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Management of regulation in the food chain - balancing costs, benefits and effects

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8 The impact of regulations on consumers and the food chain industries

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INTRODUCTION

The policy environment within which the government regulates food safety is currently in a state of flux. On the one hand there is a seemingly never-ending demand for regulation of the food system to protect public health as a result, at least in part, of contemporary 'food scares'. On the other, there are concerns about the burden imposed on the food system by what is perceived, by some, to be overly onerous food safety regulation. Reflecting attempts to solve this dichotomy, there has been increasing interest in the efficiency of food safety regulation (see for example Breyer, 1993; Antle, 1995), which in turn has changed the thrust of the debate from regulation *per se* to 'good' regulation (see for example DTI, 1994).

Whilst there is agreement on the need to regulate food safety as a general principle, there is less agreement on when regulation is necessary, the forms regulation should take and, in particular, what is 'good' regulation. Although the notion that regulation should be 'effective', 'fair' and 'publicly acceptable' (HM Treasury, 1996) is not contentious, there is debate over how general principles such as these are actually defined and measured. Thus, whilst both the food industry and consumer groups would surely agree that a regulation which imposes heavy costs on food businesses but fails to protect consumers is ineffective and even unfair, there may be less agreement in cases where there is a direct trade-off between costs to food businesses and the level of food safety. Moreover in practice it may be very difficult to objectively assess whether a particular regulation satisfies these general principles and therefore is 'good' rather than 'bad'.

This paper attempts to throw some light on the current food safety regulation debate in the United Kingdom (UK) by addressing the following basic questions which tend to underlie differences in opinion over the need for, and effectiveness of, regulation aimed at ensuring the safety of our food supply:

- What are we trying to achieve with food safety regulation?
- What are the costs and benefits of food safety regulation?
- What forms might food safety regulation take?
- How do we assess the success or failure of food safety regulation?

These questions are discussed in turn below.

AIMS OF FOOD SAFETY REGULATION

Given that absolute safety (zero risk) is a scientific impossibility, contemporary discussion of food safety is framed in terms of 'acceptable risk', a concept which acknowledges that humans can only manage the hazards to which they are exposed and attempt to reduce risks to levels which are tolerable (see for example Fischoff *et al*, 1981; Douglas, 1985; Pidgeon *et al*, 1992). In this context, the objective of food safety regulation is not to make food **safe**, but to reduce the level of risk associated with food to some level which is regarded as more acceptable than that which would otherwise prevail. That is to make food **more safe**.

The economic literature on food safety further develops the notion of acceptable risk (Smallwood & Blaycock, 1991; Henson & Traill, 1993). Economists suggest that even if it were scientifically possible to reduce the risks associated with a particular food to zero (absolute safety), it may not be desirable to do so. Given that reductions in risk involve the use of resources, trade-offs have to be made between reducing food-borne risks and reducing other risks to human health (such as motor vehicle accidents or nuclear radiation) and between reducing food-borne risks and other social objectives (for example education or national defence). This suggests that there is some socially optimal level of risk associated with food (which is non-zero) which balances the full costs and benefits to society of higher levels of safety.

The model of food safety regulation presented above posits the rationale for food safety in terms of three questions: what is the prevailing level of risk?; what level of risk is acceptable?; and, in cases where the prevailing level of risk is unacceptable, how can the acceptable level of risk be achieved?

The established approach to the first question is based on scientific risk assessment whereby risk is estimated as the product of the

severity of the health effects associated with a hazard and the probability that these negative consequences will be realised (see for example Anand, 1993; Henson & Traill, 1993; Adams, 1995). Whilst this model may at first sight seem an entirely rational approach within which to handle risk, it has been widely criticised by, amongst others, Brunk *et al*, 1991; Adams, 1995; Thompson, 1996; Millstone, 1996). For example, the framework depends on the availability of reliable estimates of the probabilities associated with particular hazards based on expert opinion. However, it is well documented that experts rarely agree with one another; scientists who appear to be as 'expert' as one another routinely produce quite different responses to the same question (eg Henson, 1997). One consequence of this according to Ulrich Beck (1992) in his book *Risk society*, is that individuals select from the range of experts available to them and thus may disagree with one another simply because they have chosen different experts.

