# Grades and Standards: Issues for the Twenty-first Century

## The Role of Grades and Standards in Moving from 'Traditional' To Consumer-Oriented Agri-Markets

*Eluned Jones*
*Virginia Polytechnic Institute and State University*

*Neilson C. Conklin*
*Arizona State University*

Why worry about grades and standards?[1] In traditional agri-marketing systems the most important, and apparently mundane, role of grades is to facilitate trade between remote geographic areas by accurately describing the commodity or product (Bockstael, p. 233). However, our system of standardization and grading, which was designed to facilitate the exchange of products in traditional marketing systems, is facing new and difficult challenges fulfilling very different roles in today's dynamic consumer-oriented markets.

The roles of grades and standards in the twenty-first century will be much more complex and challenging than the role of efficiently describing a limited number of well-defined quality characteristics and efficiently sorting commodities into reasonably homogeneous lots.

Changing expectations of the grading system are evidenced by the controversy over "cosmetic standards" for fresh produce, alleged to be a cause of excess use of pesticides and, consequently, a source of environmental degradation and human health problems. In this example, critics of the system *perceive* the existing system of grades and standards is failing to respond to an emerging consumer demand for a quality characteristic – food safety. The critics are asking that grades and standards respond to consumer preferences for food safety and the environment, a very different role from the traditional roles of facilitating trade and dispute settlement in the produce industry. This example illustrates the kind of challenge grades and standards will increasingly face in the twenty-first century.

This paper examines the changing role of grades and standards in the consumer-oriented agri-marketing systems that will characterize the twenty-first century. Our objective is twofold:

1. Raise the issues that policymakers, consumers, agribusiness and farmers will confront as the roles of grades and standards change.

2. Identify the theoretical and empirical work needed to deal with these issues in the twenty-first century.

## Production-Oriented Grades, Standards

Quality management in traditional agri-marketing systems tends to be production oriented; commodities are inspected, sorted and culled as they move from the grain elevator, packing house or other assembly point to the final consumer. Because uncontrollable factors, like weather and pests, have historically been the primary source of quality variation, quality control in traditional systems has been built around post-harvest measures.

Grades and standards play an important, if prosaic, role in this type of system by providing information on product attributes to reduce transactions costs and facilitate orderly marketing. Information reduces transaction costs by:

1. Providing a means of communicating objective information between traders at geographically remote locations.

2. Providing a consistent reference point for price quotes.

3. Providing neutral and objective information for dispute settlement

4. Consolidating inspection and sorting activities at a few points in the marketing channel.

A second, but presumably less important, function of grades and standards is the differentiation of products at the retail level (Bockstael, p. 233).

Since the advent of Agricultural Marketing Act (AMA) federal grades and standards, agricultural economists have thoroughly explored the economics of grades and standards in the context of traditional agri-marketing and production systems.[2] Much of this literature about the differentiating role of grades and standards has focused on determining the number of grades and the boundaries needed to maximize producer revenues (See, for example, Zusman). The producer focus of the grades and standards literature probably results from the fact that, in traditional agri-marketing systems, consumers make little use of U.S. Department of Agriculture (USDA) grades (Campbell; Hutchinson; and Owens and Taylor).

Grades and standards fulfill their role to reduce transactions costs by accurately describing those product characteristics that provide economic value and by supporting the buyer-seller agreement contract. Consequently, they should neither lead nor lag the market. They should facilitate the market's valuation of quality attributes, given consumer or end-user preferences. In a static market in which consumers' quality preferences are known, correspondence between preferences and grades and standards is not a problem. However, in a dynamic world in which production and measurement technology, product characteristics, and consumer preferences are changing and in which new products are introduced, the correspondence between grades and standards and consumer preferences is not guaranteed.

When grades and standards fail to keep pace with changes in consumers' choice sets of quality attributes, producers have difficulty providing the bundle of quality attributes desired by consumers or end users. Furthermore, attempts at post-harvest quality control are unlikely to lead to efficient resource allocation. Although the lack of correspondence between quality

preferences and grades and standards may arise with respect to either desirable or undesirable characteristics, it most often arises as an issue of public concern when an undesirable characteristic, which is not reflected in existing grades and standards, enters consumers' choice set.

