

Food Safety in Meat – Meeting International Regulatory & Market Requirements.

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Abstract

Governments and international institutions have laid down safety standards for the international trade in food products; these are mainly based around the Codex principles for HACCP. Although at present standards are not fully harmonized internationally, they may be used to provide a set of core guidelines.

At the same time international markets have focussed on the importance of food safety systems primarily to provide legal protection but also to give 'assurances' to their customers. This is particularly true in relation to the supply of meat and meat products in the light of recent incidents (eg Salmonella and E. coli O157) and potential risks (eg the correlation between BSE in cattle and vCJD in humans).

Various sectors of the food supply chain in different regions of the world have developed schemes to 'assure' the supply chain and eventual consumers that their products are safe. Analysis of many schemes, some of which are reported here, indicates that many of these do not fully comply with core international guidelines, nor do they fully address the requirements of the market place and consumers. Schemes that do embrace international guidelines enable members to reduce the risk and hence liability resulting from a food breakdowns.

The development of schemes that are seen to have a common standard for food safety, irrespective of country of origin, would benefit the whole food chain and consumers. This may be achieved through co-recognition of schemes or the adoption of schemes in more than one country. However, an essential pre-requisite for an international industry scheme, or schemes, is the urgent need to harmonize international standards.

By building quality attributes into the food safety system, it is possible to also meet differentiated market requirements. Such schemes not only have the potential to reduce the costs of assessing food safety, but also provide a systematic framework for quality management and can underpin promotion of the product. A model for food safety management is outlined based mainly on the innovative work carried out in Australia in recent years in terms of the development of safe quality foods as in SQF 2000 Quality Code.

Introduction

The main aim of this paper is to explore food safety management issues as it relates to the international trade in beef and beef products. Although safety of the product is the main focus, it is important to set such management systems within the context of international standards and market requirements. In order to address this, examples will be drawn from the EU and Australia and applied to the current situation in Uruguay. The rationale behind this is as follows:

- The EU is the world's largest food importer and exporter and is an important quality beef market for Uruguay under the Hilton Beef Quota. The EU also has the reputation for the most stringent conditions in terms of licensing export abattoirs and meat processing plants (and in some cases farms). Indeed, many other countries now cite EU standards as their own requirements. Therefore,

meat-processing plants in Uruguay that have EU licenses should be able to meet hygiene requirements globally. They do, however, need to address safety and quality issues in relation to their own supply base.

- Australia is the largest exporter of beef and is primarily driven by meeting the requirements of these markets. For example, only about 10% of Australian beef enters the EU but the EU licensing standards are taken as the industry standard. In addition, some farms are licensed by the EU to supply plants. So what lessons can Uruguay draw from Australian experiences in establishing food safety systems to meet international markets.
- Governments play an important role in creating the legal and policy frameworks that the industry has to operate within. Australia and New Zealand have addressed harmonisation of food safety laws while the EU is currently considering such a move. How will such developments affect Uruguayan beef production systems and exports.

Before reviewing the implications of international standards and markets on food safety management, the first question to ask is why has food safety assurance become such an important issue in recent years?

Background to Food Safety Management Systems

The main force behind the development of food safety assurance has been, and remains, the legal requirement to demonstrate that food is safe. For example, many recent incidents of meat safety have focussed on the UK. These include scares and health concerns linked to such incidents as *Salmonella* in poultry and eggs, the probable link between Bovine Spongiform Encephalopathy [BSE] and new variant Creutzfeldt Jacob Disease [vCJD] in humans and *Escherichia coli* 0157 contamination of meat and meat products. Furthermore, reported food poisoning incidents in the UK have risen dramatically from less than 15,000 in 1982 to over 100,000 by the late 90's. The UK is not alone however, in the United States of America for example, it is estimated that 7 million food poisoning cases occur each year with up to 7,000 deaths (FSIS 1997), some 5,000 deaths being attributed to meat and poultry products. These increasing numbers of recorded food poisonings may be influenced in part by changes in the notification procedures, classification of illness and greater public consciousness to visit doctors. It is thought, however, that these numbers may represent only 10% of temporary food-related sickness.

Several factors have clearly contributed to this problem including the implementation of new technologies in the food chain, Government policies and legislation, but perhaps the most important factor has been a real breakdown in food safety – and greater risks to public health. As a result of these problems, consumers are rightly demanding more transparency, traceability and assurance along the food chain from farm production to retail distribution. This has led to the introduction of various legislative instruments and, in the UK the establishment of the Food Standards Agency (Howells *et. al.* 1990; Baines & Davies 1999).

Currently the EU is considering ways of harmonising food safety laws as outlined in the EC White Paper (COM (99) 719). The proposal includes the establishment of an independent European Food Authority and the introduction of new hygienic measures based on Hazard Analysis Critical Control Points (HACCP) from primary producer to final sale to consumers. These developments reflect earlier initiatives in Australia and New Zealand to harmonise food safety legislation and set up ANZFA, the Australia, New Zealand Food Authority (ANZFA 1999). In addition, the legislation advocates the adoption of HACCP down to primary production.

The food industry is required to operate within national and international frameworks for food safety, unfortunately these frameworks are not fully harmonised and this creates problems for those involved in global trade. The sector of the supply chain that is exposed to potentially the

greatest liability in the event of a food safety breakdown is the sector where food safety laws have the greatest effect. This is generally at the consumer interface with the supply chain, in other words, at the retail/catering stage. In response to this, food retailers in particular have developed their own quality and safety (QS) systems to demonstrate 'due diligence' in their distribution, handling and the sale of food. The term due diligence is used here within its legal context where the protection of the customer from defective food is balanced with the right of the supplier not to be held liable for an offence they have taken all reasonable care to avoid (see Howells *et. al.* 1990). This approach to consumer protection contrasts markedly to administrations where strict liability is applied to food safety, however food businesses demonstrating 'due diligence' under a strict liability regime can benefit from lower insurance premiums.