Whilst there are established methods to assess prevailing levels of risks associated with food, there are no such methods to determine the level of risk which is acceptable. The literature on risk acceptability spans the social sciences, encompassing psychology (eg Fischoff *et al*, 1981), economics (Henson & Traill, 1993) and sociology (eg Douglas, 1992; Kasperson, 1992), and even the liberal arts in the form of philosophy (eg Douglas, 1985; Thompson, 1997). Whilst there is growing recognition that risk acceptability is defined not only in terms of scientific estimates of probability but also encompasses qualitative aspects, for example the degree to which a risk is perceived as voluntary or to be known by science (see Pigeon *et al*, 1992 for a brief review), there have been few attempts to incorporate such considerations into the policy process in an explicit and structured manner. There have been attempts by some government agencies to consider wider aspects of risk acceptability in regulation decision-making, for example the Health and Safety Executive. Such qualitative aspects of risk emphasise the degree to which risk acceptability is a function of the social, cultural and economic system within which we live - what is judged to be unacceptable in the UK today may be simultaneously judged acceptable in India, and maybe even as close to home as France.

Within any one country, the nature and level of risk associated with food which is deemed acceptable change over time. In part this is a function of scientific discovery which provides new and better means of reducing the risks associated with food. Simultaneously scientific discovery identifies 'new' risks to human health of which society was happily unaware. Unfortunately, the rate at which 'new' risks are discovered tends to outstrip the rate at which the means to control 'existing' risks are developed. Changes in risk acceptability also result from processes of economic and social change. As incomes have

increased, and whilst better means to control risks have been introduced, the tolerability of even small risks has declined. Simultaneously, there has been a recognition that we are routinely subject to a wide range of risks and that these risks are not/cannot be adequately managed by the traditional institutions in which we previously endowed trust (Beck, 1992).

The complexity of the notion of acceptable risk necessarily means that judgments regarding the desirability of prevailing levels of risk are made by the political process whereby conflicting interests are competed off against one another. In recent times this process has been subject to close scrutiny following a number of food scares which have been interpreted by some as indicators that the food system, and the regulatory system which acts as a constraint on its activities, are failing. Thus, there have been calls for the existing regulatory system to be revised in an attempt to overcome perceived inequalities in the prevailing balance of interests through, for example, the creation of an 'independent' food agency (Lang *et al*, 1996; NCC, 1996).

Given that the prevailing level of risk associated with food is judged to be unacceptable, the next question is why is this so? The demand for government regulation to reduce the level of risk associated with food implicitly assumes that the market is failing; the normal operation of the market, given existing regulatory controls, is supplying a level of food safety which is considered inadequate. There is thus a case for government intervention to force the market to behave in such a manner that produces the desired level of food safety through restrictions on the activities of food suppliers and/or consumers. There are many reasons why markets might fail to produce the socially optimum level of food safety. Consequently, it is important to fully understand how the market is failing in any particular circumstance, in order to implement regulatory controls which address the problem at hand effectively. Some of the important potential market failures are outlined below.

Imperfect information

For consumers to evaluate effectively the significance of individual food-borne risk factors and assess the risk posed by each food product, information has to be available on the consequence of consumption prior to purchase. Whilst it must be acknowledged that consumers are imperfect problem solvers who collect limited information upon which to base their choices, it is evident that the information set available to consumers is itself imperfect. There are three basic problems in the provision of information on food safety by the market: the nature of food-borne risks themselves; the 'public good' nature of information; and asymmetries in the supply of safety information (which are related to market structure).

The nature of food-borne risks

Three broad categories of characteristic can be defined through which consumers discover the nature of food: search characteristics, for which information can be obtained from external sources through search prior to consumption (eg, price, colour, etc); experience characteristics, for which information on the nature of the characteristics is available upon consumption (for example taste, texture, acute food risk factors); and credence characteristics, for which information is only available some time after consumption (eg, chronic food risk factors).

All food-borne risk factors fall clearly into the experience and credence categories. Salmonellosis and other such food poisonings are experience characteristics which become obvious after consumption. Longer-term risk factors such as nutritional imbalance in the diet, food additives or pesticide residues are credence characteristics and consumers cannot judge their effects immediately upon consumption. In fact, many of the direct effects may never be apparent, and those that are observable may be confined to the longer term. In these situations consumers rely upon external risk indicators to indicate the level of food safety. These are product attributes which are known to be highly correlated with the level of experience or credence characteristics. Mitchell (1992) analysed consumer perceived risk towards a number of food products and the risk indicators employed in consumer choice processes. Important indicators identified were brand, product information, price, the nature of food packaging, and the nature of the food store and its ability to handle produce. The use of these product attributes as risk indicators underlines the need for clear legislation to control their misuse, for example labelling laws.