The potential for market failure exists when grades and standards omit critical factors or when the proxy used to describe a factor is insufficient. The 1991 soft red winter wheat crop, which suffered location-specific, weather-induced scab damage, is a case in point. Since scab damage is also associated with the presence of mycotoxin, there was considerable concern in the market about the crop's value and sanitary condition. The typical market response was to heavily discount low test weight wheat and direct suspect supplies into the feed market.

A task force study indicated that initial cleaning of wheat with test weights of 52 lbs/bushel or better at the flour mill would remove scab damaged wheat and unacceptable levels of mycotoxin. However, direct use of the wheat at feed mills would not remove potential mycotoxin contamination. Consequently, because of a lack of information, the initial market reaction increased, rather than reduced, the potential sanitary risk. Additionally, although some volume was lost in the initial cleaning of low test weight wheat, the flour yield of 52-54 lbs/bushel wheat did not significantly differ from the yield of 56-58 lbs/bushel wheat. Thus when the millers' primary objective is to is to obtain a consistent flour yield, discounting on the basis of test weight may penalize producers for something other than volumetric yield (Jones).

## Consumer-Oriented Grades, Standards

The mycotoxin example illustrates how the failure of grades and standards to keep pace with shocks in traditional agri-markets can lead to market failure and inefficiency.

Issues involving grades and standards become even more complex in today's emerging consumer-oriented agri-marketing systems. Production-oriented systems presume that:

1. Consumers' quality preferences are stable.

2. The choice set of quality attributes is fixed.

3. Variation in quality is dominated by uncontrollable factors.

In this static environment, the focus is on scheduling production and minimizing the cost of providing the desired bundle of quality attributes (Figure 1). Quality management focuses on post-harvest inspection, standardization and quality control.

**Figure 1. Traditional and Consumer-Oriented Agri-Marketing Systems.**

| "Traditional" System | Consumer-Oriented System |
|---|---|
| 1. Schedule Production | 1. Consider Consumer Preferences |
| 2. Budget | 2. Evaluate Cost of Meeting Demand |
| 3. Inspection/Quality Control | 3. Schedule Production |

In consumer-oriented systems, the presumed first production step is to consider consumers' wants and needs. This critical first step is followed by an evaluation of the cost of meeting consumers' quality preferences, including the feasibility of increasing pre-harvest control over quality, and only then scheduling production. In the consumer-oriented system, quality comes first rather than last. Consumer-oriented agri-marketing systems are, by their very nature, dynamic. It seems likely they emerge in developed economies as increasingly rapid changes in technology and the preferences of affluent consumers raise the possibilities for firms to profit through product differentiation and non-price competition. In these markets, to remain competitive, firms must follow consumer-oriented strategies, delivering consumers what they need and not delivering them characteristics they do not want (Figure 2). While the markets for processed agricultural products have long been characterized by a high degree of product differentiation - Who can fail to notice the number of brands and varieties of breakfast cereal? - markets for raw agricultural commodities and minimally processed products have generally been viewed as bulk markets for fairly homogeneous products where price competition dominates. These are the markets in which grades and standards are generally used today.

Markets for raw agricultural products and commodities are changing rapidly today. For example, produce industry observers have noted a rapid trend, not only toward the labeling of boxes, a long-standing practice, but also toward branding and attaching stickers to individual fruits. The firms adopting these strategies seem to be emphasizing higher quality (above USDA grade standards) and a more consistent product. Another product market innovation is the shift toward "preprocessed products" in the form of bagged salad mixes and other forms of processing traditionally done in the kitchen.

While many of these consumer-oriented strategies are being adopted by marketing firms rather than producers, there is evidence that a trend toward tailoring products to meet consumer demands in the field is occurring. Fast food chains are using contracts or other production arrangements with growers that include specific quality requirements. These agreements may specify the variety of seed and production practices growers must use. Observing these trends in the produce industry, one is tempted to ask if there will be any role for grades and standards in produce markets of the twenty-first century.

