification. (While use of these banners did change over time in some of the stores, there was not sufficient variation over time to examine whether this is occurring. A very large number of stores with varying quantity and placement of presentations and periods of time over which those impacts could be measured would be necessary.) The success of a number of new food stores with environmentally friendly promotion gives some support to the possibility that a store's sales could be improved because it supports eco-friendly products.

The remaining variables in the model, dichotomous variables for the stores, allow unaccounted differences in buying and selling behavior at the stores to be accounted for. These differences may include the preferences of the shoppers that frequent them, or the variety of fruit alternatives available. It is evident that shoppers in some of these stores are buying higher percentages of Gala or Fuji apples in comparison to Red Delicious.

Conclusions

This analysis examines the impact of an ecolabel on current, in-store purchases over a limited period of time and store type. Though the features of retail produce sales make analysis difficult, the overall model successfully explains a large part of the variation in sales share for individual apple varieties. A major finding of the study is that the estimated model indicated the ecolabel under consideration had no impact on demand for individual bulk apples. It seems unlikely, though certainly not impossible, that additional data from the same source will show that the ecolabel actually has a measurable, direct impact under current operating circumstances. However, a number of circumstances may be responsible for this outcome at present.

It took many years for the concept of organic to impact a sizable portion of consumers, and many consumers still misunderstand what organic means. Ecolabels may take an extended period of availability to achieve an observable impact. In addition, ecolabels such as this one have multiple objectives, and this may render it more difficult for consumers to understand. It is a sustainable agriculture label, and includes both production practices and the well-being of the labor force and agricultural communities, but the sustainability concept cannot be considered to be broadly or well understood by the public at this time.

Two principal factors are believed to be responsible for the lack of impact on demand for specific varieties. The first is limited understanding and knowledge regarding the label. The second is the confusing message portrayed in the stores. The Johnson et al. (2002) companion study reported that a limited number of consumers have heard of the ecolabel, and even fewer truly understand it.

Therefore, further consumer education and "brand" management might be all that is needed for the ecolabel to have a positive impact on demand. The certifying organizations for ecolabels should examine alternative promotional approaches. To do this type of research, one will need to develop in-store signage experiments in combination with the promotional activities to help establish the program. By looking at signage and promotional activities simultaneously, one can obtain a better understanding of whether and how an ecolabel can affect retail demand for the products.

In summation, there are three principal ways in which value can be obtained for participants. The first two ways are by improving total store sales for the retailer and increasing market access for the producers. The last is increased demand for the labeled product. This study only addresses the latter; it did not discover an impact on product demand. As discussed, a number of market factors may have been responsible for this outcome.

However, an ecolabel will be more successful in achieving its objectives if demand for individual ecolabeled products is increased. Thus, an important future activity for ecolabeling is the evaluation of the effect of current promotions on actual demand and the testing of new promotional activities.

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Table 1. LA/AIDS model of retail apple demand.

	System R^2 = 0.80		N=140			
	Gala		**Fuji**		**Red Delicious**	
Average Sales Share of Bulk Apples	0.098		0.302		0.143	
Variables	Estimated Parameters	t-value	Estimated Parameters	t-value	Estimated Parameters	t-value
Intercept	0.1573	6.19	0.214	5.42	0.2256	11.91
Price of Gala (natural log)	-0.1434	-5.24	0.080	1.97	0.0797	3.91
Price of Fuji (natural log)	0.0504	1.84	-0.054	-1.27	0.0121	0.57
Price of Red Del. (natural log)	-0.0239	-0.61	0.095	1.52	-0.0413	-1.32
Weighted Av. Price O. Bulk	0.1003	2.29	0.125	1.87	0.0421	1.24
Small Alternative Availability	0.0119	0.60			-0.0425	-3.26
Apple Bag Availability	-0.0204	-1.65	0.020	1.04	-0.0075	-0.72
Eco-label Index Gala	-0.0104	-1.23	0.013	0.98	0.0107	1.57
Eco-label Index Fuji	-0.0047	-0.50	-0.004	-0.24	-0.0005	-0.07
Eco-label Index Red Del.	-0.0006	-0.06	0.010	0.55	-0.0116	-1.32
Eco-label Index Other Apples	-0.0031	-0.27	0.025	1.33	-0.0133	-1.38
Ad (weekly circular) for Gala	0.1184	4.34	0.012	0.28	-0.0547	-2.51
Ad (weekly circular) Fuji	0.0192	1.18	0.022	0.87	-0.0254	-1.96
Ad (weekly circular) Red Del.	-0.0318	-1.95	0.017	0.69	0.0272	2.15
Ad (weekly circular) Other	-0.0060	-0.68	0.005	0.35	-0.0001	-0.01
Total Display Area Gala	0.0026	2.84	-0.001	-1.02	0.0012	1.69
Total Display Area Fuji	0.0006	1.14	0.001	1.46	0.0006	1.62
Total Display Area Red Del	0.0004	0.30	0.000	0.16	0.0023	2.46
Total Display Area for Other	-0.0010	-3.05	0.000	-0.71	-0.0009	-3.47
Store 1	0.0468	1.94	0.056	1.69	-0.0185	-1.13
Store 2	0.0581	3.06	0.027	0.88	-0.0538	-3.31
Store 3	0.0185	0.80	0.101	2.85	-0.0732	-3.92
Stone Index	-0.0500	-0.81	-0.264	-2.72	-0.0374	-0.76

System R^2 = 0.80 N=140

Price Elasticities (%Change in Quantity Demanded for a 1% Change in Price)

Gala	-2.35		0.47		0.64	
Fuji	0.62		-0.98		0.16	
Red Delicious	-0.14		0.52		-1.21	
Expenditure Elasticities	0.49		-0.84		0.74	

The Influence of Biased Information on Consumers' Willingness to Pay for Products Labeled as Free of Genetically Modified Ingredients[1]

Tamara VanWechel[2] and Cheryl J. Wachenheim[3]

As application of genetic modification in crop varieties grows and expands in scope, participants from throughout the marketing channel face new opportunities and challenges associated with the development, use, and handling of the resultant products. They must evaluate the potential benefits, costs, and associated risks as part of their strategic decision-making process. For example, growers are faced with decisions about whether to grow genetically modified (GM) crops. Biotechnology companies must make investment decisions including research, commercialization, and marketing of GM technologies, organisms, and products. Food manufacturers must consider use of commodities produced with biotechnology and determine labeling and promotional strategies for the resulting food products. Consumers have new choices associated with food and other products produced with biotechnology. These and other stakeholders will benefit from information about consumer acceptance of biotechnology and factors influencing it. This information will facilitate decision-making and reduce associated risks.

Acceptance by consumers and participants at each step in the marketing channel is paramount to the commercial success of products including GM ingredients or developed using biotechnology. However, there is little information available about the willingness of consumers to purchase GM food products (Lusk et al., 2001b). In part, this is because consumers are not well informed about biotechnology (Roper Starch Worldwide, Inc., 2000; Rousu et al., 2002a), and in part because available market research is limited. Hallman et al. (2002) surveyed 1,203 US residents in spring 2001. They found that Americans are not well informed about technologies used in agriculture and the food industry, including biotechnology. Nearly 60% either did not believe or were not sure whether GM products were available in grocery stores. Perhaps in part as a result, they tended not to hold strong beliefs regarding the role of biotechnology in food production.

One of the most discussed topics in the biotechnology debate is how its adoption will affect the environment. Hallman et al. (2002) found that a strong majority of Americans were concerned about the environmental effects of biotechnology. This concern is likely to have resulted in part from the number, strength, and activities of environmental interest groups such as Green Peace and Friends of the Earth (Rousu et al., 2002b). There is some evidence that these groups have been more effective in presenting their message than those providing information about the positive or neutral effects of biotechnology. Huffman et al. (2002a) found that consumers who identified themselves as more informed about biotechnology were more likely to be unwilling to pay for GM products.

The purpose of this paper is to assess whether willingness to pay for food products can be motivated by the bias of information available about the environmental effects of the technology used in producing their ingredients. Specifically considered is how information provided about the influence of biotechnology on the environment affects willingness to pay a premium for food products labeled with a guarantee they are free of GM ingredients.

Assessment of Consumer Demand

Literature addressing issues related to biotechnology, including production and use of GM crops in the US and elsewhere, its associated ethical, environmental, and safety concerns, and regulatory options, including labeling, overshadows that devoted to the as-

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sessment of consumer willingness to pay for food products made with or including GM components. The latter is discussed here in some detail. (See Uzogara, 2000, and Persley and Siedow, 1999, for detailed considerations of other aforementioned issues.)

In the current study, revealed preference is used to assess willingness to pay using an experimental auction. Experimental auctions have the potential to provide more reliable measures of willingness to pay than hypothetical surveys (Lusk et al., 1999). The benefits of experimental auctions are described in some detail in Fox et al. (1998). They have been used in a number of studies to estimate consumer demand for new food items, such as those introduced in the current study (Fox, 1995; Hayes et al., 1995; Buzby et al., 1998; Fox et al., 1998; Lusk et al., 2001a,b; Rousu et al., 2002a; Huffman et al., 2002b).

An initial effort to assess revealed consumer willingness to pay for a product guaranteed to be produced without biotechnology was reported by Fox et al. (1994). A Vickrey sealed-bid, second price auction was used to estimate consumer willingness to pay to replace milk from cows receiving bovine somatotropin (BST) with that from cows not receiving BST. The Vickrey second price auction has been used frequently in valuation experiments (Lusk et al., 2001a). In this auction variant, the highest bidder purchases the product at the second highest bid price. Average bids to exchange a glass of milk were positive, but most, particularly in two of three metropolitan areas, were either zero or exceeded $1, supporting the existence of market segments for BST-free milk. Providing factual information to participants about BST coincided with lower variance in average bid between rounds.

Melton et al. (1996) used a second-price, ascending bid auction to determine preferences for pork chops with multiple quality characteristics among primary shoppers of households that consumed meat. Attributes discerned from viewing the fresh product were poorly correlated with those discerned from photographs, and they tended to contradict the rankings by participants after taste testing. This finding suggests that an initial purchase based on observable attributes may not be repeated if it does not correspond with eating experience.

Lusk et al. (2001b) used an experimental auction to estimate consumer willingness to pay for a higher level of steak tenderness. Rather than conducting the experiment in a laboratory setting with recruited, paid participants, they used a sample of consumers already shopping in a retail grocery store. The authors note that this helped target the population of interest (e.g., meat consumers), and helped avoid sample selection bias. It also served to address the concern noted by Buzby et al. (1998) of bid inflation resulting from giving participants money to participate. Because consumers participated as individuals, the methods used in other experimental auctions discussed here could not be employed. A method was adopted where participants paid to upgrade to their preferred steak if their bid exceeded a pre-determined “market price.”

The results emphasize that consumer preference does not necessarily translate into willingness to pay. Although consumers could readily distinguish between levels of tenderness in a blind taste test and 69% preferred the more tender steak, only 36% were willing to pay for it. The authors offered two potential explanations. First, consumers may lack confidence that a labeled steak will hold the same attributes as the same-labeled steak they previously tasted. Second, shoppers may not actually be the intended consumers of the product they are purchasing. As such they may not be buying based on their own preferences. In a second treatment, steaks were descriptively labeled as “guaranteed tender” and “probably tough.” Descriptive labeling increased preference for the more tender steak (84%), and the percentage of consumers willing to pay for it (51%).

Using first and second price auctions, Lusk et al. (2001a) assessed how much students endowed with a bag of corn chips containing GM ingredients were willing to pay to switch to non-GM corn chips. All students were from Midwestern towns and enrolled in an agriculture major, and most came from farms. Not surprisingly, given the nature of the population, students had little objection to GM foods and expressed a strong willingness to consume them. As demonstrated elsewhere, there was evidence of a market segment that valued the non-GM guarantee.

Huffman et al. (2002b) used a random n^{th} price experimental auction to assess willingness to pay for products under both voluntary (standard label versus non-GM label) and mandatory (standard label versus GM label) labeling scenarios. Participants submitted bids, which were ranked from high to low. A random number (n) was selected, and the product was sold at the n^{th} price to each of the n–1 highest bidders. For example, if the number 5 was randomly drawn, the top 4 bidders would each purchase the product at the fifth highest price. A strong criticism of the Vickrey second-price auction is that it fails to disclose the complete demand curve for the auctioned item among participants. The random n^{th}-price auction corrects for this problem because it attracts sincere bids from bidders who might be off the margin. Sincerity of bids results from a participant's inability to use a market-clearing price as a marker, and the equal opportunity among participants to purchase the good.

Participants in two Midwestern cities bid on three products. Products were selected to represent products that are highly processed (tortilla chips), refined and distilled (vegetable oil), and fresh (potatoes). Six groups bid on products with a label indicating only the name of the product, and on those also noting "This product is made without genetic engineering." Four groups bid on products with the plain label and those with labels indicating "This product is made with genetic engineering". Participants bid on either the GM (or implied GM) or non-GM products in each round (i.e., bids by individuals for GM and non-GM products did not occur simultaneously). Round sequence was randomized, and only one round was binding so as to prevent reduction of bid prices as participants moved along their individual demand curve. Prior to bidding, participants were provided one-page information summaries. Information provided was biased positively, biased negatively, or verifiable (unbiased).

Participants bid more for products presumed non-GM. No demographic characteristics appeared to affect the discount for the GM-perceived products. The hypothesis that average bids for GM food products are not different, regardless of whether a voluntary or mandatory labeling strategy is used, could not be rejected. For the GM labeled treatments (mandatory labeling scenario), bid order influenced bid price (Rousu et al., 2002a). Participants bidding on products with the GM label in the first round paid a smaller premium for products with a standard label than those who bid on products with a standard label first. Those who perceived themselves at least somewhat informed about GM bid far less for GM foods, suggesting their prior-received information was weighted by a negative bias.

Huffman et al. (2002a) used data from the four groups tested under the mandatory labeling scenario to evaluate the influence of information on the probability a consumer will be "out of the market" for GM food products. Consumers who reported always reading labels for an initial purchase of a food item and those reporting they were at least somewhat informed about GM foods were more likely to offer a zero bid for the GM product.

Rousu et al. (2002b) evaluated consumer acceptance of non-GM foods with tolerance levels of 0, 1, and 5%. Consumers bid less for foods with a GM tolerance, but the difference between bids for 1 and 5% tolerance products was not statistically significant. The products and experimental design followed the one detailed in Huffman et al. (2002b).

Methods and Procedures

A random n^{th}-price experimental auction was used to elicit and estimate the influence of information bias on consumers' willingness to pay for foods with a standard NutriFacts label compared with foods also labeled with a non-GM guarantee. The methods closely paralleled those described in Huffman et al. (2002b) and Rousu et al. (2002a). Key differences include the composition of the participant population, type and form of products, product labeling, scope of information provided to participants and the timing of its introduction, and simultaneous (versus sequential) bidding on non-GM and presumed GM products.

A convenience sample of 112 students from North Dakota State University was recruited to participate in the auction. Students were recruited through large-section anthropology, sociology, and communication classes. Approximately 33 students participated at each of three different time periods over a period of two days. A fourth auction was conducted in a college of agriculture service course with 17 students a week later to increase sample size. Monetary compensation of $15 was provided to encourage participation, but its distribution before required purchase(s) also served to eliminate any budgetary constraint.