The provision of information can itself be seen as resulting from market allocation of resources to the production of information. This is explicitly seen in the purchase of food magazines which advise consumers in their choices, but is also implicit in the decision by consumers to use information provided in food markets, for example on labels. In the first case, the monetary cost to consumers is the purchase price of the magazine, book, etc. In the second case, it is the additional price of the food item to cover the cost of information provision. In both cases it costs the consumer time and effort to assimilate and assess the information.

The 'public good' nature of information

Directly information is published it yields benefits to society as a whole in addition to the private benefits accruing to the individual who pays for it. These social benefits, which result from the 'public good' characteristics of information, are not adequately taken into account in the marketplace, and as a consequence the market for food safety information is likely to be undersupplied.

The asymmetric nature of information

It is inevitable that food manufacturers and retailers are better informed about the nature of the products they sell than individual consumers. This asymmetry in the level of information possessed by buyers and sellers is important for the nature of the supply and demand for food safety in the market. In competitive market systems it is likely that sellers will divulge a great deal of this information in the marketing of their food products and asymmetries will be lowered. However, where suppliers possess a degree of market power the asymmetries will be maintained.

Within markets characterised by asymmetry of information, the more knowledgeable group, in this case food manufacturers, may be tempted to encourage consumer misperceptions about the safety of their food products. The seminal work on the implications of informational asymmetries is provided by Akerlof (1970). Consider a market with two food products, one relatively safe, the other relatively risky. Sellers of the products can tell which products are safe and which are dangerous, but consumers cannot. Therefore, although the safer product costs more to produce, it can only be sold in the market at the same price as the riskier product. As a consequence, food manufacturers only supply the risky product and the safer product is forced from the market.

An alternative scenario is possible. Safety issues are a major part of the marketing strategies of food manufacturers and retailers. In order to emphasise the benefits of their products, food producers may overstate particular risks in competing products. For example, manufacturers of low and reduced sugar products may overemphasise the risks of sugar consumption. Consumers' misperceptions of risk are reinforced and they are encouraged to buy safer foods than they would optimally choose. The result could be that the market supplies an excess of food safety.

Finally, food safety is used as a component of companies' product differentiation strategies. This can raise entry barriers, eg through the need for higher levels of research and development and advertising, and thus lead to greater levels of concentration in manufacturing and retailing, giving still greater information asymmetries, and perhaps higher prices.

Externalities and the social costs of food-borne risk

Consumer demand for food safety is driven by private costs and benefits with little consideration for the social consequences of changes in the level of food-borne risks: ill-health which results from food-borne risk factors imposes significant costs upon society which are externalities to private decisions about the acceptable level of food safety. These externalities include the cost of lost production, medical

care, ill-health to other members of society, and surveillance and inspection. Therefore when consumers demand a higher level of food safety they yield external benefits to society as a whole, the value of which is not reflected in the market price. Thus food safety encompasses significant public good properties and, as is typical with public goods, the level of food safety supplied by the market is unlikely to reach the social optimum.

Distributional issues

The distribution of the benefits of increases in food safety between different socioeconomic groups within society is a particularly sensitive issue. The provision of food safety by the marketplace is driven by the ability and willingness-to-pay of private individuals. Consequently, the market will tend to direct lower-risk foods towards higher-income consumers and higher-risk foods to lower-income consumers. The acceptability of higher risks being borne by the lower socioeconomic groups in society obviously raises ethical questions (Douglas, 1985).

Even though it may be demonstrated that food markets are failing, due to one or a combination of the reasons outlined above, and that the level of risk associated with food exceeds what is considered acceptable as a result, this may not be a sufficient rationale for government intervention. On pure efficiency grounds, government regulation should only be pursued if it can be clearly demonstrated that the safety of food will increase as a direct result (and would not have occurred anyway), and that the value placed on this improvement in safety exceeds the costs involved. However, in practice quantifying the costs and benefits of food safety regulation is very difficult and invariably relies on a series of assumptions which, at best, are subject to challenge. (The UK Government now requires the costs and benefits of all new regulatory proposals to be assessed, including quantification where possible. Further details of this process of Regulatory Appraisal are given in Cabinet Office, 1996.)

