INTERNATIONAL TRADE AND MARKETING OF ANIMAL COMMODITIES AND PRODUCTS

Assuring the biological safety of animal production (value) chains

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The safety of value chains need to be maintained in respect of both food safety and spread on animal diseases. Historically these two issues have been considered separately but, as explained in Sub-module 2, there is increasing realization that integrating these two requirements is vital if international trade is to be better facilitated and greater efficiency achieved (Thomson et al., 2013b).

Consumers in the developed world especially are suspicious – mistrustful even – of the safety of the food they eat and especially that derived from animals as a result of regular food safety scares. The BSE crisis of the 1980-90s gave direct rise to present traceability requirements (see below) and so it is increasingly important to be able to ensure 'good practice' and compliance with standards right across the value chain, i.e. from animals on farms or in the field (for livestock raised in extensive systems and for wildlife products), through slaughter and processing to the finished, packaged product. Consumers in high value markets have to be assured on these matters and also on issues such as observance of animal rights and fair labour practices.
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TRACEABILITY REQUIREMENTS FOR FOODSTUFFS DERIVED FROM ANIMALS

‘Traceability’ of food commodities has become an increasingly important issue in human food safety in the last 20 years and is now a basic requirement for accessing high value markets for livestock products. By ‘traceability’ is meant the capacity to trace back to its source within a short period of time the origin of any problem associated with a food product. So, for example, some retail organisations demand that any abnormality identified in a product they are selling can be traced back to its origin within 4 hours irrespective of whether the supplier is local or in a distant country. Although traceability is primarily a human food safety issue it can and should also be applied for tracking animal movement and associated disease spread. Thus, improving the ability to identify and record animal movement through the marketing chain can be used for animal disease control purposes and this is increasingly being done. Institution of mandatory country-of-origin labeling (COOL) and pre-occupation with bio-terrorism in the USA have added both momentum and complexity to the traceability issue. Ideally food safety & tracking the spread animal disease need to be integrated as far as possible.

The practical importance of traceability for southern African countries has recently been demonstrated by the EC suspending the long-established importation of beef from Botswana into the EU because, apparently among other factors, Botswana’s traceability system was found to be inadequate by an inspection team of the EC’s Food and Veterinary Office conducted in early 2011 (FVO – http://ec.europa.eu/food/fvo/ir-search_en.cfm). It was initially estimated by Botswana’s official veterinary service that correction of this problem would require at least 6 months (that period has already extended to more than a year). The practical implication is that the small profit which the Botswana Meat Commission projected for 2011 was transformed into a significant loss.

Pre-occupation with traceability had its origin in the BSE (bovine spongiform encephalopathy – mad cow disease) crisis which afflicted the United Kingdom in the early and mid-1980s. Since then several other food crises, in Europe particularly (e.g. salmonella contamination of egg products, high levels of dioxin in food products), have reinforced the need for traceability. For that reason the EU has been at the fore-front of this development.

It is important to remember that traceability on its own does not result in greater food safety or better animal disease control: for that to occur it needs to be associated with quality assurance that imposes procedures and standards that are audited to ensure compliance. Ultimately, failure to comply with laid down procedures and standards that result in events which the system is designed to prevent should apportion liability for the undesirable event having occurred. Interestingly, by WTO convention, the government of the exporting country is held liable for such untoward events and not the company concerned. The idea is that governments of exporting countries need to impose systems which preclude dangerous exports being possible.
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**Characteristics of traceability systems**

Ideally, traceability systems should be able to both ‘track forward’ and ‘trace back’ through the production chain, i.e. covering all processes from the animals in the locality of primary production to the final retail outlet. Furthermore, in some countries (e.g. those of the EU) issues related to traceability need to be reflected in product labeling. Within food industries it is conventional for each link in the production chain to collect and store data associated with a product for “two steps back and two steps forward”. In this way, although there is an element of redundancy, information for the entire production chain will be available.

Traceability systems are defined by three features:

- **Breadth** – the amount of information recorded in the system;
- **Depth** – how far forward and backward traceability is maintained;
- **Precision** – the ability of the system to pinpoint a problem.

The system adopted is usually a trade off between these features of the system and the costs and benefits because traceability systems are expensive. More difficult to define is where the benefits lie. Usually there are both public and private benefits and for that reason the costs are usually shared between the public and private sectors.