At each time period, students were randomly assigned one of three treatments defined by the information they would receive about the environmental impact of biotechnology. Each participant received a packet including a pre-auction survey, detailed instructions, information about biotechnology, and a post-auction survey. Moderators reviewed step-by-step instructions orally with participants throughout the auction. Practice rounds were conducted to ensure that participants understood the auction process.

The auction consisted of two rounds. In the first round, participants bid on two varieties of each of three food products: individually wrapped muffins and chocolate chip cookies, and bags of potato chips. These products were selected to meet two key criteria. First, they include ingredients that are commonly produced in North Dakota and for which GM varieties exist (e.g., wheat) or already have been commercialized (e.g., corn, oil seeds, potatoes). Second, consumers universally purchase them, regardless of demographic characteristics. Individual serving, convenience-sized products were used to appeal to college students in the school environment. Participants bid discretely on two variations of each of the three products; one with a standard Nutrifacts label, and one also with a label indicating "This product does not contain genetically modified ingredients" (Figure 1). The two versions of each product were offered simultaneously to each participant. Labeling products containing GM ingredients was rejected as a strategy for the current study. The current US labeling policy regarding biotechnology is voluntary. Huffman et al. (2002b) demonstrate that when consumers can accurately read market signals (i.e., can interpret information identically whether from voluntary or mandatory labeling strategies), a voluntary labeling policy provides higher welfare. Furthermore, in light of public ignorance of biotechnology and the extent of adverse controversy, it is unlikely that firms would voluntarily adopt a strategy of labeling foods as containing GM ingredients.[1]

After the first round of bidding, participants were provided with and instructed to read one-page sheets with biased information (positive or negative) about the effects of biotechnology on the environment, or general information about North Dakota agriculture. The environmental impact information was not identified as biased. Under each impact statement there were from one to five supporting statements. Positive-biased impact statements included the following:

- fewer, less toxic pesticides used by farmers who grow genetically modified crops
- yield gains
- soil and water conservation
- potential for less energy and air emissions due to more efficiency in product transport.

Negative-biased impact statements included the following:

- increased use of certain herbicides
- lower yields
- increased tolerance in certain insects
- genes could move to wild species, creating weeds
- harm to nontargeted species.

A second round of bidding followed. Participants had been informed as part of their initial instructions that only one of the two rounds would be binding; that is, that they would actually need to purchase the products from winning bids in only one of the two rounds. Otherwise, participants with a winning bid in the first round may bid less for the same product(s) in the second round.

Results

Respondent profiles

The majors of the 112 participants were concentrated in the social sciences, with 30% in sociology and 26% in the humanities; 14% reported a major within the College of Agriculture. Other majors included psychology, computer science, natural resources management, business, and the hard sciences. The population was nearly evenly split by gender, with males comprising 51%, and females 49%. Most were Caucasian (93%), single (82%), had no children (88%), and lived with at least one other person (75%). Almost three-fourths (72%) reported being employed; a majority earned an annual income of either less than $5,000 (25%) or between $5,000 and $10,000 (32%). A large majority (83%) grew up in the Lutheran or Catholic faith, and 30% grew up on a farm. Just over one-third of participants (38.5%) were originally from a large city (between 10,000 and 100,000 inhabitants). Just over 51% percent were evenly split between rural towns (less than 1,000) and small cities (between 1,000 and 9,999). Ten percent were from Minneapolis or St. Paul or their suburbs.

Both pre- and post-auction surveys included questions regarding the knowledge, behavior and attitudes of participants. Although they did not reveal evidence suggesting they are active environmentalists, overall they expressed a general concern about the environment. Nearly 60% said they used recycled products always or frequently, although only 45% reported recycling always or frequently. Over two-thirds of participants agreed that more action needs to be taken to preserve the environment. A much lower percentage agreed that man has upset nature's balance (29%) or that pesticides are poisonous and should be prohibited (17%). The former seems to contrast with Hallman et al. (2002, p. 28), who reported that 90% of Americans surveyed felt that "the balance of nature can be easily disrupted by humans."

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[1] An innovative strategy for firms, and the industry in general, should they one day be required to label products that contain GM ingredients and perhaps even otherwise, is to increase general consumer acceptance by making claims regarding their inclusion an expected and customary practice. This could increase consumers' comfort level by making the GM product label one they expect to see on products they consume.

Participants reported on their knowledge about and perceptions of GM foods. They were asked how well informed they were regarding GM foods. The average response was 5.7, where 1 = extremely well informed and 8 = not informed at all. This concurs with the results of Hallman et al. (2002), who found that Americans in general freely admit to being relatively uninformed about biotechnology. Hallman et al. (2002) reported that only 41% believed that they were adequately informed. In the current study, nearly two-thirds of participants said they were only somewhat informed or not informed at all. Only 11% considered themselves well informed or extremely well informed. When asked how much of the food they consume is genetically modified, the overall average was approximately half. Overall, respondents believed there are substitutes for GM food products. Three-quarters thought there were substitutes always or frequently. Only 5% reported there were never substitutes. Most participants perceived there to be only a moderate (38%) or low (46%) level of risk or no risk (5%) associated with consuming GM foods.

Finally, participants were asked about their use of food product labels. Participants self reporting that they read nutritional labels "always", "frequently", "occasionally", and "never" were nearly evenly split over the range of responses (uniform distribution). This is consistent with results reported by Hallman et al. (2002). Although 90% of the Americans they surveyed thought GM food should be labeled as such, only 53% reported that they would look at food labels for this information and only 45% expressed a willingness to pay more for non-GM foods.

Willingness to pay

There was an overall difference between mean bids for the non-GM and presumed GM version of each product. The average bids for the non-GM versions of potato chips, the cookie and the muffin were respectively 8.6, 6.7, and 11.0% higher than for their presumed GM counterparts. In the first round, prior to information distribution, mean bids were different for the non-GM and presumed GM version of the cookie and the muffin. The bid differential for potato chips was only marginally significant. In the second round of bidding (after participants not in the control group had been provided biased information about biotechnology), average bids for the non-GM version of each product were again higher. However, there was not a significant difference in average bid for the two versions of cookie, and the difference between bids for potato chips was again only marginally significant.

The bid differential between the non-GM and presumed GM products decreased between rounds for each product. The change in the differential was small in value, but the percentage change was substantial, ranging from 25% for the muffin to 52% for the cookie. Surprisingly, the source of the change in differential between rounds was not consistent across products. Bids for both the non-GM and GM versions of potato chips decreased from the first to the second round. The bid decline was greater for the non-GM version. In contrast, bids for both versions of the muffin and cookie products increased between rounds. For each product, the bid increase was greater for the GM version.

A univariate analysis of covariance was used to test whether information about the impact of biotechnology on the environment had an effect on the differential in willingness to pay for GM versus non-GM products. The null hypothesis is that no treatment effect exists. The covariance model takes the form:

$$D_{ij} = E + T_{ij} + \exists(x_{ij} - x_{..}) + \varepsilon_{ij}$$

where:

D_{ij} = Percentage differential between bids (non-GM minus standard product, round two).

E = Overall effect

T_{ij} = Treatment effect (information bias)

$\exists\,(x_{ij} - x_{..})$ = Independent covariate: percentage differential between bids (round one)

ε_{ij} = Error term

The subscripts i and j represent the product and the treatment (information bias); x denotes the bid.

The null hypothesis is rejected (p = .004). The least squares mean bid differential (non-GM minus presumed GM product) in the second round of bidding was 9.8% for participants in the control group (those reading general information about North Dakota agriculture). The differential was higher for those receiving negatively biased information (13.9%), but the difference from the control was not significant. This result concurs with that of Huffman et al. (2002a) that prior held information regarding biotechnology or GM foods may be negatively biased. The least squares mean for participants in the group reading positively biased information was -4.84% Providing information to participants on the purported positive impacts of biotechnology on the environment resulted in the average participant paying more for the product presumed to include GM ingredients. Least squares means testing (Bonferroni) was used to adjust for the covariate effect in comparing mean differences. The average percentage difference in round two among those receiving the positively biased information was statistically different from the average among those receiving no ($p = .042$) and negatively biased ($p = .005$) information.

Conclusions

The effect of information regarding environmental impacts of GM crops on willingness to pay for GM food products was consistent with expectations. Information about the positive effects of GM crops on the environment resulted in increased bids for standard label (presumed GM) products over those identified as non-GM. Negative information increased the amount by which participants were willing to pay more for products with a non-GM guarantee. The results also support the belief that consumers do read labels, at least in an experimental setting and when the information is constrained to a standard Nutri-Facts label and a statement regarding the GM components of the product. Participants were instructed to evaluate the products, but were not specifically told to read the labels. Because products offered were identical except for the label, only participants who actually carefully viewed the labels would have differentiated between the products.

Overall, the results indicate that students are concerned about the environment and how it is affected by the use of biotechnology, and that they value non-GM labeled products. Also, willingness to pay can be influenced by information provided. While caution is advised about applying the results of this study to a more general population, to a different or broader locale, or to GM food products in general, the results are useful. College students in the Northern Plains represent a market segment similar to that which might be found at colleges and universities throughout much of the United States. The results support the idea that providing environmental impact information, particularly to this market segment, could be a beneficial strategy for agribusiness firms. Because a majority of retail food items in the United States do contain GM ingredients, should those against biotechnology continue informational campaigns, a priority for the industry should be to ensure that consumers understand the impact of GM crop production and feel safe consuming the resulting food products.

Directions for Future Research

Two important characteristics of this research that may limit its applicability include the homogeneity of the participant population as compared to the more general market, and the nature and scope of the information provided to participants (treatment). Regarding the former, the nature of the participating population not only inherently limits direct application of the results to a wider population, but also resulted in consideration of only immediately consumable food products (i.e., individual-size amounts). There is no basis for believing that willingness to pay for non-GM refreshments is representative of the willingness to pay for other non-GM food products, such as those more likely to be consumed at home.

Regarding the nature and scope of information limitation, the environmental impact information provided to participants was designed to be both visually attractive and credible. Nonetheless, it was limited to a one-page scientific summary. This format would unlikely be the choice of a firm or organization with the objective of influencing consumer acceptance of biotechnology. More likely they would consider more engaging means, such as radio, television or print media, well-designed pamphlets, and presentations aimed at specific target markets. It is also expected that firms offering a retail food product that does not contain GM ingredients would use more creative means to promote this on the product packaging, including the label, in contrast to the simple label statement used in the current study.

As the use of methods in experimental economics grows, it is anticipated that future research will be designed to overcome these limitations, at least in part. Applying the methods employed to test willingness to pay for different products would widen the scope of findings for the region (e.g., foods used to prepare meals, or foods designed to appeal to health-conscious consumers). Creative labeling may change the price premium that people are willing to pay for non-GM products, and changing how the information was presented may change consumer attitudes about and preferences for products based on their GM composition. For example, using a television or magazine advertisement as a means to convey information about biotechnology could be more influential and alluring to a greater fraction of the population. If financially and geographically feasible, engaging a more diverse population to participate in a future study would be helpful. Results then could be generalized more easily over the entire population.

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Figure 1. Example of product labels.

POTATO CHIPS

Nutrition Facts:

Serving Size: one ounce (28 g., approximately 17 chips)

Calories 150	% Daily Value
Total Fat 9g	14%
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 15g	5%
Protein 2g	

Ingredients: selected potatoes, corn oil, sunflower oil, and/or canola oil, and salt.

****This product does not contain GM ingredients.**

POTATO CHIPS

Nutrition Facts:

Serving Size: one ounce (28 g., approximately 17 chips)

Calories 150	% Daily Value
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Differential Importance of Ecolabel Criteria to Consumers

Lina Gordy[1]

Problem Statement

Present consumption patterns are not sustainable on a global level. Therefore, curtailment of the use of natural resources in human societies is necessary (Ryan, 1995). Proper ecolabeling could potentially reduce environmental impacts of consumption, but without consumer interest, these programs are doomed to fail (EPA, 1993a, 1994).

Labeling is an educational tool that also helps consumers identify environmentally preferable products (EPA, 1993a). However, in addition to choosing labeling solely to address environmental impacts, it is also necessary to focus the labels to address what is important to consumers. When choosing what products should be awarded a label it is important to decide what issues should be addressed. Labeling programs select these issues and use criteria to determine the performance for the chosen products and to shape the focus of the label. For example, the Environmental Protection Agency's Energy Star sets standards for energy efficiency, and the Food Alliance's stamp of approval focuses on sustainable agriculture (Kane and Ennis, 2003).

Attitude is the consumer's liking, endorsement or preference for product attributes. It summarizes the criteria that consumers use to make decisions regarding what products to buy (Kinnear and Taylor, 1996). Attitude is an important aspect of purchasing decisions that can be used to predict shopping behavior (Fishbein and Ajzen, 1975). Therefore, it is important for both the food industry and ecolabelers to determine consumers' attitudes to find out what criteria they want. Research is needed to determine if and how information about products' environmental impact corresponds to what consumers want (Palm and Windahl, 1998).

In the research reported here, the importance of ecolabel criteria to respondents was measured using a written questionnaire administered to 340 adults. The purpose was to establish a framework within which differential importance of ecolabel criteria could be determined. Consequently, this study tested the differential importance of a set of thirteen criteria for ecolabels on products to consumers.

The first objective was to determine the differential importance of information regarding thirteen selected ecolabel criteria. The second objective was to measure the relation of social structural variables (age, gender, ethnicity, formal education, and household income and composition) to the importance of ecolabel criteria to consumers. This study aimed to test the hypotheses:

H_1: Consumers differentially endorse criteria for ecolabels; and

H_2: Socio-demographic factors affect the importance of information on criteria for ecolabels to consumers.

Research regarding ecolabels may help guide future environmental labeling efforts to change consumer and producer attitudes and behavior, thus reducing the environmental burdens of consumption. Consumer demands for ecolabeled products have increased, but consumer attitudes toward label criteria have not been established in prior research (EPA, 1993a; Arda, 1995). The findings from this and succeeding studies may be used for establishing labels that are successful regarding consumers' confidence in and endorsement of them. This study found that these patterns exist, and that some consumers find certain ecolabel criteria more important than others. The primary purpose of this study was to provide insight into the socio-demographic triggers to criteria endorsement, and to develop a framework for testing these. The study should therefore be considered a pilot effort for exploring the use of this methodology.

Background

The ecosystem of the Earth is finite and non-expanding. With a growing population, the boundaries to the ecosystem are limiting (Daly, 1998). The need to slow population growth has been recognized for a long time (e.g., Malthus, 1798), but not until quite recently has the need to limit consumption been acknowledged (Daly, 1998).

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Ecolabels are intended to provide consumers with information and assessments not otherwise apparent, to guide them in making purchasing decisions based on the environmental impacts of products. Ecolabels also serve as consumer protection tools by providing environmental information not readily available or not supplied by the marketer (EPA, 1993a).

Ecolabels generally have three objectives:

- to prevent misleading environmental advertising
- to raise awareness and to encourage consumers to base purchasing decisions to a greater extent on environmental attributes by providing necessary information
- to provide market-based incentives for manufacturers to lessen the environmental impacts of their products and production processes (EPA, 1993a).

The main purpose of ecolabels is to alleviate the environmental burdens of human consumption, thus slowing the depletion of the natural environment (EPA, 1994).

Environmental Certification Programs (ECPs) are third-party, positive or neutral ecolabeling programs that strive to make credible, unbiased, and independent judgments about environmental product attributes. As voluntary programs, ECPs are positive selling arguments or neutral disclosures of environmental impacts (EPA, 1993a).