COSTS AND BENEFITS OF FOOD SAFETY REGULATION

The regulation debate which has transcended much of the developed world in recent years has focused attention on the costs and benefits associated with all forms of government intervention. Further, in many countries, for example the United States, UK and Canada, an explicit attempt to evaluate these costs and benefits forms part of the policy process when proposals for new regulations are being considered (OECD, 1996).

The key costs and benefits associated with food safety regulations are discussed below. In many ways the distinction between costs and benefits is an arbitrary one; effects of a regulation which are evaluated

negatively are costs, and effects that are evaluated positively are benefits. In certain cases what are regarded as costs by one economic interest group are regarded as benefits by another.

Benefits to consumers and society

The aim of food safety standards is to reduce the risk of food-borne disease below the level which would otherwise prevail. Thus the benefit to consumers is a reduction in the risk of ill-health and/or loss of life due to food-borne disease and, in turn, the costs associated with ill-health or loss of life which are avoided. The range of effects includes:

- Loss of income due to time unable to work;
- Psychological costs of pain, suffering and apprehension associated with ill-health and loss of life;
- Costs of medical care;

Sometimes these costs are borne by consumers themselves and in others by society as a whole. For example, in the UK the costs of medical care are borne collectively by tax payers rather than by the individual requiring treatment. Sometimes the benefits associated with reductions in the risk of food-borne illness may be offset by certain costs which are imposed on consumers by food safety regulations. These can include higher food prices and a reduction in the available choice of food products. There is evidence that consumers may place a great emphasis on such costs relative to what are perceived to be relatively small reductions in the risk of food-borne disease.

Costs to government

The key costs for government of food safety regulations are summarised in Figure 1. In most cases the responsibilities for implementation and monitoring/enforcement will fall upon different agencies within government. For example in the UK, food safety regulations are made by and reflect the policies of the National Government but are enforced by Local Authorities or specialist agencies. Further, the magnitude of the costs for government will depend on the nature of the rule-making process. For example, the greater the level of consultation with interested parties as part of the formal regulatory process, the greater the costs of implementation. (This is an example of where the Government might choose to expend greater resources itself in an attempt to minimise the costs on other economic agents, for example the food industry.)

Figure 1
Costs for government of food safety regulations

Activity	Costs
The legislative process	Drafting regulation
	Consultation
	Regulatory impact analysis
	Legal costs
Monitoring/Enforcement	Inspection/Investigation
	Testing
	Record keeping
	Prosecution

Source: Henson (1997)

To a certain extent the costs for government of regulating the food system depend on how suppliers respond to the regulation. For example, if the rate of non-compliance is high, then enforcement agencies will need to expend greater resources in an attempt to enforce regulations. This will tend to occur when the costs of compliance for food suppliers is high, suggesting a trade-off between enforcement costs for government and compliance costs for suppliers. However, it is possible for enforcement costs to be high even if enforcement has little impact on the behaviour of suppliers, for example if enforcement agencies lack information on the degree to which firms already comply or the appropriate action to induce compliance.

Costs to business

The category of costs associated with food safety regulations which has probably received most attention is the compliance costs imposed on business. Compliance costs are defined as the additional costs necessarily incurred by businesses in meeting the requirements laid upon them in complying with a given regulation. There are two key elements to this definition. Firstly, it covers the costs which are 'additional' to those which would have been incurred in the absence of the regulation. Secondly, it refers to those costs which are 'necessarily' incurred when complying with the regulation.

Although the range of costs associated with compliance will depend on the specific characteristics of the regulation, it is possible to devise a list which covers the major factors involved (Figure 2). In part these costs are associated with actually achieving compliance with the regulation, such as through capital investment or staff training, and in part to demonstrate compliance through record keeping.

Figure 2
Costs of compliance with food regulation

Cost incurring activities	
Administration	
Analytical services	
Capital investment:	Buildings
	Equipment
Distribution	
Input prices	
Inspection	
Labelling	
Maintenance	
Packaging	
Quality control/assurance	
Staff:	Additional
	Employee time
	Management time
Training	

Source: Henson (1997)

Of particular concern is the impact of regulations on small firms since there tend to be significant economies of scale associated with costs of compliance. Consequently, the government may deliberately apply different regulatory or enforcement standards to smaller firms in an attempt to offset the proportionately higher compliance costs. This is termed 'regulatory tiering'.

