

Meeting the requirements of importing countries: practice and policy for on-farm approaches to food safety

P.J. Dagg, R.J. Butler, J.G. Murray & R.R. Biddle

Australian Government Department of Agriculture, Fisheries and Forestry, G.P.O. Box 858, Canberra, ACT 2601, Australia

Summary

In light of the increasing consumer demand for safe, high-quality food and recent public health concerns about food-borne illness, governments and agricultural industries are under pressure to provide comprehensive food safety policies and programmes consistent with international best practice. Countries that export food commodities derived from livestock must meet both the requirements of the importing country and domestic standards.

It is internationally accepted that end-product quality control, and similar methods aimed at ensuring food safety, cannot adequately ensure the safety of the final product. To achieve an acceptable level of food safety, governments and the agricultural industry must work collaboratively to provide quality assurance systems, based on sound risk management principles, throughout the food supply chain. Quality assurance systems on livestock farms, as in other parts of the food supply chain, should address food safety using hazard analysis critical control point principles. These systems should target areas including biosecurity, disease monitoring and reporting, feedstuff safety, the safe use of agricultural and veterinary chemicals, the control of potential food-borne pathogens and traceability. They should also be supported by accredited training programmes, which award certification on completion, and auditing programmes to ensure that both local and internationally recognised guidelines and standards continue to be met. This paper discusses the development of policies for on-farm food safety measures and their practical implementation in the context of quality assurance programmes, using the Australian beef industry as a case study.

Keywords

Australia – Beef industry – Food safety – Livestock – Policy development – Quality assurance.

Introduction

As the global population continues to grow, so too does the value of the world food trade. From 1950 to the year 2000, the global population increased by more than 3.5 billion (to approximately six billion). According to recent predictions, the world population is estimated to rise by a further three billion to reach nine billion by the year 2050 (24) (Fig. 1).

Nearly all of this population growth is expected to occur in developing regions, including Africa, Asia and Latin America. The populations of industrialised countries are not expected to increase as dramatically and may, in fact, remain static. In some industrialised nations, the population is expected to decrease (8).

World population growth is also reflected in an increasing volume of food of animal origin in world trade. For example, world beef exports increased from

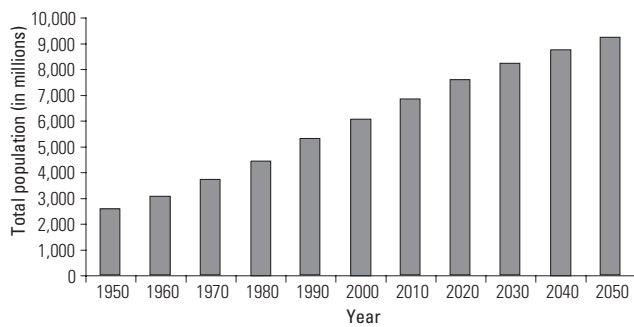


Fig. 1

The total midyear population for the world: 1950-2050 (in millions)

Source: United States Census Bureau website (24)

5,147,200 tonnes of carcass weight equivalent in 1998 to 6,060,800 tonnes of carcass weight equivalent in 2004 (11).

Owing to the increasing globalisation of trade and the industrialisation of food processing, consumers are potentially exposed to a greater number of food safety hazards than in previous generations. The reduction of trade barriers has improved the availability and security of international food markets. However, this may also contribute to the possibility of widespread and rapid dissemination of illness associated with the consumption of contaminated food (10).

Episodes of food-borne illness due to pathogenic organisms such as *Escherichia coli* O157, *Campylobacter jejuni* and *Listeria monocytogenes*, as well as international publicity about other disease issues, including bovine spongiform encephalopathy, antimicrobial resistance and dioxin contamination, have increased consumer food safety concerns over the past few decades. As a result, consumers are increasingly demanding safe, high-quality food from their governments and industries.

Since the international food trade is increasingly being regulated by disease control requirements, rather than tariffs and quotas, government authorities and agricultural and health organisations and industries are under increasing pressure to deliver comprehensive, integrated food safety policies, aimed at protecting public health and welfare (10). This applies to all aspects of the world food trade, including imported and exported foods, as well as food supply for the domestic market.

Food-borne illnesses cause major burdens on national economies and may interrupt international trade (19). As a result, many countries have undertaken fundamental reviews of national food safety regulations, generally with a view to optimising controls and restoring public confidence in food safety and security. A result of such reviews has been the establishment of new national food safety authorities and fundamental changes in the ways

that food safety policy is developed and implemented. For example, identifying the importance of pathogens such as *E. coli* O157:H7 and *Salmonella* Enteritidis in the United States of America (USA) between 1973 and 1988 was the catalyst for dramatic legislative changes in meat inspection, including mandatory hazard analysis critical control point (HACCP) programmes (25). An *E. coli* contamination of salami-style fermented meat produced in South Australia in 1995 was responsible for at least 150 cases of food-borne illness, including a number of cases of haemolytic uraemic syndrome and one death (13). This led to the Australian Government requesting the then Australia-New Zealand Food Authority (now known as Food Standards Australia New Zealand or FSANZ) to develop nationally uniform food safety standards.

Another result of these reviews was the realisation that relying on traditional end-product quality control methods was no longer adequate to ensure high standards of food quality and safety (9). Accompanying the organisational changes described above has been a move away from these traditional methods and end-product inspections towards preventative approaches using sound, science-based, risk management principles. Such risk management approaches aim to reduce the level of food-borne illness by:

- developing risk-based, sustainable, integrated food safety systems
- implementing science-based measures along the entire food production chain to prevent exposure to unacceptable levels of microbiological agents and chemicals in food
- assessment and management of food-borne risks, complemented by effective communication to address and allay consumer concerns (28).

However, in general, it has taken longer for these food-production-chain, risk management approaches to be adopted by livestock farmers. To produce and supply a safe final product, all interested parties throughout the food supply chain must be involved, including those who produce, process and trade in foods derived from livestock (i.e. farmers, slaughterhouse operators, food processors, transport operators and distributors).