ECPs include three types of certification: 1) Seal-of-approval; 2) Report card; and 3) Single-attribute certification (EPA, 1993a). Most existing national and international ECPs are seal-of-approval programs. These ecolabels generally assess products based on a lifecycle assessment (LCA) or an abbreviated LCA (EPA, 1993a).

ECPs are intended to convey information about multiple environmental attributes of products (EPA, 1993a). Several ECPs continuously raise the standards to promote environmental improvements, and to ensure that only a few products on the market meet the certification requirements (EPA, 1993a). Positive product labeling programs provide manufacturers with a market-based incentive to create products with environmental or social benefits. Often operated by a neutral third-party, these labeling programs set criteria and standards, and award a seal-of-approval for use in advertising (EPA, 1994).

Criteria for ecolabels

ECPs base the selection of products on a specific set of criteria for assessment. The criteria are developed for each product category, after which products in the same category are judged against the same set of criteria. The foremost difference among existing ECPs is how product categories and criteria are defined (EPA, 1994). Criteria-setting is typically concerned mainly with environmental policy goals, consumer awareness of environmental issues, and economic effects on industry, but determination of criteria for seals-of-approval must be based on a life-cycle review of product category.

The decision-making groups sometimes have representatives from major stakeholder groups such as environmental and consumer groups, government, and business and trade representatives. External technical advice is commonly sought from the government or standard-setting organizations. Criteria are sometimes based on LCAs in which potentially significant environmental impacts are identified. Criteria levels (i.e., standards) are established to reduce the impacts considered most significant, and to address the environmental impacts of the specific product categories. The standards for an ECP are usually elevated to provide incentives for continuous improvement (EPA, 1994).

Ecolabeling programs are developing around the world, yet they are increasingly being criticized by industry. The criticism has mainly been focused on the policy level and on the abuse of ecolabels as protectionist trade barriers. Ambiguity as to the development of criteria and standards has also been identified as a concern (Salzman, 1997; EPA 1994).

Most existing ecolabeling programs (e.g., Green Seal, USA; Environmental Choice, Canada; Bra Miljöval, Sweden; The White Swan, Nordic countries) do not incorporate consumer acceptance of label criteria, which could influence their success in the market (EPA, 1994). However, a public or internal review is usually conducted that incorporates the opinions of a review group. After principal environmental impacts have been determined, standards are set to address these impacts. The standards are set sufficiently high that only a few products on the market can meet them, in order to encourage increased product performance. After the criteria have been chosen, a review is conducted to increase public acceptance of the label (EPA, 1993a). However, exceptions may exist in labeling programs not reviewed for this research.

Because of the lack of existing research on the topic, a set of criteria, plausibly part of existing ecolabels, was developed for the purpose of testing in this research. The criteria were consistent with two frameworks, Life Cycle Assessment (LCA) and The Natural Step (TNS). LCA is frequently used for the purpose of ecolabeling (EPA, 1992). TNS is more unconventional but is increasingly being accepted as a framework for sustainable development (Nattrass and Altomare, 1999). For the purpose of testing, these criteria provided bases for criteria selection.

Criteria were extracted from existing programs and grouped according to impact categories associated with TNS and LCA. Both the LCA and TNS frameworks endorse sustainability, not only environment-related issues. These frameworks were chosen in this study as bases for criteria development to facilitate a more broad-based sustainability label. Endorsement of sustainability criteria was tested in this study by using a questionnaire to determine the importance of these criteria to consumers. Ecolabeling efforts have come about because of increased consumer demand for this type of information. Thus, criteria selection ought to be based on the importance of the criteria to consumers in order to sustain consumer interest in ecolabels.

Efforts to reduce the environmental impact of industrial activities have long been focused on production; the immediate impact of consumption and consumer lifestyles has been considered a less significant problem. Uusitalo (1986) identified two reasons for this: consumers perceive themselves as being dependent on the producers and the consumption alternatives, and consumers feel powerless in influencing decisions regarding industrial activity. In addition, very little knowledge concerning the role of consumers in environmental implications is available or widespread. The significance of consumer decisions is perceived to be less than that of macrolevel factors such as the rapid industrial, economic and population growth (Uusitalo, 1986). Despite this, new approaches to creating sustainable production and consumption processes require redirection of the thinking of all actors in the market. Thus, the role of consumer attitudes cannot be neglected.

Consumer attitude

Consumer attitude is the subject's enduring perceptional, knowledge-based, evaluative, and action-oriented processes regarding a product or its attributes (Kinnear and Taylor, 1996). Attitude measurement may be used to evaluate the effectiveness of a marketing program, or could serve as support in developing these (EPA, 1993a). Measuring consumers' attitudes is central to many marketing situations; attitudinal data are usually the basis for market segmentation strategies. Determining the attitudes of different market segments towards a product or product attributes may also be essential for targeting consumer education.

This study is concerned with the importance that consumers attach to different environmental attributes associated with a product label, in this study referred to as ecolabel criteria. Attitude is expressed by the consumer as liking, endorsement of, or preference for a product or its attributes. Attitude is an important aspect of purchasing decisions and consumer preference for a product (Kinnear and Taylor, 1996). A relationship exists between consumer attitudes and behavior, which may make it possible to predict consumer endorsement of a product based on attitudes (Fishbein and Ajzen, 1975). Similarly, attitudes should be plausible indicators of endorsement of environmental attributes of a product. Different product attributes have different importance to consumers (Hawkins et al., 2001). The consumer's overall attitude towards a product is determined by the perceived performance of the product with regard to each attribute and the importance attached to each. On this basis, it is essential to provide information about product attributes because they play an integral role in attitude formation.

Influence of social variables on consumer attitudes

It has been emphasized that the findings of studies about the relationship between socio-demographic as well as other variables and environmentally conscious consumption should be used in targeting efforts of education related to the impacts of consumer decisions on the environment (Balderjahn, 1988). In the neoclassical view, patterns of consumption are assumed to originate from socio-demographic variables such as household income and composition (Schor, 1999). From a social science perspective, socio-economic class is also a predictor of consumption patterns; consumers with similar background express similar consumption patterns. These similarities are present also in situations when no functional needs and considerations apply (Schor, 1999).

The Consumer Labeling Initiative, CLI, is a descriptive survey study performed by the EPA in which consumer preferences for format of ecolabels were examined (EPA, 2000). Socio-demographic factors (age, gender, and presence of children in the household) have been used in previous studies to investigate whether significant differences exist among various groups of interviewees, such as education and income groups (EPA, 2000; Berger, 1997). In the CLI, it was determined that presence of children in the household was significant for whether consumers read the label. In this study, it is hypothesized that environmentally concerned consumers are younger, better educated, with a higher income than the average consumer, and more often female with young children in the household.

These socio-demographic variables have been studied in other contexts concerning consumer attitudes (Balderjahn, 1988; Nesmith and Wright, 1997; EPA, 2000). Balderjahn hypothesized that consumers belonging to the upper social class (highly educated with higher incomes) generally are more ecologically concerned in their shopping behavior than other consumers. However, socio-demographic variables were shown to have little effect on ecologically responsible shopping behavior, except education, which had a relatively high predictive power but was not statistically significant. Male consumers generally were almost twice as concerned about the environment as female consumers if they also expressed a positive attitude towards environmentally conscious living.

By contrast, Nesmith and Wright (1997) determined that women are more ecologically responsible shoppers than men. Thus, Nesmith and Wright's results contradict those of Balderjahn (1988). This could be due in part to the difference in geographical location (Balderjahn in Germany, Nesmith and Wright in Canada), as well as difference in time (1988, 1997).

In general, however, social structural variables have not been shown to be reliable predictors of ecologically responsible shopping behavior (Uusitalo, 1986; Balderjahn, 1988; EPA, 1994; 2000). However, these variables have not been tested as predictors of ecolabel criteria endorsement. Additionally, Balderjahn (1988) suggested testing in different geographical locations. In this study, variables previously determined to be unsuccessful as predictors of ecologically responsible shopping behavior were incorporated to determine if socio-demographic variables may be used to predict ecologically responsible shopping behavior as expressed by ecolabel endorsement in the United States.

Methods

A descriptive survey was used in this study to determine consumer endorsement of ecolabel criteria. This method has been used to examine consumer endorsement of different aspects of ecolabels (EPA, 2000), as well as for testing other aspects of ecologically responsible shopping attitudes (Balderjahn, 1988). The first hypothesis (H_1) in this research predicted that consumers differentially endorse ecolabels. Some criteria were included because they are currently used in existing ecolabels. Additionally, the criteria were chosen to fit under the impact categories derived from the two frameworks utilized in this study: TNS and LCA. Product categories tested in this research were chosen according to previous research (Palm and Windahl, 1998; EPA, 2000).

Socio-demographic variables have been tested, but generally showed to not be reliable predictors of ecologically responsible shopping behavior (Uusitalo, 1986; Balderjahn, 1988; EPA, 1993a; 1994; 2000; Berger, 1997). However, socio-demographic variables have not been tested as predictors of ecologically responsible shopping behavior expressed through ecolabel criteria endorsement. For this reason, socio-demographic variables were tested in this research to predict ecologically responsible shopping behavior as expressed by ecolabel endorsement in the United States. Therefore, the second hypothesis (H_2) predicted that socio-demographic variables affect the importance of ecolabel criteria to consumers. Socio-demographic variables included age, gender, ethnicity, formal education, and household income and composition. Ecolabel endorsement is assumed to be an indicator of ecologically responsible shopping behavior, although it is recognized that this may not be true in all cases. However, all other predictors of ecologically responsible shopping behavior fall outside the realm of this research.

Sample location and population

The research was conducted in Muncie, Indiana. Muncie has long been used to study consumer attitudes. What came to be known as the Middletown studies were initiated in 1924, and since then, Muncie has become one of the most studied communities in the United States (Hoover, 1990). Muncie was first chosen by accident, but was later chosen for further studies due to its high number of native-born White Americans. It was thought to be "as representative as possible of contemporary America, and… at the same time compact and homogenous enough to be manageable" (Hoover, 1990, p. 5). Additionally, Muncie was at the time not dominated by one industry, nor connected to a university. The first Middletown studies produced a work that because of its detail and literary style is regarded as one of the most significant books in recent American history: *Middletown in Transition: A Study in Cultural Conflicts* (Lynd and Lynd, 1937). Because of the great detail in which the studies were conducted, Muncie has since frequently been chosen for marketing and attitudinal studies.

The population of interest for this study includes adults at least 16 years old who visited the Bureau of Motor Vehicles (License Branch) on South Madison Street in Muncie, Indiana, during the survey period (July 16-23, 2001). The respondents selected represented an appropriate sample population using limited time, as well as adequate demographic and socio-economic representation, because nearly the entire population of Muncie must visit one of the License Branches in order to renew driver's licenses, register their vehicles, and register to vote. Only one central License Branch is present in Muncie. However, one smaller branch is located north of Muncie, exclusion of which may contribute to a slight unrepresentativeness of the sample. However, this study only seeks to test a methodology for further research.

Procedure

Importance of ecolabel criteria to respondents was measured through a questionnaire distributed by the Principal Investigator to respondents as they entered the License Branch. Data were collected on six consecutive business days from 9:00 AM to 5:00 PM. After the questionnaires were completed, they were collected and numbered in order of collection. A total of 340 respondents completed the questionnaire. No count of respondents declining to participate in the survey was made. Of the 340 respondents, 179 (53%) completed all questions. Unmarked questions were labeled "no data," and the remainder of the questions was used in the analysis.

Two different parts of the survey instrument were distinguished. In the first part, respondents were asked to judge the importance of ecolabel criteria in five product categories: Food, Clothing, Household Chemicals, Electrical Appliances, and Packaging. The second part elicited responses concerning socio-demographic variables of the respondents (age, gender, ethnicity, formal education, combined household income, and age of children in the household). In these questions, several categories were provided, and if the answer did not fit in any of the choices, the respondent selected "other". The socio-demographic questions were measured categorical and qualitative data.

Respondents completed the first part of the questionnaire by indicating the best response from three possible categories: "Information important for me to have on a label", "Information unimportant for me to have on a label", or "I don't know". For some of the socio-demographics variables, a range of response choices was provided. For example, there were seven possible answers for level of education, from less than high school through PhD/professional. Categorical data were used for the socio-demographic variables age, gender, ethnicity, education, income, and household composition.

Statistical treatment

Chi-square tests were used to test the following relationships:

- endorsement of the presented set of ecolabel criteria in the five product categories versus respondent's gender
- endorsement of ecolabel criteria versus presence of children in respondent's household
- endorsement of ecolabel criteria versus respondent's self-declared environmentalism.

Analysis of variance was used to determine variation of consumer endorsement of ecolabel criteria with respect to the respondent's age, ethnicity, income, education, and self-declared political orientation.

Results

The criteria tested in this study were provided as hypothetical criteria for a hypothetical ecolabel, however plausible. The criteria tested in this research were:

- presence of toxins in product
- presence of artificial substances in product
- atmospheric effects from manufacturing
- transportation distance of product
- resources consumed in manufacturing
- waste generation as a result of manufacturing
- use of nonrenewable resources in product
- amount of energy consumed in manufacturing

- water pollution as a result of manufacturing
- geographical origin of product
- geographical origin of raw material for product
- product locally produced
- child labor in manufacturing.

Respondents differentially endorsed the presented criteria. Five criteria were utilized in all product categories (child labor, water pollution, atmospheric effects, waste generation, and energy consumption). Of these five, child labor was the most frequently endorsed criterion. This criterion is related to the social welfare impact category as associated with the TNS and LCA frameworks, and may indicate that social welfare issues are considered important to many respondents. The other four criteria are related to environmental health.

Existing ecolabeling schemes do not incorporate consumer endorsement of criteria. Rather, ecolabeling schemes choose criteria according to perceived environmental impacts of specific product categories. To determine consumer preferences for one or more criteria may be helpful in the development and reformulation of ecolabeling schemes. Considering consumer demands constitutes the basis for successful marketing activity.

Regarding all tested criteria (some of which were not utilized in all product categories), the following statements can be made. Based on their levels of endorsement relative to other criteria, energy consumption and transportation distance were unimportant to respondents. Resource consumption and non-renewable resource consumption were also generally unimportant to respondents, as well as the criteria locally produced and waste generation, which were somewhat more frequently endorsed. Water pollution and atmospheric effects were somewhat important to respondents, while presence of toxins, child labor, and principal material were important to consumers in all product categories when present.

These results may indicate that consumers in this sample population are not aware of the interconnection between certain criteria, such as transportation distance and energy consumption with locally produced and atmospheric effects. They may also indicate that respondents are not frequently exposed to such concepts or thinking. However, respondents may simply not care about the impacts of the consumer products they purchase. These causes and relationships need further investigation.

Social variables

In other research, environmental attitudes were shown to differ across a number of socio-demographic variables. It could be argued, then, that attitudes held by people will influence their shopping behavior. Therefore, in this study, it was expected that a relationship would be found between the social variables and endorsement of ecolabel criteria. Several statistically significant relationships were found (Table 1).

Age was recoded to determine differences between younger and older respondents' endorsement of ecolabel criteria. Respondents in the age category 40+ generally seemed to endorse ecolabel criteria more than younger respondents. However, no statistically significant difference was noted between younger and older respondents in ecolabel criteria endorsement.