A logical development of these end-of-chain schemes was for individual or groups of retailers to examine supplier activity. A good example being the British Retail Consortium Standard (BRC) – see later. As conditions of supply, retailers now require suppliers to demonstrate due diligence to meet the retailer's own QS requirements along with legal and the normal contractual requirements of supply. This process has been repeated down the supply chain with food processors and manufacturers requiring their suppliers to implement QS systems that meet their requirements and those of the retailer. The demand for food safety has progressed down supply chains at varying rates, in part depending on the length of the chain. For example within the UK, the fresh produce chain is relatively short, so producers got involved in due diligence issues at an early stage. In contrast, livestock supply chains are more complex, and many producers are only now beginning to appreciate the significance of demonstrating due diligence (Baines *et. al.* 1999).

In response to these demands, primary producers in a number of industry sectors and in particular regions developed their own farm assurance schemes. Such industry led schemes are prevalent in both Europe and Australia but are less well developed in the US (mainly as a result of the strong Federal regulatory and inspection systems and the use of strict liability for food safety). Although nationally recognised schemes are present, the globalisation of the food industry has raised important concerns for producers who are members of such schemes. Compliance with farm assurance makes production more expensive. It does this directly, via capital works and membership fees, as well as indirectly, through increased management costs. Do producers potentially incur greater costs than their overseas competitors who are supplying the same retail outlets? Would producers benefit from knowing how their schemes measure up to those of competing producers, or would working to a common scheme be more advantageous?

There are related problems for processors and retailers, this is mainly associated with the cost of evaluating whether supplier quality and safety schemes meet appropriate quality and safety standards. In addition to auditing these QS systems, a significant amount of management and technical resources are taken up by the assessment of various schemes to determine what is being assured and how this is achieved – in effect an analysis of the equivalence of schemes. Would the supply chain benefit from independent evaluation of equivalence of schemes? Or would a global scheme better suit the industry? These questions have been raised as part of ongoing research (see Baines *et. al.* 2000)

Although the issues raised by the evolution of food safety management systems are complex, it is increasingly apparent that the adoption of such systems is becoming a pre-requisite for access to markets, especially quality product markets. Indeed, the higher the value of the product, the greater is the level of assurance (MLC 1998). Therefore the development of safety systems for beef export from Uruguay should be undertaken within the context of current and potential future markets.

The Global Beef Market

In a recent strategy document that evaluated global meat markets to 2010, the UK Meat & Livestock Commission (MLC 2000) identified that the following key factors will impact on international meat trade:

- ❑ Between 2000 and 2010 the number of 'non subsistence' consumers is forecast to increase by some 30% from 2.1 billion to 2.7 billion. These consumers will consume more meat, especially quality meat products.
- ❑ Beef consumption has declined globally by 6% when comparing 1998 to 1988; however, there were regional differences with net increases in consumption in China (375%), Asian Pacific Rim (35%), Other Asian countries (30%) and South America (13%).
- ❑ Increase in meat consumption is linked to a combination of population increase and improving economic status. Based on this, Asia and South America are likely to be important regions in relation to beef markets.
- ❑ Consumption in Asia is forecast to grow sharply and, although there will be some expansion in production, import requirements will increase substantially.
- ❑ Both beef consumption and production are growing in South America, consequently these countries are likely to become increasingly important beef exporters.

Given these trends, beef exporting countries such as Uruguay will need to identify the requirements of target markets in terms of regulatory and market requirements. Given that regulatory requirements can be met (for example, by having adequate EU or USDA approved slaughtering and processing facilities), the challenge is to identify what the market requires. The above predictions identify possible future markets, however, the EU will remain an important market for Uruguay, not least because of the unit value of beef exports at US\$3,629 compared to US\$2,299 and an average of US\$2,329 to all markets (1998 figures).

It is important to note that the multiple food retailers are the dominant sector within the EU, and meeting their conditions of supply is important. Primary producer schemes are important entry points for supply; however, HACCP based systems at the processing level are generally required. Retailers will also retain the right to audit the supply chain themselves, mainly for legal reasons linked to traceability of the product (or who to blame in the event of a breakdown). In addition, retailers may also include other conditions that they claim are important to their customers. Such conditions may include farming systems (eg organic, free range), animal welfare, environmental protection and conservation, social and worker welfare or religious constraints for example. Current consumer research within the EU conducted by the Royal Agricultural College in collaboration with partners in Scotland, France, Spain and Italy has identified the following issues. Consumers are concerned over the safety of food and are interested where it came from, some are concerned over animal welfare and environment and some even purchase some goods on ethical grounds such as 'fair trade' products. In other words all expect safe food as a given but only some want particular quality attributes. This provides for product differentiation on quality grounds. Finally, in terms of delivering these assurances, consumers generally trust their retailers to deliver these attributes (Competition Commission 2000).

In terms of supplying quality beef into such markets, it is critical that food safety management is demonstrated. Moreover, the requirement for traceability can be turned to the supplier's advantage as it provides a vehicle to demonstrate origin and provenance through appropriate labeling. Finally, by integrating quality attributes like 'naturally reared' into the safety management system, an integrated safe quality food system may be developed at a lower cost than developing separate systems. This would require the introduction of critical quality points (CQP's) alongside critical control points (CCP's) for food safety.

Such approaches to food safety and quality management have the potential to meet different market requirements; however, a food safety management system should also address international standards.