It is important that, at each stage of the food supply chain, the safety of the product (whether animal or food) is 'certified' to the next party in the process. Additionally, systems should be in place to allow accurate and timely traceability of animals or food, in case either traceforward (to permit the withdrawal of the product) or traceback (to characterise its source) is required. Governments have an important role in providing policy guidance on the most appropriate quality assurance systems, and ensuring their implementation is verified/audited, to aid compliance with

domestic requirements, as well as those of the importing country.

Policy development

The essential principles required to establish a policy framework to protect public health from food-borne risks include:

- developing a comprehensive, multidisciplinary approach to risk analysis, involving research organisations, agricultural and farming groups, governments, food industry bodies and community groups
- conducting independent, science-based risk assessments
- ensuring a consistent approach to the processes used throughout the entire production and supply chain
- complying with obligations under the Agreement on the Application of Sanitary and Phytosanitary Measures (the ‘SPS Agreement’) (31)
- consulting widely with all interested parties and ensuring transparency during decision-making and emergency planning and preparedness
- adequately identifying emerging risks and effectively co-ordinating the response
- ensuring effective risk communication
- overseeing emergency management and addressing emerging issues, such as the threat of bioterrorism.

On-farm quality systems for livestock should focus on food safety, using HACCP principles that target areas including:

- biosecurity
- disease monitoring and reporting
- safety of feed
- safe and responsible use of agricultural and veterinary chemicals
- minimising risk factors for potential food-borne pathogens
- traceability.

These systems should also be supported by national programmes such as:

- an accreditation/auditing programme
- registration of agricultural and veterinary chemicals
- quality assurance of prepared stockfeeds

- certification for intended purpose
- training.

In Australia, co-operative agreements exist between livestock industry representative organisations and the government at all levels. One example of this type of partnership is an organisation called ‘SAFEMEAT’ (please see more information at <http://www.safemeat.com.au/>). The primary role of SAFEMEAT is to promote and provide supervision for sound management systems with the aim of delivering safe and hygienic products to the marketplace. SAFEMEAT also seeks to ensure that effective emergency management strategies are in place and can be activated at appropriate times. The organisation has developed an incident response manual, which clearly defines roles and responsibilities in an emergency and promotes links between emergency management programmes, including the Australian Veterinary Emergency Plan (AUSVETPLAN) and state and territory government emergency response plans (22). SAFEMEAT members include the major red meat and livestock industry bodies and the Federal and state/territory government authorities. The terms of reference for the SAFEMEAT organisation are provided in Table I.

Table I
Terms of reference for the SAFEMEAT organisation, a partnership between the Australian Government and the Australian livestock industries

Terms of reference
To work with the objective of establishing world best practice in ensuring the safety of red meat products
To ensure that each red meat industry sector implements sound management systems to ensure safe and hygienic products are delivered to the marketplace
To ensure adequate and nationally consistent government standards and regulations on meat safety and hygiene
To ensure that effective crisis management strategies are put in place by the appropriate red meat industry sectors and, to this end, ensure that there is a fully integrated and effective communications network

Source: SAFEMEAT Partnership (22)

The Australian Stock Diseases Acts and related legislation regulate the control of livestock diseases, placing restrictions on the movement of diseased stock and specifying the exotic and serious endemic diseases which must be notified. This legislation gives certain powers to inspectors to enter premises where disease is suspected and allows certain actions to be taken with diseased stock, such as the power to quarantine.

The Trusted Information Sharing Network for Critical Infrastructure Protection (the ‘Network’) is a government/industry partnership that was established in 2003 under Australian national counter-terrorism arrangements. The role of the Network is to advise the

industries comprising the national critical infrastructure, including the agricultural and food chain industries, about potential threats and appropriate risk management strategies (3).

The Network has developed a National Food Chain Safety and Security Strategy which is aimed at continually improving Australian preparedness to respond to potential incidents of deliberate terrorism in the agriculture and food supply chain. The strategy focuses on increasing industry capacity to protect the domestic food supply.

Australia is one of the largest exporters of livestock products in the world (Fig. 2) and regularly supplies over 70 different countries. The Australian beef industry can therefore be used as a case study to explore the practical implementation of on-farm safety approaches to meet the requirements of the importing country, as well as the domestic market. Although the authors have highlighted the beef industry, the principles of this discussion apply to all livestock industries.

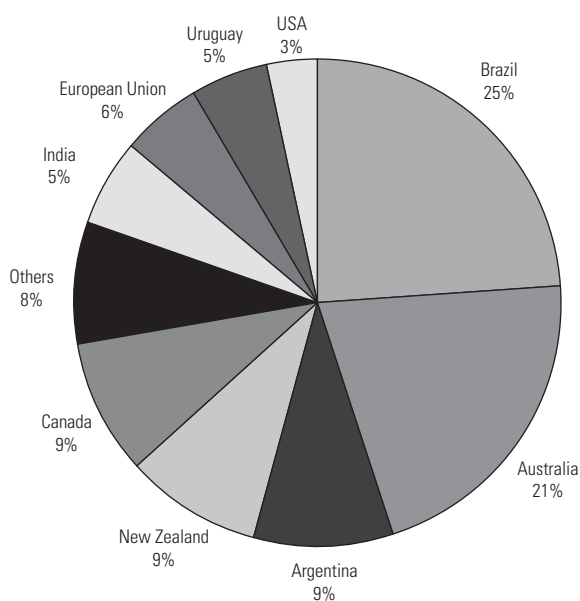


Fig. 2
World beef exports in 2004: percentages exported by exporting regions

Source: Food and Agriculture Organization (11)

Implementation

Australian on-farm beef quality assurance programmes

In Australia, a number of on-farm beef quality assurance programmes are operated and managed by livestock industry representative organisations, in partnership with the Federal Government and state and territory

governments. The major programmes which provide certification and verification to instil confidence in Australian beef are, as follows:

- the Livestock Production Assurance (LPA) programme
- the National Feedlot Accreditation Scheme (NFAS).

In addition to being supplemented by essential regulatory programmes on animal health, these quality assurance programmes are underpinned by the following supporting national programmes:

a) traceability programmes:

- national vendor declarations/Waybill (NVD/Waybill) and the electronic declaration programme
- property identification codes and a tailtag system
- the National Livestock Identification System (NLIS)
- the National Saleyard Quality Assurance (NSQA) programme

b) national programmes on chemicals and livestock feeds:

- the National Registration Scheme, administered by the Australian Pesticides and Veterinary Medicines Authority
- control of the use of agricultural and veterinary chemicals by state and territory governments
- Chemcert Australia (the national chemical certification programme for training chemical users)
- the National Residue Survey (NRS)
- targeted residue control programmes
- FeedSafe®
- the livestock fodder declarations programme.