In this study, women expressed a higher endorsement of ecolabel criteria than men. African-American respondents expressed a statistically significantly higher ecolabel criteria endorsement than White American/Non-Hispanic respondents for the product categories food and household chemicals.

Table 1. Interactions between respondent characteristics and ecolabel criteria endorsement.

Interaction	Significance
Age * criteria endorsement	NS
Gender * criteria endorsement	
Food	0.033
Household chemicals	0.030
Electrical appliances	0.034
Packaging	0.000
Ethnicity * criteria endorsement	
Food	0.001
Household chemicals	0.003
Education * criteria endorsement	NS
Income * criteria endorsement	
Electrical appliances	0.042
Packaging	0.018
Children * criteria endorsement	NS
NS = Not Significant	

No statistically significant differences were found between education groups and ecolabel criteria endorsement. However, a statistically significant difference was found between the <$10,000 income group and the $70,000-$89,999 group for the product categories electrical appliances and packaging, with the lowest income group expressing the highest ecolabel criteria endorsement. In addition, the lowest income group tended to have a higher endorsement of ecolabel criteria for the clothing category. Except for the highest income group, all other income groups followed the same pattern: the lowest income group represented the highest endorsement of ecolabel criteria, after which ecolabel criteria endorsement becomes lower as the respondent's reported income increases. However, this relationship is not statistically significant for income groups other than the lowest and the second highest. No statistically significant difference was found between respondents with children present in the household and those without children present in the household, for any product category (see Table 1 for statistical significance).

Differential Importance of Ecolabel Criteria to Consumers

The purpose of this study was to test a method for determining the importance of ecolabel criteria to consumers. Two main objectives of the study were to examine the differential endorsement of ecolabel criteria, and to examine socio-demographic variables as predictors of differential endorsement of ecolabel criteria. This study was thus intended to provide insights as to consumer attitudes towards ecolabels so that standards for policies regarding ecolabels may be developed in order to decrease the environmental impacts of consumption.

It is recommended that ecolabeling schemes take into consideration the differential importance that consumers place on ecolabel criteria. For example, comprehensive studies examining consumer preferences in ecolabels and the importance they place on different criteria are needed, so that this information could be incorporated when into setting criteria for ecolabels. Based on the reported research, more comprehensive studies utilizing a more extensive set of criteria and product categories could be conducted, potentially also in different geographical and political settings. Particularly, it may be beneficial to incorporate aspects of sustainability other than environmental criteria, because social welfare and equity issues were found to be potentially the most important aspects of sustainability for the respondents in this research. This may have several benefits. Primarily, a label incorporating social welfare criteria may be more appealing to consumers than a strictly environmental label.

It may be generalized that overall, respondents in the study desired information about environmental impacts of the products they purchase. The population sampled was from Muncie, Indiana, which may be considered fairly socio-demographically representative of the broader American public. Thus, it can be extrapolated that American consumers in general are likely to desire environmental information in the form of labels. However, the country has subpopulations that differ socio-demographically from the sample. Different communities may require differential targeting of ecolabeling and environmental education efforts. Already, some groups are socio-demographically responsive to green marketing. If ecolabels are developed only to meet their needs or desires, the benefits of ecolabeling may not reach all socio-demographic groups of American society.

In pursuit of the goals of ecolabeling, ecolabels should be available to all consumers, and not deemed a luxury, in order to guide real environmental improvements. Ecolabeling is a rapidly growing green marketing activity with considerable potential to alleviate the environmental impacts of consumption. A main objective of ecolabeling is to raise awareness about potential environmental impacts caused by products. By providing information regarding environmental attributes in the form of ecolabels, environmental attributes may be incorporated in consumer decision-making. Hence, public awareness can be increased about the environmental impact of consumption. In order to make real environmental improvements, marketers and policymakers must strive to convey the message that in an effort to decrease the environmental burdens of consumption, individual efforts matter.

For future research, it may be beneficial to utilize several sampling locations and then compare the results in different cultural and social settings. A larger sample size and extended sampling time may also be beneficial to increase the opportunities to make generalized conclusions about the broader American public. This study should be considered a pilot project for developing a framework within which criteria importance can be tested. It is suggested that other criteria, product categories and sample populations be used in future research, to more accurately capture the attitudes of the average American consumer. Ecolabel endorsement is assumed to be an indicator of ecologically responsible shopping behavior. However, all other predictors of ecologically responsible shopping behavior fall outside the realm of this research. Therefore, it is suggested that other predictors of ecologically responsible shopping behavior be tested in future research.

There is a clear lack of literature relative to socio-demographic influences on ecolabel criteria endorsement. Socio-economic and demographic differences have been discussed briefly in previous literature relative to environmental attitudes and environmentally concerned shopping behavior. However, no studies have been conducted regarding this aspect of ecolabeling. Future research is needed to explore the relationship between gender, ethnicity, household income, and respondent education and ecolabel criteria importance to consumers. Since ethnicity, income, and education are still closely related in America, determining the relationships between them and ecolabel criteria endorsement may be worthwhile for ecolabel development purposes. Studying the relationships between ecolabel criteria importance and social structural variables further may provide insight regarding the complex patterns of consumer behavior.

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Soil Amendment Quality Certification: The Woods End/Rodale Seal Program

William Brinton[1] *and Scott Meyer*[2]

The presence and use within farming of soil amendments derived from recycled plant and animals residues and waste products has exploded in world markets during the past 10 years. It is estimated that in America alone, 7 million tons of composted wastes are used in farming (Hogg et al., 2002). A similar quantity is estimated for continental Europe. Many of these composts are used in organic farming. However, of these products, only some are regularly tested regarding mandatory state standards pertaining to hygienic and site-regulatory requirements. Composts are generally viewed as benign; few are examined as to content, and still fewer for efficacy relevant to specific plant-growth or soil-improving potentials. In Europe the Eco-Label seal program examines general composition as a soil-conditioner (Hogg et al., 2002). In Germany, the organization Bundesgütegemeinschaftkompost (BGK) awards a seal based principally on achieving low heavy metal content plus meeting hygienic limits (Hogg et al., 2002). In the US, a compost industry-group, US Composting Council, awards a testing seal of assurance based on evidence of laboratory testing alone (USCC, 2002).

This paper reports a new voluntary quality seal program for composts, RSAP, that sets standards within specific horticultural end-use types (Rodale, 2002).

Compost as a Unique Product

Recycled compost products are of a partly unknown nature (from the consumer standpoint) regarding both derivation and quality of performance (Brinton and Meyer, 2002). Laboratory survey work to date with composted products indicates widely varying indices of performance and types of ingredients (Brinton et al., 1996; Long, 1998; CWMI, 2002). Furthermore, with recent reports of the presence of herbicide residues clopyralid and picloram in composts (Brinton, 2002), a sharper focus on environmental quality has become evident, while horticultural performance remains essentially unrecognized in standards. Previously, we reported widely varying indices of performance for composts of potting-mix quality and peat-compost mixtures (Brinton and Tresemer, 1996).

During composting breakdown, some stabilization occurs, whereby the product achieves a state of “maturity” generally accepted as beneficial to plants. However, the presence of incomplete breakdown products from natural decay, including ammonia and volatile organic acids (Brinton, 1999), may result in compost being odorous and performing poorly, or being phytotoxic.

Significant breakdown of natural and xenobiotic compounds does occur in composting (Brinton and Evans, 1999; Rynk, 1999). However, the length of time that is required varies, depending on several factors. A pertinent requirement in evaluating the presence of any natural or synthetic chemical residues is to examine the relative completeness of the decay cycle. A young compost, by reason of being fresh or immature, may be expected to contain some residues. On the other hand, a properly matured compost may be expected to contain little or no objectionable residues. Presently, there are no mandatory standards for compost. The Washington Department of Transportation requires a Solvita maturity test to be performed before the product is used in specified projects (WADOT, 1997). The California Department of Transportation has employed a similar system (Caltrans, 2001). Recently, to encourage more checking of compost maturity, the compost division of the California Integrated Waste Management Board has updated the Caltrans test requirement as a flowchart, and has proposed to work with the new Maturity Index (CCQC, 2001) to monitor more composts (M. Leon, California Integrated Waste Management Board, personal communication). A recent evaluation of the maturity index approach revealed that it correlates positively with observed plant performance (UC Davis, 2002).

Taking account of these facts and considering the ultimate use of composts for professional organic

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horticulture suggest that performance of the product should be an important driving factor for ecological marketing, and that reasonable safety thresholds must be established for low-level contamination, including chemicals and fine plastic particles.

The Need for a New Seal of Quality

Phase I: A laboratory survey of commercial, natural soil amendments was developed in fall 1998. Samples of readily available, bagged commercial composts from across the US were tested, with the test data then compared with information provided by the compost producer related to the use of the material (Long, 1999). Subsequently, in 2001, we obtained samples of commercial compost products within a region of intensive composting. Samples were split and riffled from commercial bags, and analyzed for composition, and tested for plant growth performance.

Phase II. We surveyed composters across the US to determine mixtures, quantities and qualities of recycled products (Brinton, 2002). Approximately 3 million m^3 of compost were accounted for in our survey. This data supplied feedback about the nature of compost ingredients and the concerns of producers in achieving end-product quality.

Plant growth tests were performed by mixing fresh media with limed peat-moss based on the "dilution-to-standard-conductivity" (DSC) procedure (USDA and USCC, 2002). Two types of plant tests were employed. One uses garden cress (*Lepidium sativum*), which is sensitive to maturity but not to clopyralid or picloram. The other uses field peas (*Pisum sativum*) and red clover (*Trifolium repens*) to assess the presence of auxinic herbicides generally. Clover is approximately three times more sensitive than peas (Brinton, 2002). Subsamples of each compost sample were shipped to an environmental laboratory for GC/MS analysis for base- and acid-extractable organic contaminants.

Results

In our Phase I analytical survey, 51% of the commercial bagged composts were described on the label as of a leaf-yard-waste nature, and a similar number (49%) specified manure in the name. 75% listed specific ingredients, but several listed possible ingredients, suggesting that a generic bag label was being used. There were no biosolids (sewage sludge) composts indicated. There were 16 companies represented on the label of the 39 composts tested, indicating that many companies offered multiple products. Only four companies gave web sites for company information and only five gave phone numbers for product information. All compost products that had labels provided multiple use guidelines ranging from mulch to seedling-starter mixes, supporting the general belief in the "cure-all" nature of composts.

Composted commercial products' coefficient of variation in total carbon, salt (conductivity), and C:N ratio was 58, 97 and 63%, respectively. The pH varied from less than 5.0 to 8.8. Only 18% of commercial products listed N-P-K contents, which varied by 46, 31 and 25%, respectively. The decomposition index of the products varied from "fresh, raw compost" to "fully mature" using the Solvita index (USDA and USCC, 2002). The cress test calibrated to a standard peat-lime mixture (=100%) ranged from 11 to 120%, with a mean of 47% in the first survey and 46% in the second. Key test traits, including pH and salt level, correlated very poorly with to recommended application rates for soil. Of the composts tested, the mismatch of recommended rates to test traits suggests to us that compost marketing in the US is seen primarily as a disposal route for recycled materials. This underscores the *caveat emptor* principle for composts and natural soil amendments.

RSAP: A Quality Seal for Composts

End use and test groups

The Rodale/Woods End Seal divides compost products into six categories based on their primary use within horticultural-agricultural systems. Each use group is then linked to a set of primary analytical traits (Table 1). Within these analytical traits, a rank-order scoring technique is applied.

Definitions of market types

A use-group is also a market group, and this means the best or highest or most appropriate use of a compost product, as determined by a technical standard comprising an analytical profile. Closer definitions and primary concepts of these uses are described in Table 2. This also links to "Allowed Use," which sets forth suggested label types and application rate ranges, also applying to the label-use accuracy. This table becomes the driving force for all classification and testing.

Scoring and ranking

Laboratory test results form an analytical profile.

This profile at first is generic or non-typical, meaning it has not yet been fitted to a best use group. A computer algorithm matches the analytical matrix against six types with a unique scoring within each use-group type based on the previous test guidelines. This process results in a rank-order. The weighted test results produce an overall “score” between 0 and 100%, where a match of >70% is required to attain a specialized or “best use” use category.

Compost and soil amendments that attain the highest ranking may achieve the “Certified” logo (Figure 1). Those that do not attain the 70% level will fall into a “Registered” group for further quality characterization (Figure 2).

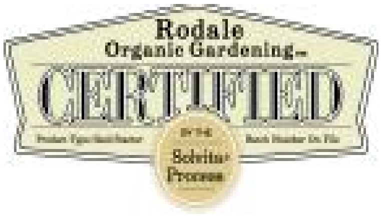

Figure 1. RSAP Seal of Quality awarded when composts achieve a high ranking within a specified use group based on analytical ranking.

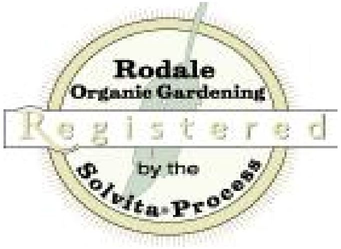

Figure 2. Logo awarded to products for which no match is available or test traits have significant outliers.

It should be emphasized that beyond the testing-scoring process, batch control is required. This may be determined from site operations manuals or a study of variability and coefficients of variation of specific test data over time. This is needed since compost involves large amounts of variable wastes handled differently over time.

Test traits that incorporate new environmental concerns, including plastic content, bioassays for herbicide residue, and weed seed content, may be readily incorporated into this quality scoring system (Brinton, 2002). Given sufficient use and calibration over time, the proposed approval system may uniquely aid growers to select and manage the best use of amendments of widely varying qualities.

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Table 1. RSAP end-use groups and associated primary analytical traits assigned the greatest weighting for ranking of quality.

Compost End-Use Category	**Analytical Determinants**						
	pH	Maturity Index	Organic Matter	Salts and Soluble Ions	Minerals and Metals	Bulk Density	Plant Growth
Seed Starter	√	√	√	√	√	√	√
Container Mix	√	√	√	√	√	√	√
Garden Compost	√	√	√	√	√		√
Topsoil Blend	√	√		√			√
Mulch			√			√	
Natural Fertilizer				√	√	√	

Table 2. RSAP end-use groups descriptors.

Quality Seal End-Use Category	Allowed Use	Unique Properties	Suggested Application Rate
Seed Starter	General plant substrate for starting seedlings in shallow containers for general gardening and later transplanting.	Loose texture, high air volume and water-holding capacity, mature organic matter, low salinity, low NH_4, high available N, moderate nutrient release potential.	Generally used at rates of 25-100% of blend.
Container Mix	Medium to large containers for growing out, nursery stock, house plants and ornamentals.	High air volume and water holding capacity, mature organic matter, low salinity, low NH_4, moderate to coarse texture, moderate nutrient release potential.	Generally used at rates of 50-100% of blend.
Garden Compost	All-purpose garden use and in greenhouse beds, incorporation into soil or container media at moderate to high application rates typical of soil building.	Medium organic matter, moderate to medium-high available nutrients and nutrient release potential, mature organic matter, medium to medium-high salinity; low C:N ratio, low NH_4:NO_3 ratio.	Generally used at rates of 25- 250 kg per 10m².
Topsoil Blend	Topsoil replacement, direct seeding, lawn-care, soil repair and garden raised beds. High to very high application rates or coverage.	Simulates rich native topsoil, low to moderate organic matter, medium to high density, low C:N ratio, low salinity, stable, low NH_4:NO_3 ratio.	Generally used for fill and soil replacement up to 100%.
Mulch	A coarse blend for surface application only, under shrubs and for general non-growth purposes; 1-8” thick surface application for weed control, gradual nutrient release, and surface organic matter improvement.	High organic matter, moderate to high C:N ratio, low to very low salinity and soluble nutrients, low NH_4:NO_3 ratio.	Generally used for cover layers up to 100%.
Natural Fertilizer	A high nutrient product best suited to be used sparingly to add nutrients to soil.	Moist to very dry, spreadable, low dust, passes pathogen tests, high available nutrients and rapid nutrient release potential.	Generally used at rates of 2-35 kg per 10 m².