It is important to understand that although traceability systems are designed to cover food safety and animal disease issues, the systems are usually intended to be generic, i.e. enabling a wide range of potential problems to be tracked and traced, including stock theft.

**Animal identification**

Chapters 4.1 (General principles of identification and traceability of live animals) and 4.2 (Design and implementation of identification systems to achieve animal traceability) in the OIE’s TAHC ([www.oie.int](http://www.oie.int)) provide an outline of the purpose, implementation and legal framework of animal identification which is the foundation of traceability in relation to animal commodities and products.

Whether individual animals really need, in a scientific sense, to be individually identified for effective traceability is a moot point. Nevertheless, because BSE was the precipitating issue (its long incubation period means that animals and the feed they have been exposed to need to be traceable over many years) it has become accepted generally that bovine animals need to be individually identified. In many developed countries this is now a legal requirement (e.g. EU, Japan, Australia). For other large animals too (e.g. sheep & pigs) this is increasingly required. It is obvious that for food safety and animal health purposes, groups of animals which have been managed as a unit (e.g. chickens in a broiler system) should not require individual identification because data associated with one animal in the flock will not differ significantly from any other so far as food safety or animal disease considerations are concerned. However, where large extensive raising systems exist, individual identification becomes an expense that is difficult to justify on economic
grounds. This is a problem faced by many countries in southern Africa that seek to increase trade performance in animal commodities and products.

Although traceability and animal identification in many countries have been instituted through legislation as a public good, food companies have increasingly exploited the requirement as a means to improve differentiation of their products from similar products within a given market, i.e. as a marketing tool. Once this occurs it means that the driver becomes economic considerations based on perceptions of consumers. This may have little to do with scientifically defensible requirements.

**Methods used for animal identification**

Animal branding with hot irons is a very old method of animal identification although best suited for identification on a herd basis. Combined with ear notching, branding can be effective for on-farm identification of individual cattle but because this system can be adulterated it is not suitable for unambiguous animal identification.

Effective ear tagging systems have been developed that are difficult to adulterate; they can be simply numbering systems. Some incorporate bar-codes or even make use of electronic systems. Micro-chip technology involving bar-codes or inserting micro-chips that emit radio-frequency signals from the tag (or from chips implanted under the skin of an animal) is increasingly used for animal identification. Namibia is the only country in southern Africa that currently has a system based on such a system; double ear tags with radio transmitters and visible bar codes are the basis of the system (ref). Radio-tracking based on radio-signal emission of ruminal boluses is used in a number of countries including, until recently, Botswana. However, recently Botswana has decided to switch to a system similar to that used in Namibia.

Obviously, it is not only the identification of animals which is important: without accompanying, meticulously maintained, computerized data-bases and recording systems, animal identification becomes a pointless exercise. To institute such systems on a country-wide basis in developing countries is not only expensive but is logistically very difficult (FAO, 2005).


**Tracing and tracking systems for animal products**

Once animals are slaughtered in an abattoir and the carcasses cut up, tracing of individual meat cuts becomes a complicated issue, particularly if further processing is involved (sausage production exemplifies the problem). The same applies to milk delivered to dairies. However, bar-code systems have been developed to enable tracing within such systems to occur efficiently. A number of commercial companies specialize in developing and adapting these systems to particular production chains for fresh produce.

A particular problem, especially when it comes to meat products, is to ensure that the meat is actually beef or mutton and has not been substituted by meat sourced from other species. This has happened in the past
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and therefore importing companies and countries are careful to check on this. Systems based on DNA technology are useful in this context but, of course, are expensive and technically complex.

**Traceability in southern Africa**

Some southern African countries have instituted mandatory identification systems for individual cattle, e.g. Botswana and Namibia. In both instances financial and practical assistance was supplied by the EU and other donors. It has been relatively easy for these countries to do this because, apart from donor assistance, they had established access to EU beef markets as well as integrated production and marketing systems specifically developed for the EU market (originally through the Lomé Agreement and subsequently the Cotonou Agreement). For other sub-Saharan African countries developing identification systems required to establish access to high value markets presents a serious challenge. Whether mandatory systems that cover all cattle in the country concerned makes sense in this situation is doubtful. On the other hand, there are a number of ways in which production chain-specific traceability could be instituted which have the advantage of being cheaper, easier to manage and without the disadvantage of involving livestock production that is not part of that particular production chain. This requires careful consideration and it is currently difficult to predict how this issue will evolve.