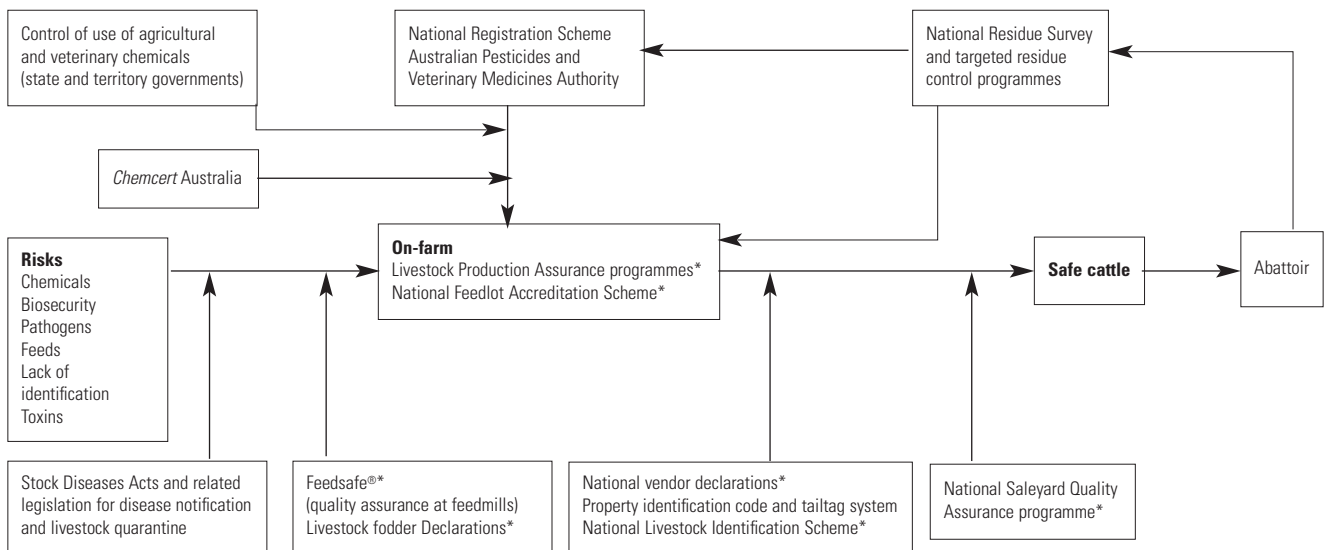
The relationships between these national regulatory and quality assurance programmes in the Australian beef industry are illustrated in Figure 3, and described below.

Quality assurance programmes

The Livestock Production Assurance programme

For detailed information on the LPA programme, see the Meat and Livestock Australia website (<http://www.mla.com.au/default.htm>) (Fig. 4).

The LPA programme was introduced in early 2004 and is an on-farm food safety certification programme that provides guidelines to help farmers declare the food safety status of their cattle. The LPA programme supports the NVD/Waybill programme, and provides assurances to purchasers about on-farm quality systems through the application of on-farm food safety guidelines. Participation in the LPA programme is voluntary; however, cattle buyers often require an LPA NVD/Waybill for purchased livestock. Farms must be LPA-accredited to purchase and supply an LPA NVD/Waybill for cattle.



*Systems that are audited for compliance with requirements

Fig. 3

A simplified schematic diagram of the links between livestock regulatory systems and quality assurance systems in Australia

Level 1: food safety

Level 1 of the LPA programme, food safety, provides confirmation of the information provided by farmers in vendor declarations. By mid-2005, approximately 111,000 farms had provisional accreditation under the LPA programme and approximately 34,000 farms had full accreditation (22). The elements with which farmers must comply to maintain their accreditation are listed in Table II.

Once a farm is accredited with Level 1 – food safety, it is subject to random audits by qualified third-party personnel, who have the appropriate industry knowledge and auditing experience to ensure compliance with the requirements and guidelines of the programme.

Level 2: quality assurance

Level 2 of the LPA programme, quality assurance, is a group of programmes that are specific to each species of livestock and have additional elements beyond the

requirements of Level 1. The Level 2 LPA quality assurance programme for the Australian beef industry is called ‘Cattlecare’. (Further information on the Cattlecare programme is available on the Ausmeat Limited website at: [http://www.ausmeat.com.au/programmes/cattlecare/.](http://www.ausmeat.com.au/programmes/cattlecare/))

Cattlecare was initiated by the Cattle Council of Australia and is based on the internationally recognised standards of ISO 9002 and HACCP. Cattlecare is a ‘whole-of-farm’ programme that ensures the products of accredited farms are based on the principles of quality assurance. Table III lists the requirements for Level 2 LPA – quality assurance.

The National Feedlot Accreditation Scheme

The NFAS, introduced in 1993, is a quality assurance programme for Australian feedlots and is mandatory for feedlots producing grain-fed beef for export markets. The NFAS is administered by Ausmeat Limited and overseen by the Feedlot Industry Accreditation Committee, comprising representatives from government and the industry. Approximately 97% of all Australian grain-fed beef for the domestic market (and 100% of exported grain-fed beef) is derived from NFAS-accredited feedlots (18).

To be accredited under the NFAS, a feedlot operator must:

- have documented procedures in place, specifically for the feedlot, that meet the requirements of the industry standards
- maintain records that these procedures have been adhered to for all cattle prepared at the feedlot
- undergo a third-party audit of these procedures, records and facilities at the feedlot.