Why Pesticide Risks Matter and Pose Tough Challenges for Ecolabel Programs

Charles M. Benbrook[1]

Why Consumers Remain Focused on Pesticides in Food

Between two-thirds and three-quarters of consumers voice strong or very strong concerns over pesticide residues in food. A market research firm recently summarized findings from a May 2002 series of focus group sessions on ecolabeled potatoes with the comment: “Consumers certainly want to do what’s ‘good for the environment.’ Even more importantly, however, they want to do what’s ‘good for my body’” (Houlihan, 2002).

Consumers remain concerned over pesticide residues in food for good reason. New scientific information strongly reinforces concern on both sides of the risk equation – pesticide exposure and toxicity. Many people are now aware that pregnant woman, infants, children, and the health-compromised are more vulnerable to pesticide-related health problems and that US regulatory science and policy in the past failed to take this biological reality into account, or did so in a cursory way.

What does “far more vulnerable” mean in this context? US Environmental Protection Agency (EPA) risk assessments often show that vulnerable populations face 100-fold to 1,000-fold higher risks than do healthy adults (Office of Pesticide Programs, 2002).

Exposure

Through the 1970s and until the late 1990s, EPA based its pesticide risk assessments on exposures to healthy adults. The Food Quality Protection Act (FQPA), passed in 1996, directed the EPA to conduct a reassessment of all food uses of pesticides, taking into account the heightened susceptibility of infants and children, the elderly, and other vulnerable population groups.

Infants consume more food per kilogram of bodyweight than adults and a much less varied diet. As a result, exposure to a pesticide from consumption of a given food is greater per kilogram of infant/child body weight compared to adults (National Research Council, 1993).

In the early 1990s relatively little was known about the frequency or levels of pesticides in food as actually eaten. Then-existing government data on residues had been collected as part of tolerance enforcement programs and represented residues at the farm gate, prior to washing, shipping, storage, marketing, and preparation. Relatively insensitive analytical methods were employed.

To improve the accuracy of pesticide dietary risk assessments, Congress funded the USDA’s Pesticide Data Program (PDP) beginning in 1991. By design, this program focuses on the foods consumed most heavily by children, and the food is tested, to the extent possible, “as eaten” (Agricultural Marketing Service, 2002). That is, banana or orange samples are tested without the peel; processed foods are tested as they come out of a can, jar or freezer bag.

Almost 10 years of PDP testing has greatly enhanced understanding of pesticide residues in key segments of the US food supply. In a given year’s results, samples of a particular food include domestic production and imports roughly proportional to their respective share of overall consumption. Also, market claims associated with a given food item, such as “organic,” “IPM-grown,” “no detectable residues” or “pesticide free,” are recorded and appear in PDP records roughly in proportion to their occurrence in retail market channels (Baker et al., 2002). As a result, PDP results make it possible to compare the pesticide risks in domestic versus imported foods, as well as to compare the frequency and levels of residues by market claim (Groth et al., 2000).

There is good news and bad news in the PDP results. Some major food groups – dairy, meat, and poultry products – contain relatively few detectable pesticides and contribute very modestly at the national level to dietary exposure and risk. Relatively few pesticides are routinely present in food at levels that pose significant risks, to the extent contemporary risk assessment science and toxicological data accurately reflect real-world risks. Most high-risk food-chemical combinations are known and under active regulatory review.

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The bad news is that six years after passage of the FQPA, key children's foods still contain worrisome pesticide residues (Consumers Union, 2001). PDP data document the foods most likely to contain residues of high-risk pesticides: apples, pears, peaches, grapes, green beans, tomatoes, peas, strawberries, spinach, peppers, melons, lettuce, and various juices. The data make it possible for EPA and others to carry out detailed dietary risk assessments, incorporating the percentage of samples testing positive, the levels and distribution of residues found, the presence of multiple residues that work through a common mode of biological action, and the relative mammalian toxicity of pesticides found.

Nearly three-quarters of the fresh fruits and vegetables (F&V) consumed most frequently by children in the US contain residues, and almost half the PDP F&V samples tested from 1994-1999 contain two or more residues (Baker et al., 2002). In general, soft-skinned fruit and vegetables tend to contain residues more frequently than do foods with thicker skins, shells, or peels.

The pattern of residues in organic foods tested by the PDP differs markedly from the pattern in conventional samples, as shown in Table 1. Conventional fruits are 3.6 times more likely to contain residues than organic fruit samples, and conventional vegetables are 6.8 times more likely to have one or more detectable residues.

The Baker et al. paper in *Food Additives and Contaminants* is the first peer-reviewed study comparing residues in organic, ecolabeled, and conventional foods. It draws on three data sets: 1994-1999 PDP data, residue testing by the California Department of Food and Agriculture, and Consumers Union testing of four foods. Consistent and highly significant differences were found in each of the three data sets, lending confidence to the statistical results despite often small sample sizes of specific organic foods and ecolabeled produce. As expected, conventional foods are more likely to contain residues than organic food. The pattern of residues in IPM-grown and "No Detectable Residue" (NDR) samples was closer to conventional foods than organic.

Table 2 presents comparable results drawing on PDP year 2000 testing. Conventional samples were 3.2 times more likely to contain residues compared to organic samples, whereas NDR samples actually contained residues more frequently than conventional produce. The number of NDR samples in year 2000 PDP testing was small, so these results should be interpreted with caution.

Compared to organic produce, conventional samples contain residues more frequently and also tend to contain multiple residues more often, as shown in Table 3. The average positive sample of conventional produce tested by PDP in 2000 contained 2.5 residues, whereas positive organic samples contained 1.5 on average. Note that imported foods consistently contained more residues than domestic samples, regardless of market claim.

Table 4 provides further perspective on the frequency of multiple residues, drawing on two data sets (PDP, 1994-1999; Consumers Union, four crops). Averaged across the two data sets, just under 7% of positive organic samples and 54% of positive conventional samples contained multiple residues. The average positive conventional apple sample contained 3.2 pesticide residues, peaches contained 3.1, and celery and cucumber contained 2.7 (Baker et al., 2002).

The FQPA requires EPA to take dietary, water, residential, and occupational exposures into account in reaching judgments whether cumulative pesticide risks exceed "levels of concern." Detailed pesticide exposure assessments in agricultural communities have shown that exposure levels increase during spray season even among children whose parents are not occupationally exposed (Koch et al., 2002). Inhalation of indoor air accounted for almost 85% of chlorpyrifos exposure in a study based in Maryland, exposure that should decline as a result of recent regulatory actions (Pang et al., 2002).

Given that almost all Americans consume pesticides every day, and also are periodically exposed from home, garden, and urban uses of pesticides, it is no wonder that recent biomonitoring studies frequently find residues of pesticides and their metabolites in urine or blood (MacIntosh et al., 1999; Adgate et al., 2001; Mills and Zahm, 2001; Lu et al., 2002). In March 2002 the Centers for Disease Control and Prevention (CDC) released the most extensive analysis ever done of environmental contaminants in blood and urine (CDC, 2001). While lead and tobacco exposure markers appear in decline, organophosphate (OP) insecticides and their metabolites were found in nearly all urine samples tested.

Toxicity

During fetal development and the first years of life, infants are much less able to detoxify most pesticides and are uniquely vulnerable to developmental toxins, especially neurotoxins, given that the brain and nervous system continue developing through about age 12 (National Research Council, 1993; Cooper et al., 1999; Eskenazi et al., 1999).

Implementation of the FQPA has triggered an explosion in toxicological and risk assessment research on the developmental effects of pesticides, with special focus on those capable of impairing either the development or functioning of the endocrine system. New toxicological data have forced downward by one to two orders of magnitude the allowable levels of exposure to dozens of pesticides found in food (Gray et al., 1999; Office of Pesticide Programs, 2002). The EPA has had to phase out hundreds of food uses of relatively high-risk pesticides (mostly OP insecticides uses) in order to meet the FQPA's new "reasonable certainty of no harm" standard, with hundreds more to go (Consumers Union, 2001).

In the last decade, compelling new evidence has emerged on the mechanisms through which pesticides can disrupt development at very low doses when exposures occur during critical developmental stages. Literature through early 1999 is summarized in a special issue of the journal *Toxicology and Industrial Health* (Colborn et al., 1999). Just a few examples follow that focus on research published since the 1999 review.

A team of researchers at the University of California-Berkeley School of Public Health found that exposures to pesticides during pregnancy significantly heightened risk of children developing leukemia, and that the more frequent the exposures, and the earlier in life, the greater the increase in risk (Ma et al., 2002). A team in the Department of Preventive Medicine, University of Southern California, found that exposure to pesticides in the home during fetal development and the early years of life increased the risk of non-Hodgkin's lymphoma, with odds ratios as high as 9.6 for Burkitt lymphoma (Buckley et al., 2000).

A study in Ontario, Canada confirmed that exposures to pesticides three months prior to conception and during pregnancy increased the risk of spontaneous abortions (Arbuckle et al., 2001).

Research supported by the French Ministry of Environment documented clear linkages between exposures to pesticides commonly used in grape vineyards and long-term adverse cognitive effects (Baldi et al., 2001). Cognitive performance in a group of children living in an upland agricultural region in Mexico with substantial pesticide use was compared to that of a similar cohort in a nearby village. Children exposed to pesticides had lessened stamina and attention spans, impaired memory and hand-eye coordination, and greater difficulty making simple line drawings (Guillette et al., 1998).

Just-published work on the developmental neurotoxicity of the most widely used insecticide in the United States, chlorpyrifos, showed that this OP targets neural cell replication and differentiation, as well as the functioning of glial cells (Qiao et al., 2002). The authors conclude that exposures to this OP during the first few years of life are probably a greater risk than during fetal development, although prenatal exposures appear to disrupt the architectural organization of specific regions in the brain and the development of the fetal liver.

Anti-androgenic pesticides have been shown to cause demasculinization in several species by blocking the receptor sites needed for male sexual hormones to perform their normal functions during development (Gray et al., 1999; Baatrup and Junge, 2001).

Why the public remains focused on pesticide risks

Food exposure to pesticides remains a significant but readily managed public health problem (Consumers Union, 2001). Pesticides in food rarely poison people from a single acute exposure episode – aldicarb in California watermelons in the 1980s was a rare exception. Pesticide exposures are also generally not the sole cause of developmental or degenerative diseases. Still, pesticides in food contribute to reproductive, developmental and chronic health problems, birth defects, degenerative neurological diseases, and cancer. Some do so through overt toxicity (i.e., exposures trigger a developmental abnormality or growth of cancerous cells). Others do so by impairing the development or functioning of the immune system, hence increasing the susceptibility of a person to a variety of diseases. The degree to which pesticides contribute to diseases is not known, which is one reason that regulators impose safety factors in determining dose levels consistent with a "reasonable certainty of no harm" standard.

While the FQPA has set the stage for EPA actions targeting high-dietary-risk pesticide uses, no one familiar with the implementation process expects decisive or aggressive action in the foreseeable future. In a detailed assessment of progress through the end of 2000, Consumers Union (CU) gave the EPA an average grade of C- for its FQPA implementation efforts. The highest grade, a B+, was awarded for progress in reducing residential exposures; the lowest grade, a D, was triggered by very modest progress in reducing dietary exposures (Consumers Union, 2001). An update using CU's grading system would produce comparable results today because few actions restricting high-risk pesticide uses have been taken since early 2001.

In the years ahead consumers are likely to continue reading about newly discovered, sometimes worrisome pesticide risks and the lack of much progress in reducing risks via government action. The money spent on organic and ecolabeled foods is likely to grow appreciably as a result.

Given that pesticide concerns will typically be the major, or at least among the major factors leading a consumer to seek out ecolabeled food, the way ecolabel programs deal with pesticide use and risks will be a decisive factor in gaining consumer trust and brand loyalty. Experience to date with U.S. ecolabel programs suggests that consumer recognition and trust is hard to win and easy to lose.

How Current Ecolabels Deal with Pesticide Risks

Current food ecolabel programs make two sorts of claims regarding pesticide use and risks. One set is based on food quality outcomes, and typically focuses on the relative presence or absence of residues in products. A second set of claims refers to how a crop was produced, often not making any direct food safety claims. Some ecolabel programs make both types of claims – for example, food promoted as free of pesticides and grown using environmentally friendly production practices.

Three broad categories of food ecolabels are discussed below: organic; based on a residue claim; and sustainable, or based on an eco-friendly production system. Pesticide use and risks are dealt with in markedly different ways across programs falling in these categories.

The global debate over agricultural biotechnology has triggered increasingly rancorous debate on the impacts of farming systems and technology on pesticide use and safety. Often organic farming is championed by small farm, environmental and consumer advocates as the low-risk, sustainable alternative to the planting of GMO seeds, while biotech proponents characterize organic systems as unproductive, backwards, and in any event, just as risky as conventional systems. They point to the use in organic farming of non-synthetic pesticides and botanicals and the lack of residue testing for these pesticides as evidence that organic food is, or may be as risky as conventional food.

Organic food

Certified organic food is grown in compliance with a highly evolved set of standards that include prohibition against the use of most synthetic pesticides, including all those known to pose even modest levels of human health risk. Organic farmers may and often do apply sulfur, oils, several botanicals, *Bacillus thuringiensis* (*Bt*), soaps, certain microbial pesticides, and pheromones.

By volume, the leading pesticides in both organic and conventional agriculture are sulfur, horticultural/petroleum distillates and oils, and copper-based fungicides. There are some formulations of these pesticides approved for organic production and many others available to conventional growers. These pesticides are used in similar ways for comparable reasons on organic and conventional fruit and vegetable farms. Sulfur is almost certainly the most common pesticide residue present on conventional and organic F&Vs, but it is never tested because it is exempt from the requirement for a tolerance and poses essentially no risk through the diet. Copper also is not tested because of tolerance exemptions and the fact that copper is an essential nutrient and harmless at the levels ingested as food residues.

Organic farmers also rely on pheromones, *Bacillus thuringiensis* insecticides, and products that coat produce with nontoxic, biodegradable materials that are often approved as food additives and are exempt from the need for a tolerance (e.g., soaps and clays). Residues of these pesticides are rarely tested because there are no tolerances to enforce and no basis for food safety concerns, given how these products are used in production agriculture.

The major botanical pesticides of concern in organic production, based on extent of use and toxicity, contain pyrethrins as the active ingredient. Pyrethrins are toxic but degrade rapidly after spraying and hence rarely leave detectable residues. Also, they are applied at very low rates, on the order of one to two one-hundredths of a pound per acre. Other botanicals of possible concern include rotenone and sabadilla. The most recent survey of organic farmers carried out by the Organic Farming Research Foundation found that only 9% of 1,045 farmers applied botanicals regularly (mostly pyrethrins and neem), and that 52% never use them, 21% use them rarely, and 18% "on occasion" (Walz, 1999).