International Standards for Food Safety

International standards underpinning international trade will become a key feature of the global food system. The creation and recognition of a 'harmonised' system, or the better understanding of equivalence of standards (Baines 1999) will become increasingly important. In stating this fact it is recognised that standards will evolve over time. However, at the present time knowledge and recognition of 'other peoples standards' is poor generally (Busch *et. al.* 2000). This is reflected in the increasing number of disputes over barriers to more free trade, for example, hormone enhanced beef production dispute between the EU and others. In order to overcome these disputes, there is an urgent need to harmonize international standards. The relationship between the activities of two international bodies, the World Trade Organisation (WTO) and the Codex Alimentarius Commission (Codex) will have a significant impact on the development of effective and equitable policies and food safety standards for international food trade.

The Codex Alimentarius Commission was established in 1962 under the Food & Agriculture Organisation (FAO) and the World Health Organisation (WHO). It is probably the most important international body concerned with food safety standards. The main objectives of Codex are to protect the health of consumers while ensuring fair trading practices. Although Codex Standards are not compulsory, they are increasingly being embraced in national rules and guidelines and are the main reference for the WTO in arbitration activities. Two main approaches to developing Codex standards are evident from member countries and the Codex regional committees. The first is based on scientific evidence that the product is 'safe' if it conforms to toxicological and microbiological limits set by expert committees. The second approach is more aligned to the WHO definition of human health which includes 'additional factors' such as consumer expectations and information, risk management, cultural and religious beliefs, the preservation of social and economic balances, the health and welfare of animals and protection of the environment. It should be noted that many of these 'other factors' have already been identified as important 'quality' attributes of more affluent markets in relation to consumer expectations! The implications for international trade raised by these 'other factors' has been reviewed by Baines & Davies (2000). In terms of safety, this paper will focus consumer protection on the following:

- ❑ Scientific evidence that the food product is safe, and,
- ❑ Risk management in the production, distribution and sale of the food product.

In other words, the application of Hazard Analysis and Critical Control Points (HACCP) to food supplies chains (Codex 2000).

The World Trade Organisation evolved out of the GATT agreements of 1994, which also included the Sanitary and Phytosanitary (SPS) and the Technical Barriers to Trade (TBT) agreements. The SPS agreement sets the limits within which countries can produce measures on plant and animal health and food safety of consequence to international trade. This agreement also considers that the Codex Standards are sufficient to ensure food safety and the protection of consumer health. Indeed Codex Standards are the only SPS reference for the WTO in arbitration during trade conflicts. The TBT agreement covers regulatory areas not covered in the SPS agreement, and includes product composition or specification and labeling – attributes that can be more closely linked to quality measures, traceability and provenance of the product or it's ingredients.

This brief review of international standards would indicate that any system aiming to demonstrate responsibility in handling food products should include the adoption of Codex HACCP systems for safety and could include other quality attributes as long as TBT agreements are not affected. The principles and application of HACCP are outlined (Annex 1) as is a decision tree for determining critical control points. The development of such a system would also meet the requirements of the supply chain, eventual markets and consumer expectations.

The next question to ask is what are the hazards associated with supplying beef for export from Uruguay?

Hazards & Risk Assessment

This is a question for the specialists in the fields of food spoilage, microbiology, toxicology and alike. However, the majority of those involved in the industry are not specialists, but will be responsible for managing the safety of food, in this case beef. Therefore specialist knowledge of hazards and understanding of the associated risks should be built into a framework for managing the hazards and risks. Hazards may be divided into three main classes based on the interaction with the food product (Figure 1). The presence of each may influence the type of assessments made to determine whether critical limits are exceeded and the actions to be taken. In addition, the type of assessment may affect when food products that exceed critical limits are removed from the supply chain. Detecting the presence of both physical and chemical hazards can be built into continuous sampling at critical points in the process with contaminated materials removed immediately. In contrast, biological hazards often require a period of culturing and bio assay before critical levels can be determined, as a result, products may have moved further along the supply chain and thus require product recall.

Nature of Hazard	Impact on Food Product	Assessment & Actions
Physical	<ul style="list-style-type: none"> <input type="checkbox"/> Physical contaminant harmful eg glass. <input type="checkbox"/> Mixed with, or covering, food product but no chemical reaction. 	<ul style="list-style-type: none"> <input type="checkbox"/> Visual assessment <input type="checkbox"/> Chemical assessment of contaminant <input type="checkbox"/> Remove source of contamination. <input type="checkbox"/> Consider separation of contaminant from food product
Chemical	<ul style="list-style-type: none"> <input type="checkbox"/> Chemical contaminant harmful to humans eg animal drugs, pesticides <input type="checkbox"/> Chemical interacts with food product to make it unsafe 	<ul style="list-style-type: none"> <input type="checkbox"/> Chemical assessment of contaminant or derivatives <input type="checkbox"/> Remove source of contamination <input type="checkbox"/> Reject and dispose of food product.
Biological	<ul style="list-style-type: none"> <input type="checkbox"/> Biological agent or it's toxins harmful to humans eg pathogens <input type="checkbox"/> Colonisation of food product causing spoilage or secondary contamination 	<ul style="list-style-type: none"> <input type="checkbox"/> Bio assay or culture techniques <input type="checkbox"/> Remove source of contamination <input type="checkbox"/> Reject and dispose of food product

Figure 1: The types of hazards that can contaminate foods, types of assessment and possible actions to be taken.

With reference to the beef supply chain, we are aware that health hazards may enter and re-enter the chain at various points. For example, confirming that a consignment of meat is below critical limits for microbial contamination at the abattoir does not mean that this consignment is now safe. Inappropriate storage could allow microbial growth and later handling or mixing with other consignments could lead to cross contamination. Since the objective is to reduce the health risk to the final consumer, and since the level of risk associated with any stage in the chain will inevitably affect the level of risk further up the chain, there is logic in developing an integrated approach to food safety management.