Fig. 4

Symbol of the Livestock Production Assurance programme in Australia

Table II
Requirements of the Livestock Production Assurance programme: food safety (Level 1)

Requirement	Details
Property risk assessment	To ensure that livestock are not exposed to areas on farms that are contaminated with organochlorines or other persistent chemicals
Safe and responsible animal treatments	To ensure that livestock intended for human consumption do not contain unacceptable chemical residues and/or are not exposed to physical hazards
Stock foods, fodder crops, grain and pasture treatments	To ensure that livestock are not exposed to feeds containing unacceptable contamination, specifically any food containing prohibited animal products (this includes materials that are prohibited to be fed to ruminants as part of bovine spongiform encephalopathy risk reduction measures in Australia) and/or unacceptable chemical residues
Preparation for dispatch of livestock	To ensure that livestock to be transported are fit for the journey, they are not unduly stressed and contamination is minimised during on-farm assembly and transport to the destination
Livestock transactions and movements	To ensure that purchasers of livestock can assess the chemical residue or food safety status of the animals and the movement of livestock can be traced if required

Source: Meat and Livestock Australia (16)

Table III
Requirements of the Livestock Production Assurance programme: quality assurance (Level 2)

Requirement	Details
Chemical residues in soil	A risk assessment must be carried out for each farm to ensure that cattle do not graze land that might contain unacceptable levels of persistent chemicals
Staff training	Training of staff should ensure that employees are able to meet the 'Cattlecare' requirements and records of training must be kept
Stock identification record	All cattle should be clearly identified from birth
Transaction and movement records	Accurate records should be kept of purchases, sales and movements. The National Livestock Identification System is an integral part of identifying cattle and tracing their movements
Prevention of bruising and hide damage	Attention to yard design, construction and maintenance is required to minimise obstructions and harsh contact points liable to cause bruising or hide damage
Transport	Cattle truck interiors should be free of obstruction and have non-slip floors
Labelling and storage of chemicals	Managers need to ensure that only legally available and properly labelled chemicals are obtained and used. Accurate records should be maintained of all chemicals used and where and how they were disposed of
The safe use of chemicals	Managers need to ensure that directions for use for chemicals are followed and that all treated cattle are identified and withheld from sale until the withholding period or export slaughter interval (an export slaughter interval is the time which should elapse between administration of a veterinary chemical to animals and their slaughter for export) has elapsed. Any adverse reactions should be recorded and reported
Treatment records	These should ensure that treatments of stock are adequately recorded to enable traceback. Application of chemicals to pastures and crops should be recorded to ensure that quarantine periods are observed prior to grazing or harvesting
Stock feeds	Care is needed to ensure that purchased stock feeds do not contain unacceptable chemical contamination or prohibited ingredients
Internal check procedures	All operators should carry out regular checks to verify continuing compliance and take any corrective or preventive action which may be required

Source: Meat and Livestock Australia (17)

The NFAS is a self-regulatory system, based on compliance with the national standards outlined in the following codes of practice and reference documents:

- the national beef cattle feedlot environmental code of practice (15)
- the Australian model code of practice for the welfare of animals: cattle (5)
- the Australian Veterinary Association code of practice for the safe use of veterinary medicines on farms (7)
- the national guidelines for beef cattle feedlots in Australia (1)
- the AUSVETPLAN enterprise manual: feedlots (2).

The requirements of the NFAS are detailed in Table IV.

Traceability programmes

Farm-to-retail traceability permits both traceback (to identify the source of a product) and traceforward (to permit the withdrawal of a product). Traceability systems are becoming more important in ensuring the provision of safe food of acceptable quality for the marketplace (14). Traceability programmes may reduce the financial and social impact of a disease epidemic or contamination incident, due to the capability to accurately identify and

rapidly trace any products from an infected animal. One study has estimated that the overall economic loss for Australia from a foot and mouth disease outbreak would be between Aus\$ 2 billion and Aus\$ 13 billion (6). Rapid tracing and effective disease response measures can limit the scale and distribution of a disease outbreak and offer the prospect of significant cost savings.

National vendor declarations/Waybill and the electronic declaration programme

Producers use the NVD/Waybill or electronic declarations programme to disclose relevant information about the cattle that they are selling. Information declared on the NVD/Waybill includes the following:

- identification of the owner and property (farm)
- the history of the treatment of the cattle with hormonal growth promotants and veterinary chemicals
- the history of the feeding of the cattle with feeds that have been treated with chemicals.

Table V contains further details of the NVD/Waybill requirements.

Although participation in the NVD/Waybill programme is voluntary, it has been adopted by almost 100% of cattle farms, due to commercial requirements. Cattle buyers rely on NVD/Waybill for accurate information on the livestock purchased and abattoir operators rely on the information to ensure that only safe food enters the food chain. The NVD/Waybill scheme is underpinned by the LPA programmes and managed by SAFEMEAT. (Further information is available at <http://www.mla.com.au/default.htm>.)

Property identification codes and the tailtag system

Australian beef farms must adhere to the requirements of the property identification code tailtag system. This mandatory system has been in place since the 1960s and was instrumental in the successful eradication of bovine tuberculosis and brucellosis in Australia. Each farm or parcel of land is assigned a unique identification number, which is printed on adhesive tags that are attached to the base of the tail of each animal before sale from the farm. This allows identification of the farm of last residence for each animal, for the purposes of traceability.

The tailtag system is in the process of being replaced with electronic identification systems that provide permanent whole-of-life animal identification, based on the property identification code. (Further information on the property identification code and tailtag system can be found on the Australian SAFEMEAT website at: <http://www.safemeat.com.au/>.)

Table IV
Elements of the National Feedlot Accreditation Scheme

Element
Animal welfare
Environmental management
Stocking density
Stock identification systems
Livestock transactions and movements
Carcass quality, bruising and skin or hide damage
Cattle transportation
Safe and responsible chemical use
Cattle treatment records
Feedlot rations
Feed commodity control
Emergency response management
Persistent chemicals in soils
Obtaining and storing agricultural and veterinary chemicals
Paddock, crop and grain treatments
Training
Internal auditing and corrective action
Quality records
Document control

Source: SAFEMEAT Partnership (20)

Table V
Questions and declarations contained in the National Vendor Declarations/Waybill programme