The trend toward private sector labeling is also evident in retail beef markets. Un-

**Figure 2. Consumer-Oriented Competitive Strategy.**

| | Need | Don't Need |
|---|---|---|
| Get | ✓ | X |
| Don't Get | X | ✓ |

like grades and standards for produce, USDA meat grades have historically been used by consumers (Hutchinson). However, as the preferences of some consumers have shifted away from meat with a high internal fat content, one of USDA's proxies for quality, internal marbling, is no longer a universal standard for quality among consumers (Cox, et al., p. 246). Retailers have responded by using house brand labels to differentiate beef based on fat content. As a result, consumers are using USDA beef grades less and research suggests that consumers lack adequate information to choose beef with the desired internal fat content (Cox, et al., p. 252).

The private sector response, house-brand labels, has not filled the information gap for consumers. Changing consumer preferences and proxies for quality measurements that do not correspond to the desired quality attributes appear to contribute to inefficiency and resource misallocation in beef markets.

Current and future trends are clearly moving toward greater disaggregation in commodity and product markets. Even in primary grains, oilseeds and fibers, disaggregated markets are accounting for an increasing share of the market. Each different end-use market has an associated set of characteristics; one market may have zero tolerance for an attribute another market considers desirable. Clearly, the market disaggregation, rapid changes in the quality attributes of interest, and changes in market structure associated with consumer-oriented agri-marketing systems complicate the role of grades and standards. What is the role of grades and standards in a consumer-oriented marketing system?

The shift from production to consumer-oriented marketing systems will not only create new roles for grades and standards, it will also require changes in our current institutions if grades and standards are to meet their existing objectives. For example, one important objective of grades and standards is the provision of a consistent quality reference point to facilitate price discovery. In this context, grades and standards are intended to reduce product variability and uncertainty about quality. Greater variability in product quality causes greater variability in market prices and uncertainty about product quality may also increase price variability and lead to lower prices for producers as buyers discount their purchase prices to compensate for the risk associated with quality uncertainty. By reducing variability and uncertainty about quality, grades and standards reduce risk and transactions costs and increase market efficiency.

Our existing system of grades and standards was designed to perform this function in an agri-marketing system in which the primary sources of variability in quality were uncontrollable due to weather and environmental factors. Today, technological advances have increased the range of controllable quality characteristics that can be influenced through choice of genetic material, management practices and the use of inputs such as chemicals and fertilizers. Advances in biotechnology promise to even further decrease uncontrollable variation in quality and increase controllable sources of variability in the twenty-first century. The post-harvest use of grades and standards in production-oriented agri-marketing systems - dominated by uncontrollable variability in quality - reduced product variability and

uncertainty, lowered transaction costs and increased the efficiency of price discovery and markets. However, in an agri-marketing system dominated by controllable quality variation and driven by consumer preferences and technology rather than weather and pests, post-harvest grades and standards may do little to reduce quality variation.

A new approach to quality management will be required to reduce uncertainty about quality, facilitate price discovery and encourage market efficiency. This new approach must focus on the identification of critical quality characteristics and the reduction of controllable variation in quality. Such a system must necessarily place a much greater emphasis on preharvest management. This is the premise of total quality management (TQM) or whole business management (Deming). A twenty-first century system of grades and standards will need to be part of a system that provides pre-harvest as well as post-harvest information on quality.

## Marketing Research Implications

The failure of grades and standards to reflect the dynamic nature of quality can lead to the misallocation of resources and economic efficiency losses. This occurs because of a lack of correspondence between static grades and standards and consumer preferences which leads to "mistakes" in allocative decisions and increases transactions costs. Moreover, the failure of grades and standards to reflect the full set of available quality attributes creates barriers to economic development and may potentially lead to the loss of markets in a competitive global economy. As market changes outpace adjustments in grades and standards, they are perceived to be lagging behind private sector innovations and even to be irrelevant for agriculture in the twenty-first century.

Dynamic consumer-oriented agri-marketing systems of the twenty-first century will require a system of grades and standards flexible enough to:

1. Maintain the correspondence between grades and standards and the attributes "valued" by consumers.

2. Provide a mechanism for signalling producers about the changing nature of quality attributes and consumer preferences.