Integrated food safety management requires adequate technical communication along the chain and a willingness to work together for the common goal. The development of common approaches to food safety would facilitate this. In addition, an integrated approach would also benefit the chain in delivering related quality attributes. In order to develop an integrated approach to safety management for beef, the various links in the chain should be identified along with associated human health hazards at each stage (Buncic 2000; figure 2). Thereafter the risks associated with these hazards should be quantified and a HACCP plan developed.

Key to the development of the HACCP plan is the application of Codex Principle 7 'the establishment of documentation covering all aspects of the procedures and records appropriate to these principles and their application' (see Annex 2). It is not only critical for this to be done internally, but there is also a very strong argument for this to be verified externally in order to communicate trust in the system. Verification can be by a 2nd party (ie the purchaser of the product) or be conducted by a 3rd party or independent certification body – the latter having greater credibility both within country and internationally.

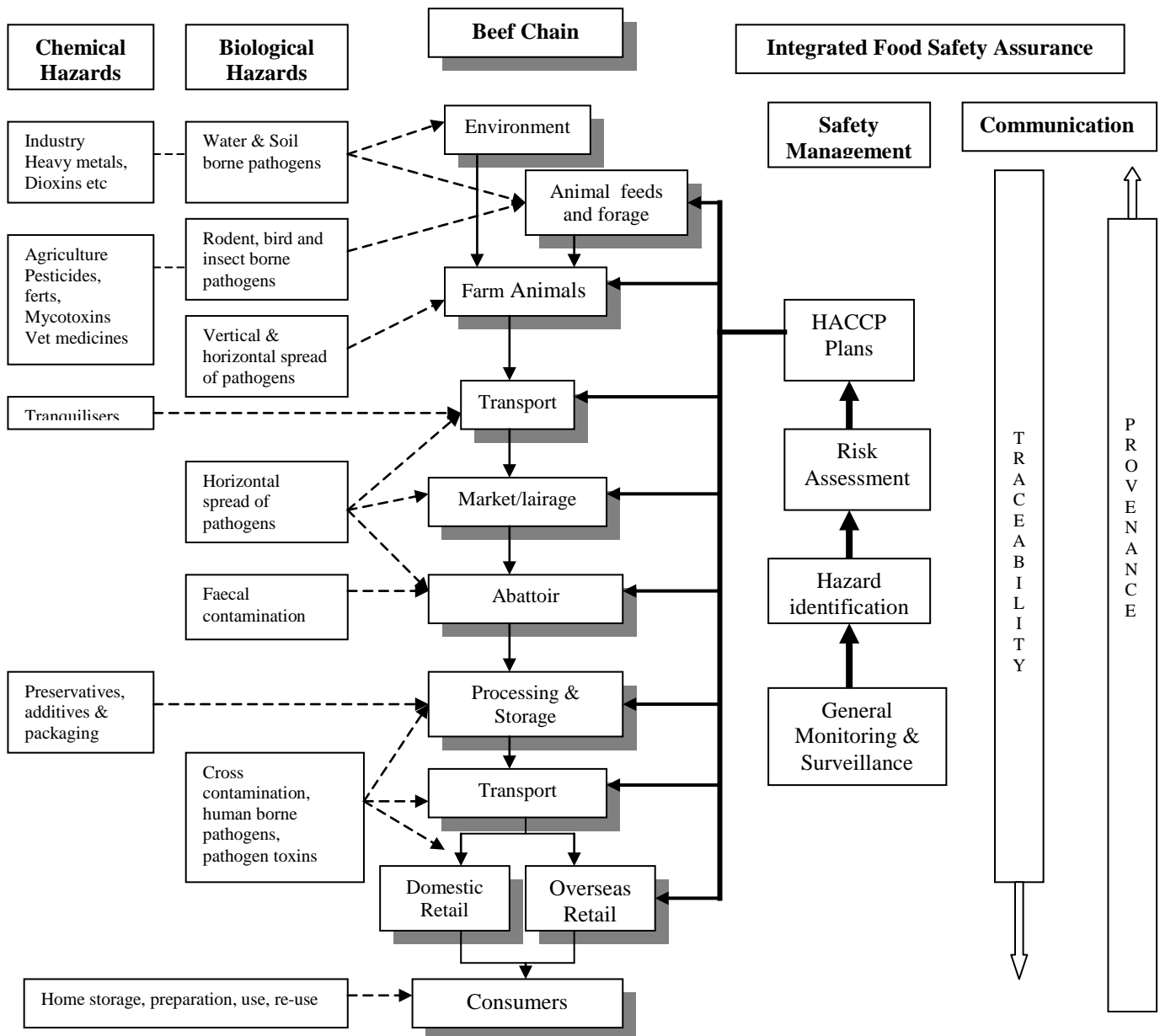


Figure 2: Schematic diagram of the beef supply chain, potential sources of human health hazards (indicative examples only) and stages of integrated assurance. (Adapted from Buncic 2000)

Given that the specific hazards and risks associated with Uruguayan beef production and processing are identified, can they be built into an appropriate model for food safety management? Furthermore, what lessons can be learnt from other systems operating around the world?

A Model for Food Safety

The following model for a food safety system is based on earlier proposed models (Baines & Davies 1997; 1998) and has drawn on good practice examples from the food and other industrial sectors. In particular, the model identifies the value of the ISO 9000 series for quality management and the Codex application of the seven principles of HACCP for food safety process controls. From this model, a template was developed and used for equivalence analysis of existing systems (Figure 3).