Question
Have any of the cattle in this consignment ever in their lives been treated with a hormonal growth promotant?
Have these cattle been raised consistent with the rules of an independently audited quality assurance programme on the farm, the PIC of which is shown above?
Has the owner stated above owned these cattle since their birth?
In the past 60 days, have any of these cattle been fed by-product stockfeeds?
In the past six months, have any of these cattle been on a farm listed on the ERP database or placed under grazing restrictions because of chemical residues?
Are any of the cattle in this consignment still within a withholding period or export slaughter interval following treatment with any veterinary drugs or chemical?
In the past 60 days, have any of these cattle consumed any stockfeed that was still within a withholding period when harvested or first grazed?
In the past 42 days, were any of these cattle:
– grazed in an endosulfan spray risk area?
– fed fodders cut from an endosulfan spray drift risk area?
I [FULL NAME] [FULL ADDRESS] declare that I am the owner or the person responsible for the husbandry of the cattle and that all the information in Part A of this document is true and correct. I also declare that I have read and understood all the questions that I have answered, that I have read and understood the explanatory notes, and that, while under my control, the cattle were not fed restricted animal material (including meat and bone meal) in breach of state or territory legislation

PIC: Property Identification Code
 ERP: Extended Residues Program
 Source: SAFEMEAT Partnership (21)

The National Livestock Identification System

The NLIS was a voluntary system for the identification and tracing of cattle, and became mandatory in 2005. It is a permanent identification system that enables individual cattle to be tracked from the farm of birth to the place of slaughter, to improve food safety, product integrity and access to markets.

All farms in Australia that run cattle must be registered with the relevant state or territory department of agriculture and each farm is assigned a property identification code.

The NLIS uses radio frequency identification devices in the form of ear tags or rumen bolus/ear tag combinations to identify cattle. Cattle are tagged with a unique NLIS device before they leave their farm of birth. Cattle implanted with NLIS devices can be electronically identified as they move through the livestock chain. All movements and deaths of cattle must be recorded in the national NLIS database.

Details of the National Livestock Identification System can be found on the Australian Meat and Livestock website at: <http://www.mla.com.au/default.htm> (Fig. 5).

The National Saleyard Quality Assurance programme

The NSQA programme is owned and operated by national saleyard owners. In Australia, the majority of cattle are sold



Fig. 5
Symbol of the National Livestock Identification System in Australia

to the market through saleyards. The NSQA programme was developed to support the National Standard for the Construction and Operation of Australian Saleyards. This standard was developed with participation from all sectors of the industry. The NSQA programme is a transparent, independently auditable means of managing and assessing compliance with the standard.

National programmes on chemicals and livestock feeds

In Australia, on-farm quality assurance systems are supported by national programmes aimed at ensuring compliance with national and international requirements for chemicals and livestock feeds. These national programmes are managed and administered by regulatory bodies such as the Australian Pesticides and Veterinary Medicines Authority (APVMA), state and territory

governments, the Australian Government Department of Health and Ageing and FSANZ. These bodies and organisations are linked to ensure the overall co-ordination of activities and that livestock farmers do not operate in isolation.

The National Registration Scheme

The Australian Pesticides and Veterinary Medicines Authority is the Australian government statutory authority responsible for the assessment and registration of pesticides and veterinary medicines, and their regulation up to and including the point of retail sale. ('Pesticides and veterinary medicines' are also referred to as 'agricultural and veterinary chemicals'.) This body administers the National Registration Scheme for agricultural and veterinary chemicals in partnership with state and territory governments and with the active involvement of other Australian government agencies, such as the Australian Government Department of Health and Ageing and the Australian Government Department of Environment and Heritage.

In accord with domestic requirements and international guidelines (i.e. the Food and Agriculture Organization of the United Nations [FAO]/World Health Organization [WHO] Codex Alimentarius [Codex] Commission [CAC]), APVMA establishes maximum residue limits, as well as specifying export slaughter intervals.

A maximum residue limit is the highest concentration of the remainder of an agricultural and/or veterinary chemical permitted in food or animal feed. Maximum residue limits are monitored to ensure farmers comply with label 'withholding periods' when using chemicals (i.e. the amount of time that must be allowed to lapse between the use of the chemical and the sale or use of the animal or feed). Both APVMA and FSANZ work co-operatively to ensure that the use of chemical products and the level of any residues in food comply with the registered conditions of use.

An export slaughter interval is the time that should elapse between the administration of a veterinary chemical to an animal and its subsequent slaughter for export purposes. Export slaughter intervals may vary from withholding periods so as to manage the differences between maximum residue limits allowed in Australia and those allowed by trading partners. Export slaughter interval advice is particularly important for quality assurance schemes, and especially for producers completing NVDs as part of the whole-of-chain management of exported beef. Export slaughter intervals have been agreed to by the cattle industry and the registrant of the veterinary chemical.

In addition, APVMA operates a quality assurance programme which provides an effective reporting and

feedback system to the National Registration Scheme for agricultural and veterinary chemicals. The Adverse Experience Reporting Program (AERP) reports on unintended or unexpected effects of agricultural and veterinary chemicals on animals, people and the environment. In turn, APVMA conducts science-based risk analyses of received adverse experience reports to improve the responsible management of agricultural and veterinary chemicals throughout their life cycle. The aim of the AERP is to ensure that products on the market remain safe and effective, are of acceptable quality, are used in the best possible way, and that the instructions and warnings on labels are appropriate.

State/territory control of chemical use

Australian provincial state and territory governments regulate the use of agricultural and veterinary chemicals after sale at the point of retail. These regulations cover:

- basic training requirements for users
- licensing of commercial pest control operators and ground and aerial spray operators
- residue monitoring
- arrangements to enforce the safe use of chemicals, including the use of codes of practice, spraydrift guidelines and other user-awareness-raising initiatives.

State and territory regulations use a national model to regulate dangerous substances in the workplace. State and territory government agencies for primary industry, agriculture, health and the environment also advise on agricultural and veterinary chemical use and promote other means of controlling pests and diseases. They undertake research, training and education to manage the possible risks from agricultural and veterinary chemical use and improve the ways they are used.

Chemical use quality assurance

Nationally accredited veterinary chemical training programmes are run in Australia by agricultural and veterinary chemical training providers. The aim of these training programmes for farmers is to ensure the safe and effective use of chemicals in animals for food production.

For example, the National Farmers' Federation and the Rural Training Council of Australia established *Chemcert* Australia as a national training and accreditation programme, based on recognised national industry competencies. *Chemcert* Australia trains farm chemical users to meet all regulations and laws requiring the safe use of agricultural and veterinary chemicals, as well as their obligations under industry quality assurance programmes. (Information on *Chemcert* Australia is available at: <http://www.chemcert.org.au/index.shtm>.)