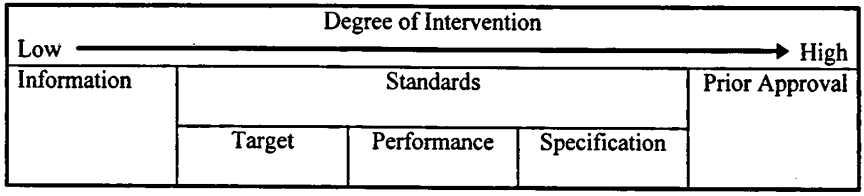
The foregoing discussion demonstrates the wide-ranging economic impact of food safety regulations. Not only do restrictions on the free operation of the market result in both costs and benefits, in many cases these costs and benefits accrue to different economic interest groups, leading to potentially significant distributional effects. Consequently, the government must look to ways of achieving the desired level of food safety which impose the minimum costs on the economic system as a whole, and on vulnerable groups (for example low income consumers and small- and medium-sized food businesses) in particular. As will be clear from the next section the economic effects of food safety regulation relate not only to the degree to which the

government intervenes, but also the instruments it employs in doing so.

FORMS OF FOOD SAFETY REGULATION

Regulation of food safety can take a number of forms (Figure 3) which differ in the degree to which they impede freedom of activity (Ogus, 1994). At one extreme, information measures require suppliers to disclose certain facts about their products, but do not otherwise restrict behaviour. At the other, suppliers may require prior approval of a product from an official agency before being permitted to release it onto the market; such approval will be based on pre-specified safety criteria.

Figure 3
Forms of government food safety regulation



Source: Henson (1997)

Food safety standards allow suppliers to release products onto the market without any prior control, but suppliers which fail to meet certain minimum safety standards commit an offence. Food safety standards can take three main forms. Target standards do not prescribe any specific safety standards for the supplier's products or the processes by which they are produced, but impose criminal liability for pre-specified harmful consequences which arise from their products. Performance standards require certain levels of safety to be achieved when the product is supplied, but leave suppliers free to choose the mechanisms through which they meet such conditions. Specification standards are applied both to products (product standards) and the processes by which those products are made (process standards) and can take positive or negative forms, either making the use of particular ingredients or particular production methods compulsory, or prohibiting the use of particular ingredients or production methods.

In the case of food safety, government regulation normally takes the form of standards which generally correct market failures, in particular information deficiencies and externalities, more effectively than redress through private law and information disclosure requirements.

Private law is generally not regarded as an effective mechanism for regulating food. The courts are generally only able to act retrospectively to compensate an individual who has suffered harm, whilst access to redress through private law is dependent on the availability of the resources required to do so.

Similarly, the efficacy of mandatory disclosure of information, eg, in the form of food safety warnings, is generally regarded as limited in the case of food safety. Such mechanisms depend on the ability of consumers to process food safety information in an appropriate manner and to take action to avoid food-borne hazards. Consequently, information tends to discriminate against consumers with poor educational attainment. Further, information disclosure only influences the actions of those who have direct contact with a hazard rather than those affected as an externality to the action of others. (A particularly interesting case of the use of information disclosure is Proposition 65 in California which requires that consumers are warned if they are likely to be exposed to a substance added to food which is carcinogenic. The rationale behind this action is that consumers can take private litigation action if they are injured by consumption of a food and were not prior warned.)

As a general principle, it is desirable to maximise the freedom of suppliers to choose the manner in which they meet the specified regulatory objectives. This will enable suppliers to minimise compliance costs by implementing the most efficient method of complying with the specified regulatory standards and promoting innovation in compliance technology. However, this general principle may be offset by greater costs for other economic groups which are party to the regulation. For example, standards which permit considerable freedom in the method of compliance are generally more difficult to monitor and enforce and consequently impose greater costs on enforcement authorities. In addition, there is a tendency for suppliers to over comply when given discretion regarding the method of compliance in a bid to offset uncertainties over what is deemed sufficient to satisfy the regulatory standard.