Ref	Food Safety Management Template			
1.1	Scheme Name	Inspection Organisation <i>[where appropriate]</i>		
1.2	Scope of Scheme - Products Covered <i>[please tick]</i> Fruit and Veg [] , Cereals and Grains [] , Pigs [] , Poultry [] , Eggs [] , Beverages [] , Wine [] , Beef/Sheep [] , Milk [] Fibre [] , Food Processing [] , Food Distribution [] , Other <i>[state.....]</i>			
1.3	Number of Producer Members in Scheme -			
1.4	Estimated % of domestic market covered by the Scheme -			
1.5	Purpose of Scheme - has the Scheme been set up to provide evidence: Of compliance with food laws and regulation yes [] no [] That the food product is safe yes [] no [] That the food product is of a stated quality yes [] no []			
	Attributes of Scheme	Yes	No	Comments
2	Does your scheme contain the following or equivalent			
2.1	Reference to Codex Alimentarius Commission	[]	[]	
2.2	Reference to Hazard Analysis & Critical Control points (HACCP)	[]	[]	
2.3	Reference to ISO Management Standards ISO9000 or ISO14000 series	[]	[]	
3	Definitions, does scheme define the following :			
3.1	Type of business covered by scheme	[]	[]	
3.2	HACCP	[]	[]	
3.3	Procedures for applying HACCP	[]	[]	
3.4	A plan for HACCP	[]	[]	
3.5	Training in HACCP or other risk assessment procedures	[]	[]	
3.6	Skilled HACCP practitioner	[]	[]	
4.1	Quality Scheme – Commitment			
4.1.1	Is owner/Director/Manager of business required to make a commitment to quality/safety in a policy statement and is this communicated to employees and consumers	[]	[]	
4.1.2	Is business required to identify who has operational responsibility for quality/safety	[]	[]	
4.1.3	Is there a training requirement for employees with operational control eg HACCP training or legal training	[]	[]	
4.2	Quality Scheme – Suppliers			
4.2.1	Is there a requirement to document the specifications of purchased products which may affect food safety	[]	[]	
4.2.2	Is there a requirement to record inspect of raw materials [inputs] in relation to safety And quality prior to use	[]	[]	
4.3	Quality Scheme – Control of Production			
4.3.1	Is HACCP, or a similar risk assessment, procedure applied to the production process and are records kept	[]	[]	
4.3.2	Are procedures in place to take corrective action if HACCP identifies breakdown in safety/quality. Are records kept	[]	[]	
4.3.3	Are raw materials, intermediate and final products handled, stored and transported to minimise risks of food safety/quality breakdown. Is this documented.	[]	[]	
4.3.4	Is the business required to ensure that food products comply with food safety regulations	[]	[]	
4.4	Quality Scheme – Inspection & Testing			
4.4.1	Is equipment used in the production process regularly calibrated to manufacturers specifications and records kept	[]	[]	
4.4.2	Are sub-standard raw materials and products removed from the process and final product.	[]	[]	
4.4.3	Are internal audits systematically carried out by suitably skilled staff	[]	[]	
4.5	Quality Scheme – Document Control & Records			
4.5.1	Is there a requirement to maintain a list of documents that describe the safety/quality scheme	[]	[]	
4.5.2	Is there a requirement to maintain records that demonstrate that the production process, inspection and testing have been carried out according to the HACCP, or similar plan.	[]	[]	
4.6	Quality Scheme – Product identification & Traceability [Tracking]			
4.6.1	Is the final product identified in such a way that it may be recalled if necessary, are records kept of identification and destination of product.	[]	[]	
4.7	External Audit, inspection or verification			
4.7.1	Is the safety/quality scheme subject to external inspection by the purchaser	[]	[]	
4.7.2	Is the safety/quality scheme subject to external inspection by an independent appointed Body	[]	[]	

Figure 3: Template used to compare existing schemes to a model system. Adapted from SQF Quality Code, AGWEST Trade & Development, WA.

This template has been applied to European and Australian primary producer schemes as well as schemes developed for suppliers to retail consortiums. Over 20 schemes have been analysed to date. This paper will only compare selected schemes from the Beef sector to the British Retail Consortium scheme (a scheme for suppliers providing products under retailer

'own label' schemes) and the Australian SQF2000 scheme (a scheme operating in over 12 countries that can potentially cover all products). A summary of the equivalence of these food safety systems to the template is provided (Annex 2).

The following general conclusions may be made in relation to European schemes currently in operation:

- ❑ The supply chain without the direct involvement, or investment, from Government has developed UK schemes. Schemes for beef (eg FABBL or SQBLA) are mainly based on producer protocols and conformance with these is assumed to address the risks to food safety. The schemes do not fully meet the guidelines for international trade, as producers are not required to evaluate the risks to food safety using HACCP or equivalent. There are plans, however, to introduce HACCP type assessments to the Assured Produce Scheme (fresh produce).
- ❑ The European beef and veal schemes evaluated (eg VPC and Ekro) generally differed from those in the UK in that HACCP, or equivalent, risk assessment and the link between safety and quality were more evident. The European schemes also differ from UK schemes in terms of the main drivers for development. There is evidence of Government support for the development of farm assurance schemes (e.g. Denmark and Sweden) or alternatively, existing agricultural co-operatives have undertaken development of safety and quality marks for their members (e.g. France and Spain).
- ❑ The proposal by the European Commission to recast horizontal and vertical Directives on hygiene of food of plant and animal origin and the proposal to introduce systematic implementation of HACCP at all levels of the food chain, including primary production, will require all of these industry schemes to be revised. It appears that mainland European schemes are better placed to adapt to such legislative changes.