National Residue Survey

In partnership with various industries, the Australian Government Department of Agriculture, Fisheries and Forestry conducts the NRS, which randomly monitors chemical residues in raw food and fibre commodities. The participating industries, including the beef industry, pay for the operation of the survey. The NRS also surveys heavy metals and organochlorines, such as dichloro-diphenyl-trichloroethane (DDT), that could still be present in the environment as the result of past industry use. The general classes of chemicals, and some specific examples of chemicals included in the survey, are shown in Table VI.

The primary purpose of the NRS is to ensure that food commodities produced in Australia meet national and international residue requirements, to support access to key export and domestic markets for the participating industries. Traceback investigations are initiated when there are reasonable grounds to believe that any residue findings might have been the result of incorrect use of an agricultural or veterinary chemical.

The NRS conducts random residue and targeted monitoring and is involved in compliance and residue prevention projects. The NRS conducts random monitoring for the chemicals listed in Table VI, to collect data on the level of residues in agricultural and fisheries products. Its targeted monitoring, compliance testing, and residue prevention projects assist in obtaining information about known or potential residue problems, using a non-random sampling process. Table VII contains information on some targeted monitoring projects.

FeedSafe

In 2003, the Stock Feed Manufacturers' Council of Australia (SFMCA) initiated a voluntary quality assurance programme for the Australian stock feed manufacturing industry, known as FeedSafe®. This programme demonstrates the commitment of the Australian stock feed industry to quality assurance and risk mitigation in the manufacture and use of animal feeds. Through FeedSafe®, the SFMCA has recognised the need for a broader industry approach to feed and food safety, and is providing greater security of supply to the Australian livestock industries. The central aspect of FeedSafe® is a code of good manufacturing practice, which has been developed in conjunction with the Veterinary Authorities. The main elements of FeedSafe® are summarised in Table VIII. Additional information on the programme is available at http://www.sfmca.com.au/feedsafe/about_feedsafe/.

Livestock fodder declarations

To provide assurances about the quality and safety of stockfeed, farmers should obtain a completed commodity

Table VI
The general classes of chemicals included in the National Residue Survey

Broad classes of chemicals	General categories of chemicals within each class
Anthelmintics	Macrocyclic lactones Benzimidazoles Salicylanamides
Antibiotics	Beta-lactams Aminoglycosides Tetracyclines Macrolides Cephalosporins Lincosamides Sulfonamides Others (e.g. chloramphenicol)
Hormones	Corticosteroids Resorcylic acid lactones Steroids Stilbenes
Other veterinary drugs	Beta-agonists Non-steroidal anti-inflammatory drugs
Pesticides	Organochlorines Organophosphates Synthetic pyrethroids Benzoyl ureas
Environmental contaminants	Chlorinated biphenyls Metals (e.g. cadmium, lead, mercury) Mycotoxins

Source: National Residue Survey annual report, 2004-2005 (4)

vendor declaration or by-product vendor declaration from the suppliers of the livestock fodder. These vendor declarations indicate the chemicals that the product has been exposed to, if any. Commodity vendor declarations cover chemical treatments that might have been applied to stockfeed items. The by-product vendor declaration covers materials that have not been produced specifically for use as stockfeed, including fruit and vegetable wastes and crop-processing by-products, such as peel, pulp, stems, pressings and leaf material.

These vendor declarations include information on the following aspects of the commodity:

- the contact and address details of the supplier of the commodity
- whether the commodity comes from a farm accredited under a quality assurance scheme
- whether any residue testing has been performed on the commodity
- details of any chemicals applied to the farm (or neighbouring farms) where the crop was grown.

Table VII
Targeted monitoring, compliance testing and residue prevention projects conducted by the National Residue Survey (NRS)

Project	Description
National Organochlorine Residue Management project	The National Organochlorine Residue Management project aims to minimise the potential for organochlorine residues in beef. The beef industry and the state governments jointly fund the project. The project collects information at abattoirs from testing cattle from at-risk farms for organochlorine residues (compliance testing), and also focuses on developing on-farm property management plans to minimise the risk of livestock grazing organochlorine-contaminated land
The National Antibacterial Residue Minimisation project	The National Antibacterial Residue Minimisation project aims to minimise antibacterial residues in cattle using advisory, analytical and regulatory techniques. The beef industry and the Australian state/territory governments are partners in the project. The NRS is responsible for national co-ordination of the project and management of financial disbursements to the state and territory governments
Targeted Antibacterial Residue Testing project	The Targeted Antibacterial Residue Testing project focuses on testing animals at abattoirs suspected by veterinary inspectors of having received recent antibacterial treatment. The project combines targeted testing, quality assurance, extension and regulation to minimise antibacterial residues in beef. The NRS co-ordinates the project and manages the financial disbursements to state and territory governments and laboratories
Endosulfan residues in beef	In conjunction with extension programmes to inform cotton and cattle producers how to minimise the risk of unacceptable endosulfan residues in cattle, endosulfan testing of slaughter cattle occurs each cotton spray season
Hormonal Growth Promotant Audit project	Australia has developed a hormonal growth promotant-free accreditation scheme that allows Australian cattle producers to supply the European Union market. On-farm third-party audits are routinely conducted to monitor compliance with accreditation requirements. The NRS manages the testing of samples taken during these audits

Source: National Residue Survey annual report, 2004-2005 (4)

Table VIII
The elements of FeedSafe®

Element
Premises and mill buildings
Personnel training and qualifications
Plant and equipment
Raw material sourcing and purchasing
Raw material quality and storage
Feed formulation and manufacturing
Product labelling
Loading, transport and delivery to clients
Product inspection, sampling and testing
Customer complaint investigation

Source: Stock Feed Manufacturers' Council of Australia (23)

Department of Agriculture, Fisheries and Forestry and the Australian Government Department of Health and Ageing. Thus, FSANZ is responsible for the following activities:

- developing standards for food manufacturing, labelling, processing and primary production
- providing information to consumers to enable better consumer choice
- co-ordinating national food surveillance, enforcement and food recall
- conducting consumer and industry research
- undertaking dietary exposure modelling and scientific risk assessments
- providing risk assessment advice on imported food.