From a cost-effectiveness perspective, target standards which render it illegal to supply food which is deemed to be unsafe appear a desirable approach to food safety regulation. The specified goal of the regulation can be translated directly into prohibited outcomes and it is then left to suppliers to implement appropriate mechanisms to ensure these prohibited outcomes do not occur. This permits firms to implement the method of compliance which is most efficient given their own particular cost structure.

However, target standards can also impose significant information costs on both enforcement agencies and suppliers which, in certain cases, may outweigh such efficiency gains. For many food-borne risks

the relationship between human ill-health and exposure to a particular hazard is separated by space and/or time. Consequently, the costs to enforcement agencies in determining a causal link between the actions of a particular supplier and the exposure of consumers to a hazard are often very high. In this situation all but the most obvious violations of the standard may remain unchallenged since enforcement agencies constrained by budgetary considerations will be reluctant to pursue any action unless there is a high probability of success in the courts.

In the case of target standards it is the responsibility of individual suppliers to determine the quality of their own performance which will ensure compliance with the standard. This can impose high information costs on suppliers associated with uncertainty over which practices are or are not acceptable under the standard. Consequently, there may be an inherent tendency for firms to implement procedures in excess of those required to comply, as security against violation of the standard. An example of such an approach is the UK Food Safety Act 1990 which makes it an offence to sell for consumption food products which are unfit for human consumption.

The costs of implementing performance standards are greater than for target standards since the regulator has to predetermine the quality of performance by suppliers which is acceptable given the goals of the regulation. However in many cases, such as where firms in the market or the products they produce are relatively homogeneous, there will be economies of scale associated with this task being undertaken by one central agency rather than individual suppliers. Furthermore, determining when a violation of the standard has occurred is generally easier and less costly since performance standards are more closely defined and compliance can be directly monitored at the place of production. Thus enforcement costs are generally lower.

Since performance standards define the actions of firms which are permissible more precisely than target standards, there is less flexibility for firms to determine the most efficient method of compliance and consequently compliance costs tend to be higher. However, since the actions required of firms are more precisely defined, there is less uncertainty associated with performance standards. Therefore, information costs tend to be lower and there is less tendency for firms to over-comply.

Specification standards are more precisely defined than either target or performance standards, laying down a comprehensive series of rules about the nature of food products and/or the processes by which they are produced which, it is assumed, will ensure the desired level of food safety. Consequently, at any point in time there is less uncertainty associated with specification standards, both for enforcement agencies in terms of determining which products or processes comply with the standard, and for suppliers in terms of what

has to be done to achieve compliance. However, as a result of their precise nature, specification standards tend to become obsolete as technology develops and may need to be regularly updated. The nature of the regulatory processs is such that the momentum with which standards are updated will tend to lag behind the rate of technological change. Consequently, standards will tend to arrest innovation, resulting in significant losses of social welfare.

The precise nature of specification standards implies high implementation costs for regulatory agencies since even relatively straightforward food safety targets need to be translated into detailed input and/or production parameters. However, once implemented, specification standards are relatively easy to enforce since the enforcement agency has simply to verify in the case of a positive standard that the prescribed input or process has been used or, in the case of a negative standard, that the prohibited input or process has not been used.

Whilst the detailed nature of specification standards minimises the information costs to firms of determining how to comply, there is little flexibility for firms to adapt the method of compliance to their particular cost structure. Further, unlike target or performance standards, there is little incentive for firms to develop compliance technologies which reduce compliance costs. However, since there is little discretion over how to comply with the standard there is less uncertainty regarding the costs of compliance. Further, there is likely to be less variation in compliance costs between individual firms in the market.

In conclusion, food safety regulations can potentially impose high costs of compliance on food businesses which in certain cases feed through as higher prices to consumers and inhibit innovation. Consequently, it is important for policy makers to adopt regulatory forms which achieve the desired level of food safety at the minimum cost to food suppliers. In most cases this implies maximising the flexibility afforded to suppliers to achieve the desired level of food safety in a manner which is most appropriate to their own particular circumstances, even if this in turn imposes greater costs of enforcement on local government or other responsible agencies.