Because of the pervasive problem of stock theft, the animal identification systems of some countries are designed to assist in tracing stolen cattle as well as provide an aid to traceability. This applies in the case of South Africa, for example, where the relevant act (Act 6 of 2002: Animal Identification Act) was specifically intended to assist in management of stock theft. The problem is that, as it stands, the Act is not ideal for traceability purposes because the registration of owners does not necessarily reflect the location of that owners’ animals and therefore is not efficient in tracing animal movement.

**INTEGRATION OF FOOD SAFETY AND ANIMAL DISEASE MANAGEMENT**

A subject of current debate is whether integrated biological risk management systems for food safety and control of animal pathogens spread through traded commodities and products would facilitate expansion of international trade by making the current fragmented systems simpler, more effective, less costly and easier to audit and certify. Furthermore, because food manufacturing is increasingly complex and typically involves a number of enterprises along involved production/value chains, it is logical that risk management needs to be applied at that level. The practicality of such an approach for managing animal disease threats has been advocated by recent provision of a guideline by the Food and Agriculture Organisation (FAO, 2011). (http://www.fao.org/docrep/014/i2198e/i2198e00.htm)

Introduction of integrated sanitary risk management along value chains would be beneficial to rural development in southern Africa. Such an approach is technically relatively straight-forward through integrating the steps and principles of HACCP (hazard analysis, critical control points) with the concept of CBT. Apart from providing a simpler and more auditable alternative to geographically-based sanitary
control, the alternative would obviate some of the unintended but unfortunate socio-economic and environmental consequences of the current system.

Neither CBT nor HACCP has an officially or widely recognized definition although the 5 preliminary steps and 7 basic ‘principles’ of HAACP are readily available on various sites via the internet (e.g. http://www.icd-online.org/an/html/courses/haccp.html). HACCP is, according to the World Health Organisation (WHO), founded on Good Hygiene Practice and Good Manufacturing Practice (http://www.ec.europa.eu.food/training/good_hygiene_practice). Good Farming Practice (e.g. GlobalGAP) is, or should be, an equally important foundation.

It is axiomatic that all proven risk amelioration methodologies could potentially be employed in the management of value chains to ensure sanitary safety, including in combination. Essentially, the product and the processes involved in its production, together with cost-efficacy of sanitary control measures, determine the most appropriate method(s) because the weaknesses of end-product certification for biological products are well recognized (see 3.3). As previously indicated, international standards for food safety are based on the process of production but the sanitary standards applied in respect of TADs in animal commodities and products are generally not, despite the existence of Article 4 of the SPS Agreement. For that reason, a case can be made for incorporation of alternatives into international standards dealing with TADs, recognizing that the alternatives must be at least as technically sound as existing standards. The objective is to provide effective mechanisms to obviate serious adverse consequences resulting from single-option approaches.

There are many definitions for value chains, to some extent dependent on whether they are viewed from a narrow (i.e. within a particular enterprise) or broader perspective. From the broader perspective, adopted for this discussion, value chains constitute the complex range of activities implemented by various actors (primary producers, processors, traders and service providers) to transform raw material via a production chain to the saleable final product (http://www.valuechain4poor.pbworks.com, modified; FAO, 2011).

As originally envisaged, CBT was aimed primarily at identification of animal commodities that are inherently ‘safe’ from a sanitary perspective (Thomson et al., 2004). The best example is milk derived from cows suffering from BSE; scientific evidence indicates that the BSE agent is not present in milk of diseased cows. Likewise, deboned beef from which visible lymph nodes have been removed is considered to present a ‘very low’ risk of transmitting BSE, FMD and some other infectious agents (Thomson et al., 2009; OIE, 2011). However, it was equally evident that further processing (e.g. simple cooking) would further reduce the probability of products being able to transmit infectious agents (e.g. FMD viruses or Salmonella spp.). Consequently the nature of the final product defines the sanitary trade risk (as long as it is produced according to an accepted protocol).