The UK British Retail Consortium scheme that is applied to suppliers from more than one country was also evaluated as an example of a system further up the supply chain. The main conclusions drawn from the operation of this scheme were as follows:

- ❑ This is a technical standard for suppliers to meet in order to supply retailers under the Retailer's own label. The majority of suppliers are involved in food processing and have a history of applying both ISO 9000 and HACCP (see Varzakas & Jukes 1997; Caswell & Henson 1997). It is therefore understandable that these aspects are included. The BRC is currently promoting their scheme as being the most appropriate European and global scheme for supplying food to retail outlets.
- ❑ European retailers generally believe that it is a legal imperative to audit supplier activities and their schemes even though there is a significant cost to this activity. However, they could see benefits coming from an internationally recognised safety and quality scheme, these included:
 - ❑ Assured (minimum) level of safety and quality and a leveling of standards across product groups. This could lead to an industry driven global standard or at least a consistent standard within the EU but would be dependent on harmonization of legislation and public inspection approaches.
 - ❑ A more consistent approach to managing food safety and quality and an opportunity to provide a level playing field in relation to these attributes. It would also remove the accusation of having dual standards. Uncertain of the use of this for quality as this varies according to customer needs and perceptions.
 - ❑ A reduction in costs of managing food safety and quality systems and better traceability along the chain and better communication with suppliers.
- ❑ They perceived the main disadvantages of an internationally recognised scheme to be:
 - ❑ A possible lack of flexibility that may manifest itself as a lack of customer choice (in terms of quality), reduced product differentiation and difficulties in revising 'best practice' guidelines. There may also be different 'best practice' standards operating in different countries that may affect implementation.

- ❑ Different countries may have specific requirements (for safety) which may make an international scheme difficult to implement.
- ❑ Possible language/interpretation difficulties.
- ❑ Concerns over who would own the scheme – this was discussed further and relates to the current politics and power bases within supply chains operating within Europe.

Australia and New Zealand have gone through a process of food safety legislation harmonization and are currently implementing changes. For example, in Australia there is a debate as to whether HACCP should be applied down to the primary producer level. Two schemes were evaluated as being indicative of food safety management in the region:

- ❑ CattleCare is one example of a group of on farm assurance schemes (others include flock care, grain care etc) that address food safety only. Although HACCP is addressed, this is done in a similar way to the UK schemes where conformance with production protocols is assumed to reduce risks to food safety breakdowns. This group of schemes does benefit from having common modules and the opportunity for a whole farm assessment as opposed to individual enterprise assessments. Common modules include physical and chemical contamination but microbiological contamination is not addressed separately. Should on farm HACCP be implemented in Australia, these schemes will need to be modified, perhaps with the introduction of a HACCP guide for on farm use and on farm training in risk assessment.
- ❑ SQF 2000 has been developed to address food quality as well as food safety for a range of food products at all stages in the supply chain. It also differs from other schemes evaluated in that there is a requirement for individual business risk assessment to be carried out by trained and competent practitioners. The initial assessment of a business aims to assess whether the HACCP system in place is capable of controlling the risks specific to that business (technical assessment), subsequent surveillance is to check whether the internal audit system is operating effectively. In other words, the scheme fully meets the intended legislation in Australia and the international guidelines outlined in this paper. Producers, suppliers, retailers and consumers are already experiencing the value of this scheme over 12 countries around the world. The SQF Quality Code has recently introduced SQF1000 for those supplying existing food operators with SQF2000 in place. This is a simplified safety programme that is designed to meet the existing HACCP plan of the SQF2000 business.

Summary

This paper has explored the concept of common food safety standards for international trade and the adoption of these into industry safety management schemes. The Australian experience, as a result of harmonizing food laws, provides a good model of what may be achieved when there is a common legal framework and a desire to access other markets. In order for such an approach to spread globally, there is a need to agree international food safety standards through the activities of the WTO and Codex regional committees. Thereafter, industry led schemes should seek to demonstrate these standards. Moreover, by linking safety management along the supply chain (as in the SQF1000 & 2000 Codes) an integrated approach to safety may be developed. This would then lead to co-recognition of schemes that meet these common standards and would facilitate some schemes (such as the SQF 2000 scheme) becoming fully international. I would welcome your views of the model proposed in this paper in relation to the development of safe quality systems for the export (and home consumption) of beef produced in Uruguay.