ASSESSING THE SUCCESS OR FAILURE OF FOOD SAFETY REGULATION

Given that food markets are already highly regulated, it is implicit in demands for further food safety regulation that existing government controls are failing to provide the desired level of safety. Experience suggests that there is never a shortage of interest groups which consider current government policy is failing, indeed government

failure appears to have become ubiquitous to modern society (Bovens & Thart, 1996). However, for the purposes of a more constructive contribution to the food safety regulation debate it is necessary to examine what separates success from failure a little more closely. Three issues, salient to the current discussion are discussed below.

Inevitability of failure

Would we have had Bovine Spongiform Encephalopathy (BSE) if the UK government had not altered the existing regulatory controls on processing temperatures for animal feed in the 1980s? Would the fatal outbreak of *Escherichia coli* in Scotland at the end of 1996 have occurred if we had had registration rather than licensing of food premises? Maybe, but maybe not! It is only when we start wondering about what might have been, that we fully realise that what *has* happened need *not* have happened. This inevitably leads us to question why existing regulations, which were supposed to protect the safety of our food supply, failed.

It is very easy to look back at the decisions that were made in the past and fall into the 'wisdom after the event trap' whereby our estimates of the outcome of historical decisions are strongly influenced by what we know actually happened (Bovens & Thart, 1996). Once we know the outcome, the events that occurred seem very logical, more predictable and maybe even inevitable; we seem to 'just know it would happen'. Of course what we are doing is underestimating the complexity of the problem and the general uncertainty faced by government when the regulation was actually promulgated and performing an ex-post reconstruction framed in terms of what we know today. We are always wiser after the event and therefore on this basis will automatically judge much of the existing controls to have failed.

Relativity of failure

Because of the lack of a fixed benchmark which applies regardless of time and place and is universally agreed by all with an interest in food safety regulation, it is virtually inevitable that a particular regulation will be deemed a failure by someone. Below are a few examples by way of illustration:

- The benchmark against which food safety regulations are assessed tends to change over time and there is a tendency to evaluate regulations against what is possible today rather than what was possible when the regulation was actually promulgated, for example, as science provides better means to control existing food-borne hazards or identifies new hazards in food of which we were previously unaware.

- Individual interest groups adopt their own benchmarks against which to assess the success or failure of food safety regulations. In many cases these benchmarks may not accord with those adopted by government when the regulation was originally promulgated.
- In many cases there may be no formal benchmark against which to assess food safety regulation, either because the objectives of the regulation were not formally specified when it was originally formulated or because the specification of such a benchmark is not possible. In this case there is no way to formally judge whether a regulation is a success or failure.
- Even in cases where a bench mark does exist, there is no consensus on how much deviation from the intended outcome represents a failure. If the intended reduction in the incidence of food poisoning was 30% but it actually only declined by 25%, is this a failure? What about if it had only declined by 20%? Would a decline by 35% have been an outstanding success?

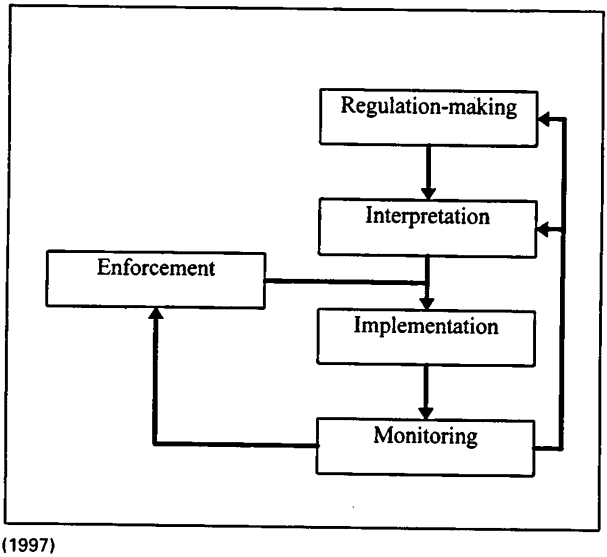
Imperfect markets *versus* imperfect regulation

The food safety regulation debate, like all forms of government policy, involves a trade-off between imperfect markets and imperfect regulation (see for example Wolf, 1990). Not only do markets fail to achieve the outcome that society demands but so, in many cases, do regulations. Regulation is a very blunt tool which is relatively easy to promulgate but incredibly difficult to implement and enforce in such a way that firms comply in the manner intended. Further, should a regulation fail, it can in certain circumstances be very difficult and time-consuming to remove.