Food safety standards

Domestic standards

Domestic food standards are developed by the independent statutory authority, FSANZ, in consultation with industry stakeholders, the public, the Australia and New Zealand Food Regulation Ministerial Council, and other government agencies, including the state and territory government, the Australian Government

International standards

As the global food trade continues to increase, the importance of uniform food standards for consumer protection is obvious. The SPS Agreement recognises the FAO/WHO CAC as the relevant body for setting international food standards, and Codex standards have therefore become the 'benchmark' (i.e. definitive standard) for evaluating national food controls (12). Codex, established in 1962, is the international, inter-

governmental body that develops food safety and commodity standards to protect the health of consumers and ensure fair practices in the food trade.

A number of Codex Committees are responsible for addressing food safety issues, including:

- food hygiene
- food labelling
- pesticide residues
- milk and milk products
- fish and fish products
- fresh fruit and vegetables.

This work is facilitated by independent, expert, scientific advice from other committees that set maximum limits in food for additives, contaminants, and agricultural and veterinary chemicals.

In addition to Codex, WHO is involved in other activities that promote food safety, including:

- assisting the development of national food safety policies and infrastructures
- writing and enforcing food legislation
- promoting food safety technologies
- educating consumers
- generating data on epidemiological surveillance of food-borne diseases, food contaminants and the food safety infrastructure (27).

In 2000, WHO announced an expansion of its food safety programme in response to emerging food safety issues. These expanded activities include:

- obtaining better food-borne diseases data
- creating a WHO/FAO risk assessment body
- investigating the causes of increased food-borne disease
- defining food safety research needs (26).

The SPS Agreement recognises the World Organisation for Animal Health (OIE) as the international organisation responsible for establishing and maintaining animal health standards and guidelines for international trade in animals and animal products. In 2001, the OIE decided that the then *International Animal Health Code* (now the *Terrestrial Animal Health Code*) would include food safety in a context consistent with its mandate (i.e. pre-harvest controls over animal products) (30). Extra resources have been provided to allow this work to progress and to help the OIE

strengthen its collaboration with the World Trade Organization, WHO, FAO and Codex (29).

The increased importance of international food standards has meant that obtaining international agreement to new or amended standards has become more difficult and controversial. International standards must continue to reflect legitimate global concerns, be based on sound science for the protection of consumer health, and not provide unjustified barriers to trade.

Conclusion

It is internationally recognised that traditional methods aimed at ensuring food safety, such as end-product quality control, do not adequately ensure the safety of the final food product. To achieve an acceptable standard of food safety, governments and the food industry must provide quality assurance systems based on sound risk management principles throughout the food supply chain. By controlling food safety hazards at the beginning of the process (i.e. on the farm), it is possible to reduce the challenge to food safety management systems at other steps along the supply chain.

In this paper, the authors have used the Australian beef industry as a case study to outline the development and implementation of on-farm quality assurance measures that encompass food safety using HACCP principles. These measures are further supported by auditing, the registration of chemicals, quality assurance systems for stockfeeds and various training and certification procedures.

Acknowledgements

The authors wish to thank Mr Ed Klim, Manager of the Product Integrity and Safety Branch, Australian Government Department of Agriculture, Fisheries and Forestry, for his assistance in sourcing information on Australian livestock quality systems and helping to prepare Figure 3, the schematic diagram of linkages between Australian livestock regulatory and quality systems. The authors would also like to thank Mr Alan Edwards, Manager of Biosecurity Coordination, the Australian Government Department of Agriculture, Fisheries and Forestry, for his assistance in preparing the information on the Network.



Répondre aux exigences des pays importateurs : pratiques et politiques pour assurer la sécurité sanitaire des aliments au niveau de la ferme

P.J. Dagg, R.J. Butler, J.G. Murray & R.R. Biddle

Résumé

Compte tenu de la demande croissante des consommateurs en produits alimentaires de qualité et sans danger pour leur santé, et des récentes alarmes concernant les maladies transmises par les aliments, les gouvernements et le secteur agroalimentaire se doivent de mettre au point des politiques et des programmes de protection sanitaire des aliments correspondant aux meilleures pratiques au niveau international. Les pays exportateurs de denrées alimentaires issues de la production animale doivent se plier non seulement à leurs propres normes nationales, mais aussi aux exigences des pays importateurs.

Au niveau international, on considère désormais que les contrôles de qualité en fin de processus de production et les autres méthodes de ce type visant à contrôler la sécurité sanitaire des aliments sont insuffisants pour garantir la sécurité sanitaire du produit final. Pour atteindre un niveau acceptable de sécurité sanitaire, les gouvernements et le secteur agricole doivent travailler de concert pour mettre au point des systèmes d'assurance qualité fondés sur des principes solides de gestion du risque appliquée tout au long de la chaîne d'approvisionnement alimentaire. Les systèmes d'assurance qualité mis en œuvre dans les élevages ainsi qu'aux autres stades de la chaîne d'approvisionnement alimentaire devraient aborder la sécurité sanitaire des aliments en appliquant la méthode d'analyse des risques et de maîtrise des points critiques (HACCP). Ces systèmes doivent couvrir plusieurs aspects, dont la biosécurité, la surveillance des maladies et leur notification, la sécurité sanitaire des aliments destinés aux animaux, l'innocuité des produits chimiques utilisés dans l'agriculture et des médicaments vétérinaires, le contrôle des agents potentiellement responsables d'infections d'origine alimentaire et la traçabilité. Ils devraient également s'appuyer sur des plans de formation accrédités, avec délivrance d'un certificat en fin de formation, et sur des programmes d'audit permettant de s'assurer que les lignes directrices et les normes reconnues au niveau local et international continuent d'être respectées. En se basant sur l'exemple du secteur de production de viande bovine en Australie, les auteurs examinent les politiques à mener pour que les mesures de sécurité sanitaire des aliments soient prises au niveau de la ferme et appliquées concrètement dans le contexte des programmes d'assurance qualité.

Mots-clés

Animal d'élevage – Assurance qualité – Australie – Élaboration de politiques – Secteur de production de viande bovine – Sécurité sanitaire des aliments.