Annual inspections are carried out by organic certifiers to assure that only permitted production inputs and practices are used on certified fields. The farm plans submitted by growers to certifiers must spell out the methods used to control pests common in the region; experienced organic field inspectors have in-depth knowledge of what farmers need to do to avoid damaging pest losses. When farm plans gloss over critical pest management challenges, applicants can expect a series of questions from inspectors during annual farm visits and a degree of skepticism when certification decisions are being made. Some certifiers periodically test a small percentage of the food they certify each year for residues of synthetic pesticides; with full implementation of the National Organic Program rule, certifiers will likely test for pesticides somewhat more regularly in order to retain accreditation.

Available data firmly support the conclusion that buying organic food is the best way for consumers to reduce exposure to pesticide residues in food, especially residues of higher-risk products (see Tables 1-4 and Baker et al., 2002; Younie and Litterick, 2002). Still, organic food is not free of pesticide residues. For example, nearly all samples of fresh organic (and conventional) stone fruit, grapes, tomatoes, and certain other crops contain residues of sulfur or horticultural or petroleum oils and about one-quarter of organic F&Vs test positive for prohibited synthetic pesticides.

It is legitimate to ask why one-quarter of organic F&V samples contain residues of synthetic pesticides when presumably no certified organic production fields are directly sprayed with these materials. Like transgenic DNA, pesticides are ubiquitous and mobile across agricultural landscapes. Most positive organic samples contain low levels of pesticides widely used on nearby conventional fields that most likely stem from drift, use of contaminated irrigation water, soil-bound residues of persistent pesticides, or cross-contamination with post-harvest fungicides in storage facilities (Baker et al., 2002). The small percentage of samples sold as organic and found to contain relatively high levels of residues likely arise from inadvertent mixing of produce, laboratory error, mislabeling, or deliberate fraud.

Those hoping to convince consumers that pesticide residues in organic food are as risky as those in conventional foods are not likely to let these facts get in the way of their arguments. Expanded residue testing of botanicals and biopesticides would be needed to decisively settle the empirical issues behind this debate. But settling this largely artificial controversy would mean less testing of much more significant pesticide dietary risks, a tradeoff thus far rejected by government regulatory and research agencies.

Programs based on residue claims

Some ecolabels are based on claims of "No Detectable Residues," and are often called "NDR" programs. The added claim "pesticide free" is sometimes used in advertising and promotional material associated with NDR-certified food.

The best known and most successful NDR programs are run by the Gerber Product Company and Scientific Certification Systems (SCS), an Oakland, California based company. The SCS "NutriClean" program uses an NDR standard of 0.05 ppm, although SCS is reportedly moving toward a 0.01 ppm standard (Stan Rhodes, President, Scientific Certification Systems, private communication, 2002).

Gerber quality control procedures are designed to assure "no detectable pesticides in finished baby food product." Their program relies on grower contracts and reporting of pesticide use, a "Do Not Use" list, and use of highly sensitive analytical methods at several stages of the food manufacturing process, with limits of detection as low as 0.001 ppm and rarely over 0.01 ppm.

The lower the residue level allowed in an NDR program, the stronger the food safety claims that can be supported by the program. Lower allowed levels will require farmers to make more substantial changes in IPM systems and typically will rule out most mid- to late-season uses of high-risk pesticides. Lower levels also will increase program costs since residue testing will have to be done with more sophisticated methods and equipment. In some instances, grower contracts, multi-faceted quality control procedures, and chain-of-custody procedures are necessary to guarantee the absence of residues above NDR program standards.

NDR programs that make “pesticide free” claims are vulnerable to legal challenges since such claims can be misleading. This is because the “free” in “pesticide free” actually means “free of a subset of pesticides tested for above a given level of detection at the time food is consumed.” NDR programs typically equate “pesticide free” at the time food is purchased and consumed with reduced use of pesticides during the production season. While seemingly logical, food that meets an NDR standard when consumed might contain appreciable residues prior to harvest or when sold to consumers, as was clearly the case in 1994-2000 PDP testing (see Tables 3 and 4). Publicly available residue data on NDR and conventional produce suggests that pests on fields meeting an NDR standard may have been managed in much the same way as pests in nearby conventional fields growing the same crop. Greater transparency and better understanding are needed regarding just what an NDR label means in terms of pesticide residues, since some consumers are looking to ecolabels to provide both greater assurances of food safety and lessened environmental and farmworker risks from pesticide use.

Still, consumers can be confident that NDR-certified food rarely contains residues over 0.05 ppm. Unfortunately, it is difficult to make a case that the absence of residues over 0.05 ppm means that NDR-certified food is largely free of pesticide risk. Azinphos-methyl residues in apples are among the major contributors to overall OP dietary risk, yet the mean residue level found in PDP testing ranges between 0.03 ppm and 0.06 ppm from year-to-year. Methamidophos in tomatoes is another risk driver, with mean residues typically in the same range. A majority of the 100 food-pesticide combinations ranking highest on Consumers Union’s list of risk-driver pesticide uses involve cases where mean residues are under the 0.05 ppm NDR standard (Groth et al., 2000).

The highest-risk pesticide-food combination in EPA’s cumulative OP dietary risk assessment was dimethoate in grapes; the mean dimethoate residue found was well below 0.05 ppm. Accordingly, a significant portion of conventional grape samples tested by the PDP would meet the 0.05 ppm NDR program standard.

Consumers Union developed a method to calculate tolerance levels for high-risk pesticides that in all likelihood would meet the FQPA’s “reasonable certainty of no harm” standard (Groth et al., 2000). For the approximately two-dozen pesticides with acute or chronic Reference Doses at or below 0.0001 mg/kg per day, tolerance levels must be set at 0.01 ppm or lower to fully protect infants and children. (RfDs are regarded as acceptable levels of exposure and are calculated by applying safety factors between 100 and 3,000 to the “No Observable Adverse Effect Levels” found in toxicological experiments.)

EPA has set tolerances at 0.01 ppm for two carefully studied major risk-driver uses of the OP insecticide chlorpyrifos (apples and grapes) and is likely to establish tolerances this low or lower for some other OP-crop uses. Hence, it is clear that the typical 0.05 ppm NDR standard is not health-protective for the most toxic pesticides now appearing with some regularity in key children’s foods. To support pesticide food safety claims, future ecolabel programs will have to be at least as strict as federal law. A standard between 0.01 ppm and 0.001 ppm will be needed and is within reach for sophisticated programs, as demonstrated by the success of the Gerber Products Company in meeting their quality control goal of no detectable residues in finished baby food products.

NDR-based programs must confront another problem arising from the uses and residue profiles of some of today’s safest biopesticide alternatives. Spinosad, kaolin clay, and harpin proteins are examples of biopesticides with attractive environmental and toxicity profiles. These biopesticides already are or soon will be approved for organic production. Use of these products though will routinely result in residues above 0.05 ppm. In such cases, the application of an NDR standard divorced from actual risks could emerge as a barrier to progress toward reduced-risk pest management systems.

Eco-friendly farming system claims

A third category of ecolabels is based on a wide variety of combinations of claims regarding the use of eco-friendly production systems and practices, sometimes coupled with assurances that certain high-risk practices and inputs are not used. Some ecolabel program goals and claims are expansive, even comprehensive, encompassing pesticide use and risks, erosion control and sedimentation, water quality, riparian area management, preservation of wildlife habitat, and worker safety and quality of life issues. The Food Alliance is a well-known example of a “full-service” program.

Other programs are more focused and narrow in terms of the crops and regions covered and the types of environmental issues addressed. The Pacific Northwest's Salmon Safe program is an example of a narrowly focused program that strives to achieve a single, well-defined outcome of broad interest to people in the region.

In general, the more focused an ecolabel program, the easier it is to establish credible, meaningful and verifiable goals. It requires considerable work to define goals, establish risk indicators, set standards, and specify how progress will be measured and verified. Unfortunately, all these steps must be completed in sequence by each environmental, grower, commodity, or consumer group wanting to establish a credible ecolabel program. Experience suggests that the single most important ingredient is a good working relationship among people and constituencies that share common goals. People skills and mutual respect greatly enhance the odds that partnership-driven activities will be successful and sustainable.

Ecolabel programs based on production systems typically focus on adoption of conservation and biologically based farming systems. Biointensive, prevention-based IPM is typically a prerequisite for program participants and is often a major program focus. Accordingly, programs strive to identify core biointensive IPM practices and a way to establish certification standards linked to the adoption of some portion of identified, proven practices.

In practice, biointensive IPM systems are extraordinarily complex and dynamic and are difficult to capture in a "check list" of practices. Differences from one season to the next, or one production region to another, can dramatically alter pest pressure and the efficacy of various pest management practices, triggering the need for changes in IPM systems and pesticide use.

The World Wildlife Fund-Wisconsin Potato and Vegetable Growers Association-University of Wisconsin (WWF/WPVGA/UW) potato collaboration has successfully developed a set of biointensive IPM standards that are now incorporated in the certification of potatoes labeled as "Healthy Grown." Accomplishing this task for a single commodity in a defined geographic area required years of effort and a major commitment of time by growers, environmentalists, university researchers, IPM specialists, advisory committee members, consultants, and the state's potato industry trade association.

While overly simplistic "check-list" IPM should be avoided by ecolabel programs, there are some basic principles that ecolabel programs should feature prominently in IPM program standards and requirements:

- Proven phytosanitary practices should be mandatory, as must resistance management practices.
- If farmers find it necessary to intensify pesticide use because of growing pest pressure, they should also diversify and intensify adoption of a range of preventive practices.
- Steps should be taken to identify where pest populations first emerge, so that aggressive, early-season actions can be taken to slow population growth and spread.
- Active steps should be taken to avoid harm to beneficial arthropods, and to the extent possible, populations of beneficials should be encouraged through management of field borders and pesticide selection and use patterns.
- The tracking of pesticide use and risks should be incorporated in some way into ecolabel programs, especially if any claims are made related to pesticide risks.

The requirement for adoption of biointensive IPM practices can serve as a vehicle to inform farmers of the system changes they are expected to make. This serves an educational function and allows farmers to project what program enrollment will entail and cost, and whether alternative systems and technology will work acceptably well in their farming system.

Credible Pesticide Risk Claims in Ecolabel Programs

Most ecolabel programs attract clients and consumers by pledging to reduce pesticide risks. The organic claim is the cleanest and most rigorous – no synthetic pesticide use is allowed. This basic feature and advantage of organic farming is backed up by a sophisticated set of production standards, a science-based materials review process, annual inspections, and occasional residue testing. No other food ecolabel program can match the organic label in terms of the scope of pesticide risk-related claims that can be legitimately made and defended.

One of the simplest and best ways for a non-organic ecolabel program to make strong and defensible pesticide risk-related claims is to issue "Do Not Use" or

"Use With Restrictions" lists of pesticides. If a "Do Not Use" list contains most of the high-risk pesticides used on conventional farms producing a given crop in a given region, farmers meeting the standards almost certainly will reduce the adverse impacts of pesticides. Setting up and administering such a program is relatively simple and inexpensive, especially compared to programs based on residue testing or environmental performance standards, like adoption of sufficiently "green" or biointensive IPM systems.

Hybrid ecolabel programs combine "Do Not Use" lists with requirements for the adoption of proven prevention-based biointensive IPM practices. The "Do Not Use" lists are often needed to gain consumer and environmental community confidence that the program is achieving meaningful changes.

"Do Not Use" lists can be remarkably effective in changing pesticides use patterns, as demonstrated by the WWF/WPVGA/UW biointensive IPM potato collaboration. In 1996, this program identified 12 high-risk pesticides used in potato production and placed them on a "Do Not Use" list that is now part of the standards governing production and labeling of "Healthy Grown" potatoes. Table 5 presents basic data on the use of these 12 pesticides in Wisconsin potato production in 1992, 1995, 1998, and 2001.

Across the whole Wisconsin potato industry, the 12 high-risk pesticides accounted for 14% to 16% of total use by weight prior to the beginning of the collaboration in 1996. Two years later, in 1998, their share had dropped to 4.1%, and in 2001 declined further to just 2.1%.

A key goal of the Wisconsin collaboration is reducing not just the amount applied, but also the overall public health and environmental consequences of pesticide use in potato production (Lynch et al., 2000). To track risks, not just the amount applied, the collaboration developed a toxicity index that encompasses acute and chronic mammalian risks, ecological risks (birds, fish, small aquatic invertebrates), and impacts on bees and beneficial organisms.

The index is used to calculate "toxicity units," an indicator of relative pesticide risk potential that is driven by amount applied and the inherent toxicity of pesticides (Benbrook et al., 2002). In 1992, the 12 high-risk pesticides used in Wisconsin potato production accounted for 32% of total toxicity units; most of the balance was associated with use of fungicides needed to control the serious outbreak of late blight that hit major potato production regions in the early 1990s.

Two years into the Wisconsin program, growers had on average reduced toxicity units associated with the 12 pesticides to just 9.5% of total toxicity units, and reduced them further to 1.4% in 2001, the first year "Healthy Grown" potatoes were certified in Wisconsin.

In 2001 there were only 53 fields of potatoes certified in Wisconsin as "Healthy Grown," covering some 4,800 acres, or about 6% of the state's total potato area, yet most growers in and out of the program adhered to the "Do Not Use" lists for most of their land, as evident in the huge drop in the amount of "Do Not Use" pesticides applied between 1998 and 2001. The ability of ecolabel programs to change pest management behavior across a whole industry is encouraging and provides strong justification for continuing public and private sector investment in ecolabel programs and IPM partnerships.

Essential ingredients for credible claims

The six essential ingredients of credible pesticide-related ecolabel claims can now be described.

1. There must be logical basis – a process or analytical method – to identify the pesticide risks that the program is striving to reduce. Organisms at risk and the nature of the possible adverse impacts following exposures need to be specified. This process/method must be grounded in accepted risk assessment concepts, models and data, and must ultimately make sense to consumers and attract their attention and money. Risks will change over time and ecolabel programs must have the flexibility to continuously target the most significant risks.
2. Target risks must be quantifiable at the field or farm level in some sort of baseline from which reductions in risk can be calculated. Typically, the easiest and most defensible baseline is average pesticide use and risks on land managed by nearby conventional growers not in the program. The data to establish such baselines for major crops in the US are often readily available at the crop-state level.
3. Credible risk indicators must be established that can serve as a proxy for the real-world risks that an ecolabel program is striving to reduce (impacts on birds, farmworker poisonings, OP die-

tary exposure risk, or a combination of multiple risks).

4. Standards must set forth acceptable levels of risk stemming from pesticide applications on a given field enrolled in an ecolabel program. The standards can be based on actual direct measures of risk – poisoning episodes, residues in food, bird kills – or on indicators of risk, such as aggregate pesticide toxicity units per acre.
5. Compliance with standards must be independently verified by a third party that is granted access to information needed to assess actual field-level performance relative to stated standards and requirements.
6. All aspects of the program must be transparent and accessible to growers, consumer and environmental organizations, interested members of the public, the farm community, and regulators.

Program standards can be simplistic and easy to enforce or complicated and challenging to implement. Programs should take into account both the volume of pesticides applied and pesticide toxicity in order to avoid the pitfall of risk-trading, where a prohibition against the use of one set of high-risk pesticides simply triggers a shift to other products, some of which may turn out to be worse than those on the initial “Do Not Use” list.