Having decided that existing regulatory measures have failed to achieve the desired level of food safety is not sufficient grounds to proceed to new regulatory controls, it is also necessary to understand why existing controls have failed. This requires an understanding of the process by which regulations are made and then implemented (Figure 4). Thus there needs to be a recognition that the government is not the only party involved in the regulatory process: we must also consider the actions of enforcement officials and food businesses which comply, or do not comply, with existing regulations. For example, the regulation may not have had the desired effect because a significant proportion of food businesses failed to comply or food businesses complied in a manner which was not anticipated. Alternatively, the regulation may have been misinterpreted, and therefore misenforced, by enforcement officials. In all cases, before it is deemed that a regulation has failed, it is necessary to examine why the regulation had the effects it did. Maybe it was not the regulation at all, but simply the manner in which it was implemented, and that small

changes to the regulatory process, for example through revisions to enforcement guidelines, would have produced the desired outcome?

Figure 4
Regulatory process



Source: Henson (1997)

CONCLUSIONS

This paper has not provided any answers, but has served to illustrate the great complexity of the issues raised by the food safety regulation debate. It is hoped that it will serve, at least in part, to overcome the tendency of certain interest groups to over-simplify the impact of regulatory controls on food markets, both in terms of the wider costs and benefits and how judgments are made about success or failure. It is only through a full understanding of these issues that effective regulatory controls can be implemented which balance the full effects on consumers, the food industry and the government and achieve a level of food safety which meets the needs of society.

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DISCUSSION

Mrs Joanna Wheatley (Farmer) said that her main concern about regulation and controls relates to the possible transference of genetic material and whether adequate systems are in place for post-licensing surveillance, and monitoring of the effects of the use of biotechnologies. The problems she envisaged were herbicide resistance and the risk of 'super weeds' and a possible build-up of antibiotic resistance in cattle.

Dr Geraldine Schofield said in reply that the herbicide resistance issue has been addressed by the Advisory Committee on Releases to the Environment (ACRE) on which she has served as a member. One of the questions debated early on was based on the 'precautionary principle' of 'what if x and y happen?', and debate has now moved on to 'if it does happen what is the increased risk of harm?' She agreed with the questionner that there will be a certain amount of gene flow in terms of some of the crop plants now on the market and agreed also that in order to avoid resistances in pest populations or multiple herbicide resistances, there has to be integrated crop management; but as herbicides are not sprayed onto a natural population, the risk of harm by gene transfer to the natural environment is pretty small. A problem that could arise is the re-emergence of a weed into a major crop species. These questions are however being asked and are matters for the manufacturers of the herbicide and the crop producers. With regard to antibiotic resistance build-up, the risks were addressed by the Advisory Committee on Novel Foods and Processes (ACNFP) which concluded that there was a potential, although extremely small, risk of the transfer of the antibiotic resistance marker in the animal gut.

Dr Schofield said that if we are to realise the advantage of the technology, the question of monitoring has to be addressed partly by the industry that is providing that technology, and partly by those responsible for the public funding.

Ms Sheila McKecknie felt that one of the problems of regulatory systems is that they often specify procedures to be applied in isolated situations or to specific products, rather than addressing the more global or more general problems of which antibiotic resistance is one. She therefore asked whether there is any evidence of regulatory frameworks that can deal with the generality as opposed to the specific product outcome?

Dr Geraldine Schofield accepted the importance of this broader approach to regulation and added that academic researchers in the USA are addressing this very issue but no conclusions are yet available.

Mr David Gaunt (British Simmental Cattle Society) referred to the intense pressures on the beef industry which appeared almost to amount to a requirement that it should produce food in a sterile environment. This, of course, would be impractical and his proposition was that as we have a very diverse population with different cultures and different standards of food preparation and hygienic understanding, the consumers' organisations should press for consumer education and for the reintroduction within our school curriculum of those factors which will help to bring common-sense back into food hygiene.

Ms Sheila McKechnie accepted that consumer education provides an important part of the solution to reducing the level of food poisoning, certainly in the field of microbiological safety. She also expressed the view that we should stop seeing the BSE problem as a debate between the farmers and the consumers since polarisation does not in these complex issues, help to take the debate forward. Consumers and industry do have a number of things in common but they do also face a number of issues where their interests are diametrically opposed; it is the clarity of those issues in terms of the detail, that make for a good regulatory process.