References

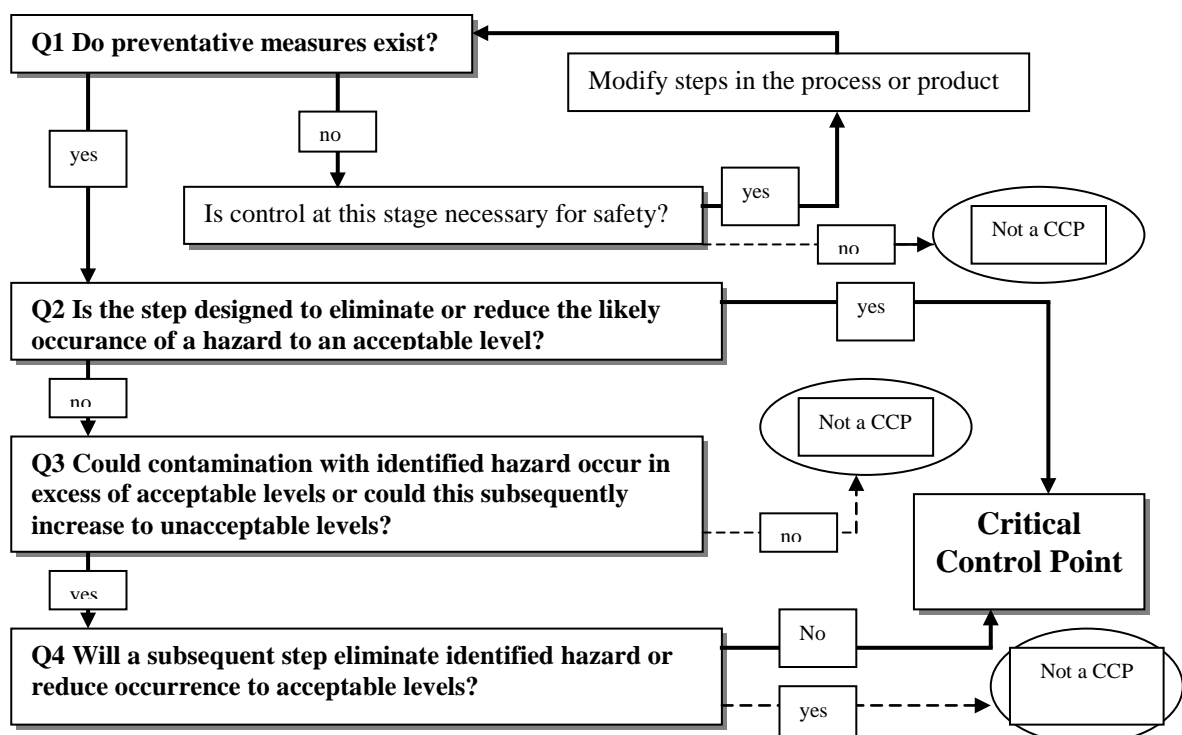
1. **ANZFA (1999)** Australia New Zealand Food Authority Annual Report 1998-99. Commonwealth of Australia, Canberra
2. **Baines R.N. (1999)** Environmental & Animal Safety Dimensions to Developing Food Safety & Quality Assurance Initiatives in the United Kingdom. Market Rights and Equity: Food and Agriculture Standards in a Shrinking World. Institute for Food & Agricultural Standards. Michigan State University.
3. **Baines R.N. , Davies W.P & Ryan P [2000b]** Reducing Risks in the Agri-Food Supply Chain – Co-Recognition of Food Safety Systems or a Single Global Scheme. X IAMA World Food Congress, Chicago.
4. **Baines R.N., Davies W.P. (2000)** Meeting Environmental and Animal Welfare Requirements through On-Farm Food Safety Assurance & the Implications for International Trade X IAMA World Food Congress, Chicago.
5. **Baines R.N. & Davies W.P. (1999)** Building Trust through Farm Assurance. IAMA World Food Congress, Florence, Italy
6. **Baines R.N. & Davies W.P [1998]** Quality Assurance in International Food Supply. In G.W. Ziggers, J.H. Trienekens & P.J.P. Zuurbier [Eds] 3rd International Conference on Chain Management in the Agribusiness and the Food Industry. Wageningen, Netherlands pp213-223
7. **Baines R.N. & Davies W.P [1997]** Food Quality Assurance, Public Perceptions and International Benchmarks. In R.J. Loader, S.J. Henson and W.B. Trail [Eds.] Globalisation of the Food Industry: Policy Implications, University of Reading pp109-124
8. **Baines R.N., Dee T., Manley W. and Smith G. (1999)** Evaluation of Environmental Conditions in Quality Assurance Schemes for Food Production. Department of the Environment, Transport and Regions (contract ref CR218, in press)
9. **Buncic S (2000)** Developments in Food Safety in the Meat Chain. Langford Food Industry Conference, University of Bristol, UK.
10. **Busch L., Bingen J., Harris C., & Reardon T. (Eds) (2000)** Market Rights and Equity: Food and Agriculture Standards in a Shrinking World. Institute for Food & Agricultural Standards. Michigan State University. January 2000.
11. **Caswell J.A and Henson S.J. [1997]** Interaction of Private and Public Food Quality Control Systems in Global Markets. In R.J. Loader, S.J. Henson and W.B. Trail [Eds.] Globalisation of the Food Industry: Policy Implications, University of Reading pp 217-34
12. **Codex (2000)** The Codex Alimentarius Commission and the FAO/WHO Food Standards Programme. ftp://ftp.fao.org/codex/standard/fh_basic.pdf
13. **COM(99)719** White Paper on Food Safety. Adopted January 2000
<http://www.europa.eu.int/comm/dg24/library/press/press37_en.html> 9Accessed 10-2-00)
14. **Competition Commission (2000)** A Summary of Supermarkets. A Report on the Supply of Groceries from Multiple Stores in the United Kingdom.
<<http://www.competition-commission.gov.uk/446.htm>> (Accessed 10-11-2000)
15. **FSIS [1997]** Food Safety & Inspection Service - Current Initiatives. USDA Information Service. United States Department of Agriculture. Washington
16. **Howells G.G., Bradgate J.R. & Griffiths S.M. [1990]** Food Safety Act 1990. Blackstone Press Ltd. London.
17. **MLC (2000) New Horizons The Global Meat Market to 2010.** Meat & Livestock Commission, Milton Keynes, UK
18. **MLC (1998)** Making Money Out of Beef. Meat & Livestock Commission, Milton Keynes, UK
19. **Varzakas T. and Jukes D.J. [1997]** The Globalization of Food Regulation and Quality: A Study of the Greek Food Market. In R.J. Loader, S.J. Henson and W.B. Trail [Eds.] Globalisation of the Food Industry: Policy Implications, University of Reading. pp253-71

Annex 1a Principles & Application of the HACCP System

(Adapted from Codex Alimentarius Commission – Food Hygiene Guidelines see Codex 2000)