Several Integrated Fruit Production (IFP) programs in Europe, and a few in the US, use a “Red/Yellow/Green” list approach in defining acceptable pesticide uses. In these programs, relative risk judgments are made regarding the environmental impacts of an acre-treatment with a given pesticide. Per acre risks are compared to the risks from use of alternative products; the riskiest products are placed on a “Red – Do Not Use” list; the least riskiest go on a “Green – Unrestricted Use” list; all others land on the “Yellow – Use Only When Needed and with the Following Precautions” list.

The IFP “Red/Yellow/Green” approach is designed to provide farmers access to some pesticides that can pose significant risks under some circumstances, but can be used safely with the proper attention to detail and safety precautions. The public health and environmental benefits of an IFP-based ecolabel rest largely on how and to what extent credible risk indicators drive the delineation of the three lists. Most IFP programs to date are not transparent in terms of the criteria and data used to place various pesticides on the Red/Yellow/Green lists. Also, they do not limit the number of applications that can be made with “Yellow” and “Green” pesticides.

Shortcomings in most contemporary IFP programs reflect how IFP programs have been carried out to date, rather than inherent flaws in the IFP approach. It would be a simple matter to place caps on the maximum number of “Yellow” and “Green” pesticide applications that may be made per season; the delineation of lists could be grounded in rankings of indicators of risk per acre.

There are many ways that ecolabel programs can capture the interactions between pest management systems and pesticide use and risks. Those that establish meaningful goals for reduction in risk and credible risk indicators to monitor progress will have the best chance to win the confidence of consumers.

Critical future challenges loom for ecolabel programs. Those active in California and Florida must find ways to deal with the consequences of the phase-out of methyl bromide. Use of soil fumigants in general deserves more attention by ecolabel programs; for this reason, the soil fumigation policy developed by the Protected Harvest board is a welcome development. All programs, including organic certification, will have to deal more effectively with post-harvest pest management and pesticide use. Impacts and applications of biotechnology pose a number of challenges.

Ways must be found to accommodate – and communicate to consumers about – the wide range of toxicity in the pesticides that are applied. Some recently registered and emerging biopesticides clearly are far safer than the conventional products they can help replace, but pose new challenges, from residues in food to resistance management.

Better ways are needed to empirically capture the linkages between progress toward biointensive IPM and reduced reliance on high-risk pesticides. Pest complexes and pest pressure are highly variable and dynamic across time and space, and farmers must adapt quickly and decisively in many circumstances. Ecolabel program standards and guidelines need to anticipate the need for system changes and find ways to permit and reward innovation that moves growers toward biointensive IPM.

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Table 1. Frequency of pesticide residues in fresh fruits and vegetables by market claim; Pesticide Data Program, 1994-1999[a].

	Organic			**No Market Claim**		
	Number of Samples	Number of Positives	Percent Positive	Number of Samples	Number of Positives	Percent Positive
Eight Fruits	30	7	23%	12,612	10,287	82%
Twelve Vegetables	97	9	9%	13,959	8,465	61%
All Fresh Foods	127	16	13%	26,571	18,752	71%

[a]Residues of long-banned organochlorine insecticides and their metabolites are not included.

Source: Data from Table 2 in Baker et. al., 2002.

Table 2. Organic, pesticide free and NDR samples in 2000 testing carried out by USDA's Pesticide Data Program (PDP).

Market Claim	**Number of Samples**			**Number of Positives**			**Percent Positive**		
	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
Conventional	6,780	2,014	8,794	4,314	1,563	5,877	64%	78%	67%
Organic	39	9	48	7	3	10	18%	33%	21%
NDR	5	3	8	4	3	7	80%	100%	88%
All Market Claims	**6,824**	**2,026**	**8,850**	**4,325**	**1,569**	**5,894**	**63%**	77%	**67%**
	Number of Samples			**Number of Positives**			**Percent Positive**		
	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
Organic Fruits and Vegetables									
Cantaloupe	6	1	7	0	1	1	0%	100%	14%
Carrot	3	1	4	2	0	2	67%	0%	50%
Green bean	2	2	4	1	0	1	50%	0%	25%
Lettuce	5	0	5	0	0	0	0%	-	0%
Orange	9	0	9	1	0	1	11%	-	11%
Strawberry	4	0	4	0	0	0	0%	-	0%
Bell pepper	4	2	6	2	0	2	50%	0%	33%
All other	6	3	9	1	2	3	17%	67%	33%
All Organic	**39**	**9**	**48**	**7**	**3**	**1**	**18%**	**33%**	**21%**
	Number of Samples			**Number of Positives**			**Percent Positive**		
	Domestic	Import	Total	Domestic	Import	Total	Domestic	Import	Total
Conventional Fruits and Vegetables									
Apple	180	4	184	141	4	145	78%	100%	79%
Cantaloupe	186	214	400	74	158	232	40%	74%	58%
Carrot	163	16	179	137	9	146	84%	56%	82%
Cherry	275	0	275	259	0	259	94%	-	94%
Cucumber	392	337	729	262	305	567	67%	91%	78%
Grape	393	339	732	220	287	507	56%	85%	69%
Green bean	581	113	694	395	82	477	68%	73%	69%
Lettuce	720	12	732	265	8	273	37%	67%	37%
Nectarine	341	2	343	335	2	337	98%	100%	98%
Orange	701	22	732	569	20	589	80%	91%	80%
Peach, composite	273	260	533	249	252	501	91%	97%	94%
Peach, single	272	259	531	248	247	495	91%	95%	93%
Pear, canned	354	8	362	22	1	23	6%	13%	6%
Pineapple	149	215	364	4	16	20	3%	7%	5%
Potato	364	4	368	257	1	258	71%	25%	70%
Strawberry	493	20	513	451	19	470	91%	95%	92%
Strawberry, frozen	36	1	37	29	1	30	81%	100%	81%
Bell pepper	538	187	725	357	151	508	66%	81%	70%
Tomato, canned	360	1	361	40	0	40	11%	0%	11%
All Conven-tional	**6,780**	**2,014**	**8,794**	**4,314**	**1,563**	**5,877**	**64%**	**78%**	**67%**

Table 3. Number of residues found in 2000 PDP testing by type of claim and source of produce.

Market Claim	Number of Unique Residues Found			Average Number of Residues per Positive Sample		
	Domestic	Imported	Total	Domestic	Imported	Total
Conventional	9,559	4,903	14,462	2.2	3.1	2.5
Organic	7	8	15	1.0	2.7	1.5
NDR ("Pesticide Free" & "No Pesticides Detected")	6	17	23	1.5	5.7	3.3

Source: Benbrook Consulting Services, derived from the results of year 2000 Pesticide Data Program testing (AMS, 2002)

Table 4. Occurrence of multiple residues by market claim in PDP and Consumers Union data set.

	Organic Samples with Multiple Residues		IPM/NDR Samples with Multiple Residues		No Market Claim Samples with Multiple Residues	
	Number	Percent	Number	Percent	Number	Percent
PDP 1994-1999 (20 Crops)	9	7.1%	46	24%	12,102	45.5%
Consumers Union (4 crops)	4	6%	20	44%	42	62%
Average of Two Data sets		6.5%		34%		53.6%

Note: Residues of long-banned organochlorine insecticides and their metabolites are not included
Source: Data from Table 5 in Baker et. al. (2002)

Table 5. Trends in the application and toxicity units associated with twelve "do not use" pesticides in Wisconsin potato production (see notes).

	1992	**1995**	**1998**	**2001**
Pounds Applied	96,000	180,000	49,414	8,000
Pounds Applied as a Percent of Total H/I/F Applications	16%	14%	4.1%	0.66%
Toxicity Units (in millions)	37.6	55.7	15.7	2.1
Toxicity Units as a Percent of Total H/I/F Toxicity Units	32%	28%	9.5%	1.4%

"Do Not Use" list compiled by the WWF-WPVGA-UW Potato IPM Collaboration (aldicarb, azinphos-methyl, disulfoton, methamidophos, carbofuran, carbaryl, oxamyl, endosulfan, phorate, diazinon, permethrin and paraquat).
H/I/F – Herbicides, Insecticides and Fungicides.
Use data from the USDA's National Agricultural Statistics Services – Agricultural Chemical Usage Surveys.

Assessment of Environmental Standards for Arable Farms

Philippe Girardin[1] and Eric Sardet[1]

Ecolabeling: A Societal Requirement

To respond to society's demand for a more sustainable agriculture (better stewardship of the environment, animal welfare, better integration into the local fabric), the mass market, some professional organizations, and even producer groups have proposed guidelines or standards for how farmers manage their farming systems. Facing this proliferation of guidelines, the consumer is confused. Which is the most sustainable? What are the impacts of the different types of agriculture (integrated, sustainable, low input, organic, etc.)? How can one rate them?

To answer this question, we propose a method for comparing standards for arable farming systems. As a first step, only the environmental impacts were taken into account, but not health or social impacts. The method provides an outline of a "reference" standard.

Analysis of the Standards

We analyzed eight sets of standards proposed for European farmers. According to their historical origin or their aim, they are variously called "standards", "reference guide", "charter, "contract", "commitment", "base", etc. (Hereafter, these all will be called "standards.") They are:

- the European standards for organic agriculture (OA) (Le Guillou and Scharpé, 2000)
- the standards of the International Organization of Biological Control (IOBC) (Böller et al., 1997)
- the Swiss guide for Integrated Production (IP) (Ofag, 1999)
- the basis for agriculture "raisonnée" (French Ministry of Agriculture, 2002)
- the charter of Farre (Forum de l'Agriculture Raisonnée Respectueuse de l'Environnement) (Farre, 1999)
- the contract of CTE 68 (Contrat Territorial d'Exploitation) (Préfecture du Haut-Rhin, 2000)
- "engagement Irtac" (Institut de Recherches Technologiques Agro-alimentaires des Céréales) (Irtac, 1999)
- the system of reference Quali'Terre (Quali'Terre, 2000).

These standards sometimes include external control, but sometimes only involve self-assessment. The study was carried out only for standards for arable farming systems, and does not cover viticulture, arboriculture, mixed farms, dairy farms or vegetable farming.

The method for analyzing the environmental impacts of each standard was developed in two steps:

1. Evaluation matrix

The first step is to develop a double entry table (shown in Table 1 with values entered for the specific case of Organic Agriculture):

- The rows correspond to the six components of environmental impact (expanded to 10 rows by breaking some down into subcomponents) regarding which all the technical actions mentioned in the standards were assessed: ground and surface water; air; soil; biodiversity; nonrenewable resources; and landscape.
- The 27 columns are formed from the total of 210 technical actions found in the eight standards. The actions corresponding only to the regulatory process (such as keeping pesticides in a special room) were not taken into account. Those 210 technical actions were grouped into 27 technical operations and then into 8 technical functions (fertilization, pesticide management, water management, rotation, cropping plan, soil cover, non-

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productive elements, and mechanical operations). For example. the technical function "pesticide management" includes six technical operations: storage of pesticides; handling and use; rinsing and disposal of containers; sprayer management; choice of pesticides; and biological control. These encompass the 48 separate technical actions found in one or another of the eight standards.

When the technical operation has no impact on the environmental component being considered, the corresponding box in the matrix is shaded (for example, splitting of N-fertilizer application has no impact on the landscape).

2. Rating of technical actions

Each technical action receives a rating score. Examples are presented in Table 2 for pesticide management. The score for each of the six technical operations (e.g., "choice of pesticides") is calculated by summing the scores of the technical actions going into that technical operation. In using the sum, it is assumed there is a compensation among the different technical actions. To get a clearer picture, the values for the technical operations are represented in the evaluation matrix with pictograms corresponding to four classes (✗ = no prescription, or a prescription dealing only with regulatory aspects; Λ = technical operation with a low effect on the environment; K = technical operation with a medium effect on the environment; ϑ = technical operation with a high environmental effect).

An evaluation matrix with those pictograms was set up for each of the eight standards. Table 1 has already given an example for the European standards on organic agriculture. In this first step of evaluation, the rating of a given technical operation is the same for all environmental components. With a more precise evaluation of the technical actions, it is possible to differentiate the impact for each environmental component.

Comparison of Standards

Simple comparison

The simplest way to compare the standards is to count the number of pictograms that represent each of the four classes. Such a presentation (Figure 1) shows that respectively 53 and 58% of the technical actions included in the IP (18 of 34) and OA (18 of 31) standards have a high impact on the environment. At the other end, the Farre and Quali'Terre standards mention more technical actions (respectively 46 and 45), but very few of these have a high environmental impact (respectively 13 and 27%). However, this type of comparison does not take into account the relative importance of the technical operations, all of which get the same weight. To avoid this shortcoming, the standards also were compared using the multicriteria analysis method ELECTRE III (Shärlig, 1990).

Multicriteria analysis

The ELECTRE III method needs a reduced (<10) number of criteria. The information included in the eight evaluation matrices must be aggregated. This aggregation was done in two steps. First, the information in each of the eight rows of the matrix was condensed into a single row by aggregating the information within each column. Then, the 27 columns were condensed into 8 columns corresponding to the 8 technical functions (Table 3). To do so, each of the 27 criteria was weighted by agro-environmental experts using Simos's method (1990). One set of these weighting factors is presented in Table 4. It was used for the remaining calculations.

ELECTRE III was used for a first comparison of the eight standards for their impacts on groundwater (Table 5A). Only the criteria that affect water quality were used in the calculation (pesticides, N-fertilizer and irrigation management). A second ranking was done taking into account the impacts on all the environmental components (Table 5B) using ELECTRE III and four other methods of global aggregation. The first is the weighted mean. In the second method, called "dictatorial", the criterion with the highest weight is used for the first ranking, the second criterion is then used to break ties, and so forth. In the third method, called "hierarchical", any standard that does not obtain at least the value K for the most important criterion is set aside. Then, any standards that do not obtain at least that value for the second most important criterion are set aside, and so forth. In the fourth method, called "democratic," the standards were compared pairwise by two for the eight technical functions. One standard was judged better than the other if it is higher for at least 50% of the criteria. Those criteria must also correspond to more than 50% of the total weight.

Results

The results of the ranking show the environmental relevance of organic agriculture and integrated production (Swiss IP and IOBC) (Morris and Winter, 1999). While the other standards have some positive aspects, they clearly are insufficient to improve environmental quality in arable lands.

The OA standards imposes fewer constraints than the others, but, they have a stronger positive impact on the environment. Nevertheless, some improvements can be proposed, such as quantitative management of N fertilization; irrigation management; and soil cover. Some parts of the IP standards could be included in OA, since most parts of the different standards are complementary. Continuing development of the standards is necessary to keep consumers' confidence.

Apart some specific points like storage of pesticides, the standards of French "raisonnée" agriculture, which are close to the English or German "integrated" agriculture (Bonny, 1997), have a very weak positive impact on the environment. Most of the items mentioned in those standards correspond only to the regulatory aspect or are only optional. This kind of standard is intended to be met by 80% of all farmers. In contrast, the most restrictive standards, such as IP or OA, are accepted by only a few percent of farmers.

The environmental impacts presented here are only potential impacts. Very likely, the farmers' practices go beyond what they need to do according to the standards they agree to follow. This is particularly true in organic agriculture, where farmers are obliged to use rotations, cover crops, and other beneficial techniques even if that is not explicitly stated in the standards (Bourdais, 1998).