In publications on the application of CBT as a means of providing alternatives to geographic risk management standards associated with trade in commodities and products of animal origin, the similarity in concept and principle, and therefore potential for integration, of HACCP and CBT methodologies, has not been identified. However, even a superficial examination of their similarities/dissimilarities suggests
remarkable overlap. Both HACCP and CBT are essentially based on (1) identification of the hazards associated with a particular commodity or product, (2) identification/selection of appropriate risk mitigation measures (where potentially a variety are available), (3) their application and (4) certification that these mitigation measures have been effectively applied so that the traded commodity or product can be accepted as having appropriate (i.e. acceptably low) risk by the importer as well as the competent authority of the importing country.

HACCP has a crucial advantage when it comes to implementing such processes provided by the adoption of critical control points (CCPs) and compliance with critical limits for those points. Focusing control on CCPs with associated limits and recording provides a basis for practical auditing and certification.

The potential for integration of HACCP and CBT approaches for management of both food safety- and animal disease hazard assurance therefore exists and is being proposed as a way forward that would assist countries in southern and eastern Africa obtain better access to international markets.

AUDITING AND CERTIFICATION IN SUPPORT OF TRADE IN COMMODITIES AND PRODUCTS DERIVED FROM ANIMALS

Certification that assures the importer that foodstuffs derived from animals or that contain components derived from animals are ‘safe’ for human consumption and also in respect of their potential for spreading dangerous animal diseases is fundamental to international trade. The international standards pertaining to these aspects – food safety and animal disease risk management – have been explained above (Sub-module 2).

It is important to appreciate that in terms of the WTO’s SPS Agreement, ultimate responsibility for ensuring the safety of exported products lies with the government of the exporting country (not the exporting company). Therefore, if an imported product results in human or animal disease the government of the exporting country can be held responsible by the government of the importing country. This ensures that the governments of exporting countries have systems in place that provide credible control and accompanying certification procedures that are reliable.

One of the problems facing developing countries trying to access high value markets for livestock commodities and products is that certificates supplied to certify that specified standards have been met sometimes lack credibility as far as importers are concerned. In other words, export certification may not be accepted as trustworthy. Unfortunately, there are examples of unreliable certification occurring although, of course, such events are not restricted to developing countries. The problem is nevertheless more acute for developing countries that for those in the first world.

There are essentially 3 forms of certification: (1) first party certification where the producer/supplier certifies the product or production system, (2) second party certification where the buyer approves or certifies the product or production system and (3) third party certification where a person or organization independent of both the producer and the importer provides hopefully unbiased certification. In international agribusiness
there is an increasing trend towards third party certification provided by specialized companies. This is not used in the animal health world currently because the ISSB concerned recommends that such certification be provided by the government or ‘competent authority’ of the exporting country. However, nothing prevents the importer or exporter using an independent certification body additionally. However, that implies redundancy and additional expense.

Powerful trading blocks or nations frequently enforce second party certification or at least a form of it based on physical inspection and approval of export systems and facilities in supplier countries. So, for example, entities in Botswana and Namibia that export beef to the EU are subject to regular inspection by the EU’s Food and Veterinary Office (FVO – part of the European Commission’s DG Sanco).

It is a universally accepted principle that certifying bodies and their employees need to:

- be technically competent to provide the certification required,
- have access to all the information and data necessary to perform certification adequately, and
- be independent, i.e. are not under the influence of the seller, buyer/importer or the government of the country concerned.

In the animal health sphere the adoption of third party certification has so far been limited because, as explained above (Sub-module 2), the OIE recommends that such certification is provided by the government of the exporting country or an appointed agent/body known as the ‘competent authority’. Furthermore, nearly all certification in relation to animal health is based on assurance that important TADs do not occur in the country, zone from which the commodity or product is derived. This creates a problem of principle because the government is generally responsible for maintaining freedom of countries or zones from specified TADs. Therefore, in such cases, the government or its agent certifies its own performance in maintenance of disease freedom within the country as a whole or in respect of one or more zones.

The OIE has a major initiative to improve the standard of veterinary services in the developing world with the title “Performance, Vision and Strategy” (PVS). The two thrusts of this initiative are to provide support and a mechanism for evaluation of veterinary services of OIE-member countries. One of the outcomes of this will be to increase the credibility of quality assurance and certification provided by countries who are members of OIE. However, this process is, by its nature is long term and also does not overcome the issue of independence required for reliable certification.

An analysis of the current situation and possibilities for improving it has been published (Thomson et al., 2006). That paper therefore forms the basis of this module.