HACCP Principle		HACCP Application
1	Conduct a hazard analysis	<ol style="list-style-type: none"> 1. Assemble HACCP team with expertise in product and processes 2. Describe product 3. Identify intended use 4. Construct flow diagram 5. Confirm flow diagram against process in operation (or planned process) 6. List all potential hazards associated with each step and consider any measures to control identified hazards
2	Determine Critical Control Points (CCP's)	7. Determine CCP's – see decision tree below
3	Establish critical limit(s)	8. Establish critical limits and tolerance levels. Determine at what point critical limit is exceeded based on known limits or risk assessment if unknown.
4	Establish system to monitor control of CCP(s)	9. Establish a monitoring system for CCP that is able to detect loss of control ie when critical limits are exceeded. Consider continuous monitoring and/or periodic audit.
5	Establish corrective action to be taken when monitoring indicates CCP(s) are not under control	10. Establish corrective actions that are able to deal with loss of control when it occurs and is capable of determining when CCP has been brought under control.
6	Establish procedures for verification to confirm that the HACCP system is working effectively.	11. Establish procedures for verification or audit that include review of HACCP system and records, records of deviations and actions taken in order to confirm that CCP's are kept under control
7	Establish documentation covering all procedures and records appropriate to these principles and their application	12. Documentation and record keeping should be appropriate to the nature and scale of the operation

Annex 1b : Decision Tree to Identify Critical Control Points



Annex 2

Schemes Assessed against Food Safety Management Template

(Adapted from SQF Quality Code, AGWEST Trade & Development, WA)

Ref	Food Safety Management Template						
1.1	Scheme Name	SQB	VPC	NV	CC	BRC	SQF
1.2	Scope of Scheme - Products Covered <i>[please tick]</i>	Beef Lamb	Beef	Veal	Beef	Retail	All
1.3	Number of Producer Members in Scheme -	8500	110	3	?	?	1310
1.4	Estimated % of domestic market covered by the Scheme	70% SCO	1% SPA	50% NL	? AUS	100% UK*	<1% Global*
1.5	Purpose of Scheme - has the Scheme been set up to provide evidence: Of compliance with food laws and regulation That the food product is safe That the food product is of a stated quality	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
	Attributes of Scheme						
2	Does your scheme contain the following or equivalent						
2.1	Reference to Codex Alimentarius Commission						✓
2.2	Reference to Hazard Analysis & Critical Control points (HACCP)			✓	✓	✓	✓
2.3	Reference to ISO Management Standards ISO9000 or ISO14000 series			✓	✓	✓	✓
3	Definitions, does scheme define the following :						
3.1	Type of business covered by scheme	✓	✓	✓	✓	✓	✓
3.2	HACCP			✓	✓	✓	✓
3.3	Procedures for applying HACCP			✓		✓	✓
3.4	A plan for HACCP			✓		✓	✓
3.5	Training in HACCP or other risk assessment procedures			✓	✓	✓	✓
3.6	Skilled HACCP practitioner	✓		✓		✓	✓
4.1	Quality Scheme – Commitment						
4.1.1	Is owner/Director/Manager of business required to make a commitment to quality/safety in a policy statement and is this communicated to employees and consumers	✓	✓	✓	✓	✓	✓
4.1.2	Is business required to identify who has operational responsibility for quality/safety	✓	✓	✓	✓	✓	✓
4.1.3	Is there a training requirement for employees with operational control eg HACCP training or legal training		✓	✓		✓	✓
4.2	Quality Scheme – Suppliers						
4.2.1	Is there a requirement to document the specifications of purchased products which may affect food safety	✓	✓	✓	✓	✓	✓
4.2.2	Is there a requirement to record inspect of raw materials [inputs] in relation to safety And quality prior to use	✓	✓	✓		✓	✓
4.3	Quality Scheme – Control of Production						
4.3.1	Is HACCP, or a similar risk assessment, procedure applied to the production process and are records kept		✓	✓		✓	✓
4.3.2	Are procedures in place to take corrective action if HACCP identifies breakdown in safety/quality. Are records kept	✓	✓	✓		✓	✓
4.3.3	Are raw materials, intermediate and final products handled, stored and transported to minimise risks of food safety/quality breakdown. Is this documented.	✓	✓	✓		✓	✓
4.3.4	Is the business required to ensure that food products comply with food safety Regulations	✓	✓	✓		✓	✓
4.4	Quality Scheme – Inspection & Testing						
4.4.1	Is equipment used in the production process regularly calibrated to manufacturers specifications and records kept		✓	✓	✓	✓	✓
4.4.2	Are sub-standard raw materials and products removed from the process and final product.	✓	✓	✓		✓	✓
4.4.3	Are internal audits systematically carried out by suitably skilled staff		✓	✓		✓	✓
4.5	Quality Scheme – Document Control & Records						
4.5.1	Is there a requirement to maintain a list of documents that describe the safety/quality scheme	✓	✓	✓	✓	✓	✓
4.5.2	Is there a requirement to maintain records that demonstrate that the production process, inspection and testing have been carried out according to the HACCP, or similar plan.		✓	✓	✓	✓	✓
4.6	Quality Scheme – Product identification & Traceability [Tracking]						
4.6.1	Is the final product identified in such a way that it may be recalled if necessary, are records kept of identification and destination of product.	✓	✓	✓	✓	✓	✓
4.7	External Audit, inspection or verification						
4.7.1	Is the safety/quality scheme subject to external inspection by the purchaser	✓		✓		✓	✓
4.7.2	Is the safety/quality scheme subject to external inspection by an independent appointed body	✓		✓	✓	Some	✓
<p>Comments – SQB = Scottish Quality Beef & Lamb Association; VPC = Vadella dels Pirineus Catalans; NV = Navobi Ekro Milkfed Veal ; CC = Cattle Care: BRC = Technical standards for suppliers of food products into member retailer chains under their own labels. – BRC - British Retail Consortium; SQF 2000 = Scheme for range of food products that operates in several countries;; SQF - Safe Quality Food.</p>							