3. Adapt to vertically integrated markets which emphasize pre-harvest rather than post-harvest quality management.

Institutional change is often sticky and slow. However, there are ample incentives for institutional changes in our system of grades and standards as indicated above. Political and social pressure to make grades and standards more responsive to food safety and environmental concerns, the development of organic certification programs and changes in the system of food labeling all indicate that institutions governing the quality in agricultural markets are not completely resistant to change. Institutional innovations are limited not only by demand but by our ability to supply them - our current state of knowledge. The current imitations of economic theory restrict our ability to respond to the need for new institutions as we shift toward consumer-oriented agri-marketing systems. Economic analyses of quality

typically focus on a single exchange point in a single market and existing theory is not broad enough to support analyses on increasingly disaggregated markets.

The lack of theoretical support is not surprising since the foundations of contemporary microeconomic theory are rooted in the perfectly competitive model which assumes that quality is homogeneous (i.e., nonexistent). "New" economic theory gives us Lancasterian demand theory and Rosen's hedonic approach. These models provide the ability to consider the demand for underlying quality attributes but are generally limited to a single exchange point in the market. As agribusinesses move toward increased vertical integration and coordination, the assumptions of cost minimization (duality) which underlie these models are violated. Ackerlov's lemon model, which incorporates uncertainty about quality, and Barzel's work on measurement costs extend the role of quality in the theory of competitive markets, but do not provide a complete framework for understanding quality in dynamic markets.

To address these limitations of economic theory we will need to broaden our horizons. In business principles classes students are given a set of nine points and told to connect the points with straight lines without the pen leaving the paper. To accomplish this feat, the lines must extend beyond the limits of the points. We must do the same. The worst approach we can take is to continue to support analysis of policy problems confronting grades and standards within the confines of our current set of methods. This is tantamount to ignoring the realities of dynamic consumer-oriented production and marketing systems and hoping they will go away.

## ENDNOTES

1. For the purposes of this paper, the terms grades and standards refer to the federal system of grading and standardization unless otherwise modified.

2. A thorough review of this literature can be found in Bockstael.

## REFERENCES


Ackerlov, George A. 1970. "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism." *Quart. J. Econ.* 84: 488-500.

Barzel, Yoram. 1982. "Measurement Cost and the Organization of Markets. " *J. of Law and Econ.* 45: 27-49.

Bockstael, Nancy E. 1987. "Economic Efficiency Issues of Grading and Minimum Quality Standards." *Economic Efficiency in Agricultural Food Marketing*, eds. R.L. Kilmer and W.J. Armbruster. 231-255. Ames, IA: Iowa State University.

Campbell, G.W. 1956. *Consumer Acceptance of Beef: A Controlled Retail Store Experiment.* Arizona Agr. Exp. Sta. Rep. 145, Arizona State University.

Cox, Linda J., B. Starr McMullen and Peter V. Garrod. 1990. "An Analysis of the Use of Grades and Housebrand Labels in the Retail Beef Market." *West. J. Agr. Econ.* 15: 245-253.

Deming, W. Edwards. 1986. *Out of Crisis*. Cambridge, MA: Institute of Technology Center for Advanced Engineering Study.

Hutchinson, T.Q. 1970. *Consumers' Knowledge and Use of Government Grades for Selected Food Items*. Washington, DC: USDA ERS Marketing Research Rep. 876.

Jones, Eluned, ed. 1991. *Soft Red Winter Wheat Quality: Issues for Producers, Millers and Bakers*. Virginia Coop. Ext. Serv. Bull. 448-051, Virginia Tech.

Lancaster, Kelvin. 1966. "A New Approach to Consumer Theory." *J. Political Econ.* 74: 132-157.

Owens, A.L. and F.R. Taylor. 1955. "Consumer Knowledge of Quality Determining Factors in Eggs." *J. Farm Econ.* 37: 625-637.

Rosen, S. 1974. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition" *J. Political Econ.* 82:34-55.

Zusman, Pinhas. 1967. "A Theoretical Basis for Determination of Grading and Sorting Schemes." *J. Farm Econ.* 49:89-106.