Taking into account the complementary nature of the eight standards analyzed here, it is possible to set up a "reference" standard for which the most environmentally positive technical action was selected. For example, for the management of hedges, the IP standard was included, whereas splitting the N fertilizer application was taken from "raisonnée" agriculture. Even if it is not the best way to avoid nitrate pollution, it is the best among the actual standards. No standard has a satisfactory requirement regarding field size management or soil organic matter content. The agronomic and economical feasibility of such a "reference" standard must still be demonstrated.

Two improvements in this method for comparing standards for agriculture can be investigated. First, the environmental impact could be differentiated according to the environmental components. For instance, the impact of soil cover could be considered more important for erosion and runoff than for soil biological activity. The second improvement concerns the use of weighting factors for the different environmental components. The Simos's method could also be used for the environmental criteria. In this case there will be three kinds of expertise involved in the comparison. The first expertise corresponds to the decision rules for each technical action (Table 2); the second is used to weight the technical operations; the third is used to weight the factors for the environmental components.

Conclusion

The proposed method allows us to do four things: 1) to clarify the standards for users; 2) to rank them according to one or all the environmental components; 3) to improve the current standards; and 4) to help in writing new standards.

However, to answer the societal requirements, it will be important to enlarge the method by including health, social and ethical aspects in order to assess not only the environmental impacts but also the overall sustainability of agricultural practices (Féret and Douguet, 2001). This assessment could be made more reliable by using three indices (social, environmental and health), which could rate the type of management and later all the food products. The method presented in this paper could be used to developed the environmental index.

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Figure 1. Environmental quality implications of four standards for arable farming systems.

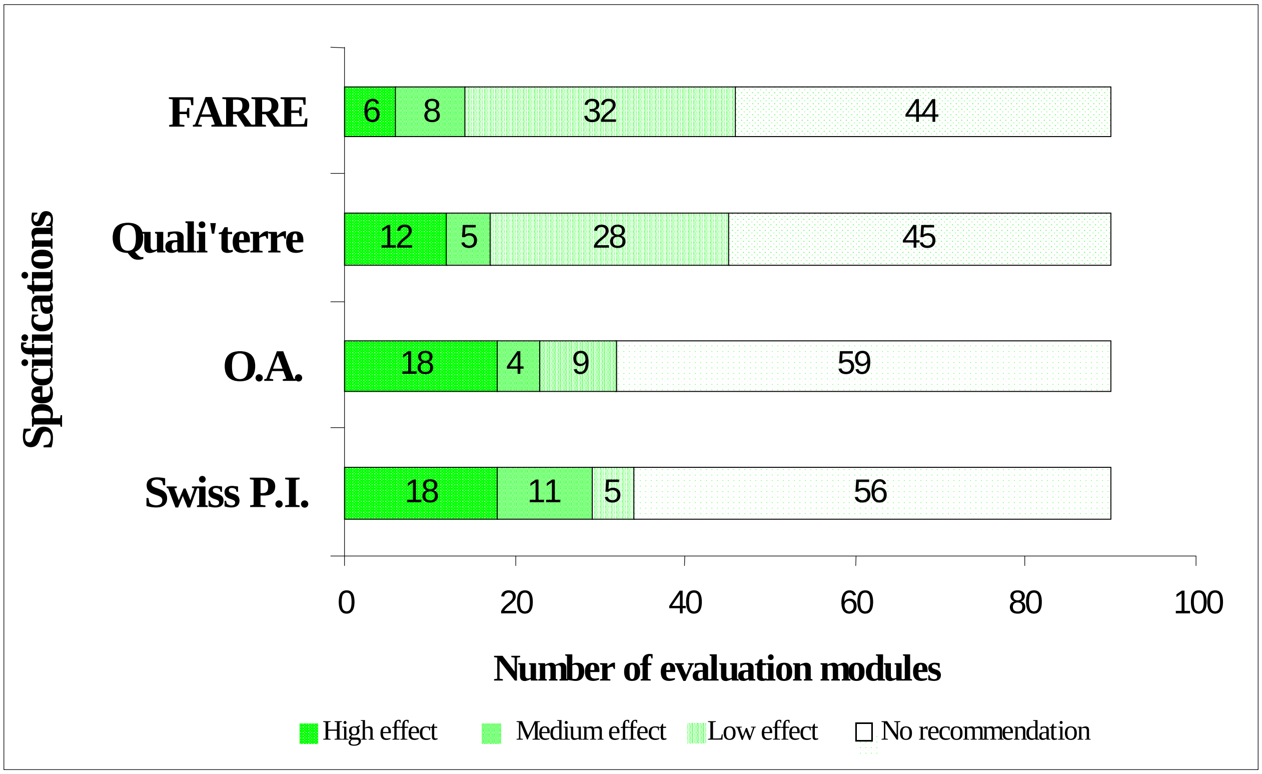

Table 1. Evaluation matrix for the environmental impacts of agricultural techniques for Organic Agriculture

			TECHNICAL OPERATIONS																										
			PESTICIDES						FERTILIZATION											MECHANIZATION			ROTATION	CROPPING PLAN		SOIL COVERING	Non Productive Elements	WATER USE	
									Nitrogen							P & K	Mineral amendments	Organic matter	Trace elements										
			Storage	Handling	Rinsing/ disposal	Sprayer	Choice of pesticides	Biological control	Agenda	Dose	Splitting	Intercrops	Storage	Spreading	Type					Maintenance	Choice of tools	Anti-erosive techniques		Field size	Crop diversity			Quantity	Managemen^{t}
ENVIRONMENTAL COMPONENTS	WATER	surface	✗	✗	✗	✗	☺	☺	✗				☺	✗		☹								✗		✗	✗	✗	✗
		ground	✗	✗	✗		☺	☺	✗	✗	✗	☹	☺	✗	☺													✗	✗
	SOIL	Quantity						☺										☹				✗		✗		✗	✗		
		structure															✗	☹			✗								
		Chemical quality													☺	☹	✗		✗				😐						
		Biological quality.					☺	☺				☹						☹	✗		✗					✗			
	AIR			✗	✗	✗	☺			✗			☺	✗	☺			✗		✗	✗								
	LANDSCAPE				✗		☺														✗			✗	😐	✗	✗		
	BIODIVERSITY		✗	✗	✗	✗	☺	☺								☹	✗		✗		✗		😐	✗	😐	✗	✗		
	Non Renew. Ressources									✗					☺	☹				✗	✗							✗	

Table 2. Example of decision rules to qualify environmental impact of pesticide management.

PESTICIDE MANAGEMENT

✘Storage [a]

☐ The floor of the room is covered with concrete	**+ 6**
☐ Room that does not freeze	**+ 1**
☐ Room locked, well-ventilated	**0**
☐ Room with pesticide cabinet, or, on the floor, a duckboard isolating the pesticides from the soil, or, a reserve of absorbent material in case of leakage or spillage, and, a water reserve or an extinguisher close to the room.	**+ 2**
☐ Room with an extinguisher or nearby water source	**+ 0.5**
☐ Unusable pesticides stored in a specific room and not kept for too a long time	**+ 0.5**
☐ Fuels kept separate from flammable materials	**+ 0.5**
☐ Establish and maintain a register of pesticides kept in stock	**+ 0.5**
☐ Tools used specifically for preparation of the spray mixture stored in the pesticide room	**+ 0.5**

✘Handling and use

☐ Filling site :	
▪ if a filling site is mentioned	**+ 0.5**
▪ if safety standards are mentioned	**+ 4**
or	
☐ Filling of the sprayer tank :	
▪ no pesticide spill (brackets, intermediate tank, return-flow valves)	**+ 1**
▪ no direct pumping into ground or surface water	**+ 1.5**
▪ Prepare mixer in a room with no risk of spilling into a body of water or a groundwater recharge area	**+ 0.5**
☐ Field location relative to the water resource: no spraying less than 10 m from a watercourse	**+ 3**
☐ Calculate accurately the minimum volume of mixture for each treated area	**+ 1**
☐ Remember to use personal protection (notwithstanding common sense and the regulations)	**0**
☐ Take into account the information given by the extension services and agrometeorological information	**+ 0.5**
☐ Subscribe to a technical advisory service not linked to a pesticide marketing organization	**+ 1**

✘Rinsing/disposal

☐ (a) Provide a water reserve on the sprayer or in the field and spray the rinse water on the field	**+ 3**
☐ (b) Cans and packages : 3 systematic rinses, pour the rinsing water into the sprayer, make a hole in the cans and keep in a special room before disposal or recycling	**+ 3**
☐ (c) Be involved in the collection operation or put cans, packages and outdated pesticides in a waste collection site where toxic wastes are collected	**+ 3**
☐ If (a) + (b) or (a) + (c)	**+ 8**

✘Sprayer

☐ Sprayer checked by accredited service at least every three years	**+ 2**
☐ Self-check of sprayer once a year according to the directions of use	**+ 2**
☐ Before each spraying, be sure sprayer is in good working order (filter, gauge, valves, nozzle)	**+ 3**
☐ Water reserve on the sprayer for the user	**+ 1**
☐ Brush/"handblower" in the tractor to clean the nozzles	**+ 1**
☐ Choice of nozzles: prefer air injection nozzles and recoil nozzles (bigger drops, less drift)	**+ 3**

Table 2, *continued*

✘Choice of pesticides

☐ No pesticide use (Organic farming standards)	**+10**
☐ Systematic selection of pesticide treatment based on tolerance thresholds ***or*** ☐ Recommendations for each crop with (a) prohibition of at least one type of treatment (insecticide, fungicide, growth regulator, herbicide....) (b) limitation on number of sprayings ☐ if (a) or (b)	**+ 4** **+ 4** **+ 2**
☐ Application rate: systematic reduction, at least 20%	**+ 2**
☐ No atrazine (until July 2003; afterwards: forbidden by regulations)	**+ 2**
☐ Choice of pesticides according to their toxicity (impacts on health/beneficials/biodiversity) according to a positive list in the standards	**+ 4**
☐ Take into account field risks (drainage, slope) in pesticide choice according to mobility and persistence ▪ with an accepted diagnostic method ▪ if no complementary information	 **+ 4** **+ 1**
☐ Control of resistance through the successive or simultaneous use of active ingredients from different chemical classes	**+ 2**
☐ Have valid (less than 3 years old) instructions (ingredient, recommended dose, spectrum of activity...)	**+ 0.5**

✘Alternative methods

☐ Implementation of preventive pest control: ▪ if no complementary information ▪ if general approaches (hoeing, flame weeding, biological control...) ▪ systematic choice of biological, biotechnical, physical and agronomic means when they are efficient	 **+ 1** **+ 2** **+ 5**
☐ Choice of varieties according to their tolerance or resistance	**+ 3**
☐ Recording of crop health, and interpretation from technical reports	**+ 2**
☐ Weeding at the scale of crop rotation and according to soil management	**+ 1**

[a] The points obtained for each technical operation (✘) are summed, and the pictogram (see Table 3) is assigned according to the following rule:
[sum] ≤3 = ☹ ; 3 < [sum] <7 = 😐 ; [sum] ≥7 = ☺

Table 3. Evaluation matrix of the environmental impacts of technical functions for eight standards.

	Pesticides	**Fertilization**	**Non-productive elements**	**Cropping plan**	**Rotation**	**Irrigation**	**Soil cover**	**Mechanization**
French raisonnée	☹	☹	☹	●	●	☹	●	●
CTE 68	☹	●	😐	●	●	●	😐	☹
OA	☺	☹	●	😐	☹	●	●	●
FARRE	😐	☹	☹	●	●	☹	●	●
IRTAC	😐	☹	●	☹	☹	😐	●	●
IOBC	😐	●	😐	☹	☺	😐	☹	😐
Quali'terre	☹	☹	☹	☹	☹	☹	●	☹
Swiss IP	😐	●	☺	☹	☺	●	☺	●

Table 4. Weighing factors of an agronomist expert obtained by Simos's method[a] (1990).

<table>
<tr><th colspan="6" rowspan="2">Pesticides</th><th colspan="11">Fertilization</th><th colspan="3">Mechani-zation</th><th rowspan="3">Rotation</th><th colspan="2">Crop-ping Plan</th><th rowspan="3">Soil Cover</th><th rowspan="3">Nonproductive elements</th><th colspan="2">Irri-gation</th></tr>
<tr><td colspan="7">Nitrogen</td><td rowspan="2">P & K</td><td rowspan="2">Mineral amendments</td><td rowspan="2">Organic matter</td><td rowspan="2">Trace elements</td><td rowspan="2">Maintenance</td><td rowspan="2">Choice of tools</td><td rowspan="2">Anti-erosion techniques</td><td rowspan="2">Fied size</td><td rowspan="2">Crop diversity</td><td rowspan="2">Quantity</td><td rowspan="2">Management</td></tr>
<tr><td>Storage</td><td>Handling/ utilization</td><td>Rinsing/ disposal</td><td>Sparayer</td><td>Choice of pesticides</td><td>Biological control</td><td>Agenda</td><td>Dose</td><td>Splitting</td><td>Intercrops</td><td>Storage</td><td>Spreading</td><td>Type</td></tr>
<tr><td rowspan="2">.03</td><td rowspan="2">.11</td><td rowspan="2">.08</td><td rowspan="2">.18</td><td rowspan="2">.37</td><td rowspan="2">.24</td><td>.06</td><td>.28</td><td>.19</td><td>.21</td><td>.02</td><td>.13</td><td>.11</td><td rowspan="2">.13</td><td rowspan="2">.05</td><td rowspan="2">.21</td><td rowspan="2">.13</td><td rowspan="2">.50</td><td rowspan="2">.43</td><td rowspan="2">.07</td><td rowspan="2"></td><td rowspan="2">.50</td><td rowspan="2">.50</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">.25</td><td rowspan="2">.75</td></tr>
<tr><td colspan="7">.47</td></tr>
<tr><td colspan="6">.20</td><td colspan="11">.19</td><td colspan="3">.01</td><td>.12</td><td colspan="2">.15</td><td>.07</td><td>.16</td><td colspan="2">.11</td></tr>
</table>

[a] The expert is given cards, on each of which is written the name of one criterion, and is asked to rank them in increasing order according to the impact of the criterion on an environmental component. He can put cards in the same position if he judges the impacts are similar, and he can insert white cards within the set of the "criteria" cards to increase the distance between criteria. Then, the ranks are transformed into weighting factors. A group of experts gets an agreement on the ranks they obtained.

Table 5. Ranking of the standards according to the impact on water [A] or the total environmental impact [B] of the agricultural practices they recommend.

[A] Impact on surface and groundwater.

Aggregation Method	**Standards**							
	Swiss IP	OA	IOBC	IRTAC	CTE68	FARRE	French Raisonnée	Quali' terre
ELECTRE III	3	**1**	2	4	5	5	7	7

[B] Impact on all the environmental components (water, air, soil, biodiversity, non-renewable resources, landscape)

Aggregation method	**Standards**							
	Swiss IP	OA	IOBC	IRTAC	CTE 68	FARRE	French Raisonnée	Quali' terre
Weighted mean	**1**	2	3	4	5	6	7	7
"Dictatorship"	2	**1**	3	4	6	5	7	7
"Hierarchy"	**1**	4	2	3	6	4	7	7
"Democracy"	**1**	3	2	3	3	3	3	3
ELECTRE III	**1**	3	2	4	4	6	7	7