Cumplimiento de los requisitos impuestos por los países importadores: principios y prácticas para garantizar la inocuidad de los alimentos desde la propia explotación

P.J. Dagg, R.J. Butler, J.G. Murray & R.R. Biddle

Resumen

Ante la creciente demanda de alimentos inocuos y de buena calidad por parte de los consumidores y los recientes problemas de salud pública relacionados con enfermedades transmitidas por vía alimentaria, los gobiernos y la industria agropecuaria se encuentran bajo presión para ofrecer políticas y programas integrales en materia de inocuidad que se ajusten además a las buenas prácticas reconocidas en el plano internacional. Los países que exportan artículos alimentarios obtenidos a partir del ganado deben cumplir tanto los requisitos del país importador como su propia normativa.

En los medios internacionales ya se admite que el control de calidad en el punto final y otros métodos similares para garantizar la inocuidad de los alimentos no sirven para que el producto acabado ofrezca las debidas garantías de inocuidad. Para lograr un nivel aceptable al respecto es menester que los gobiernos y la industria agropecuaria trabajen concertadamente para instituir, en toda la cadena de abastecimiento alimentario, sistemas de garantía de calidad basados en sólidos principios de gestión del riesgo. Los sistemas que se implanten en las explotaciones ganaderas y otros eslabones de la cadena deben tratar la cuestión de la inocuidad aplicando principios del análisis de riesgos y control de puntos críticos. Tales sistemas han de cubrir aspectos como la seguridad biológica, el control y la notificación de enfermedades, la inocuidad de los piensos, la utilización segura de productos químicos en agricultura y veterinaria, el control de eventuales patógenos transmitidos por vía alimentaria y la rastreabilidad. Es preciso además que vengan complementados con programas acreditados de entrenamiento que faciliten un certificado final de acreditación y programas de auditoría que aseguren el cumplimiento de las directrices y reglas reconocidas tanto local como internacionalmente. Los autores estudian la elaboración de políticas para instituir medidas de inocuidad en las explotaciones y su aplicación práctica como parte de programas de garantía de calidad, utilizando para ello el ejemplo de la industria australiana de carne vacuna.

Palabras clave

Australia – Bovinos – Elaboración de políticas – Garantía de calidad – Industria de carne vacuna – Inocuidad de los alimentos.



References

1. Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (1997). – National guidelines for beef cattle feedlots in Australia, 2nd Ed. Primary Industries Report Series 47. Commonwealth Scientific and Industrial Research Organisation (CSIRO) Publishing/ Primary Industries Standing Committee (PISC)/ Standing Committee on Agriculture and Resource Management (SCARM), Collingwood, Victoria, Australia.
2. Animal Health Australia (1998). – Enterprise manual: feedlots (Version 2.1). Australian Veterinary Emergency Plan, Edition 2.0. Primary Industries Ministerial Council, Collingwood, Victoria, Australia.
3. Australian Government Attorney-General's Department (2006). – Australia's Critical Infrastructure Protection Arrangements. Available at: [http://www.tisn.gov.au/agd/WWW/rwpattach.nsf/VAP/\(930C12A9101F61D43493D44C70E84EAA\)~Diagram+for+web+site.doc/\\$file/Diagram+for+web+site.doc](http://www.tisn.gov.au/agd/WWW/rwpattach.nsf/VAP/(930C12A9101F61D43493D44C70E84EAA)~Diagram+for+web+site.doc/$file/Diagram+for+web+site.doc) (accessed on 20 February 2006).
4. Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) (2005). – National Residue Survey annual report 2004-2005. DAFF, Barton, Australian Capital Territory. Available at: <http://www.affa.gov.au/content/output.cfm?ObjectID=715E69E1-5C4B-4439-84A2091FE098AD6D#0405> (accessed on 20 February 2006).
5. Australian Primary Industries Standing Committee (PISC) (2004). – Model code of practice for the welfare of animals: cattle, 2nd Ed. Primary Industries Report Series 85. Commonwealth Scientific and Industrial Research Organisation (CSIRO) Publishing/PISC/Standing Committee on Agriculture and Resource Management (SCARM), Collingwood, Victoria, Australia.
6. Australian Productivity Commission (2002). – Impact of a foot and mouth disease outbreak on Australia: research report. AusInfo, Melbourne.
7. Australian Veterinary Association (AVA) (1997). – Safe use of veterinary medicines on farms. AVA Code of Practice, prepared by the Therapeutics Subcommittee and adopted in February 1990. AVA, St Leonards, New South Wales, Australia.
8. Bongaarts J. & Bulatao R.A. (eds) (2000). – Beyond six billion: forecasting the world's population. Panel on Population Projections, Committee on Population, Commission on Behavioral and Social Sciences and Education, National Research Council. National Academy Press, Washington, DC.
9. Butler R.J., Murray J.G. & Tidswell S. (2003). – Quality assurance and meat inspection in Australia. In *Veterinary Services: organisation, quality assurance, evaluation* (E. Correa Melo & F. Gerster, eds). *Rev. sci. tech. Off. int. Epiz.*, **22** (2), 697-712.
10. Caporale V., Giovannini A., Di Francesco C. & Calistri P. (2001). – Importance of the traceability of animals and animal products in epidemiology. In *Traceability of animals and animal products* (H.A. MacDaniel & M.K. Sheridan, eds). *Rev. sci. tech. Off. int. Epiz.*, **20** (2), 372-378.
11. Food and Agriculture Organization of the United Nations (FAO) (2005). – Meat market assessment, commodities and trade. FAO, Rome. Available at: http://www.fao.org/es/ESC/en/20953/21014/highlight_27269en.html (accessed on 20 February 2006).
12. Food and Agriculture Organization of the United Nations (FAO) & World Health Organization (WHO) (1995). – Application of risk analysis to food standards issues. Report of the Joint FAO/WHO Expert Consultation, Geneva, 13-17 March. WHO/FNU/FOS/95.3. FAO/WHO, Rome/Geneva.
13. Henning P.H., Tham E.B., Martin A.A., Beare T.H. & Jureidini K.F. (1998). – Haemolytic-uraemic syndrome outbreak caused by *Escherichia coli* O111:H-: clinical outcomes. *Med. J. Aust.*, **168** (11), 552-555.
14. McKean J.D. (2001). – The importance of traceability for public health and consumer protection. In *Traceability of animals and animal products* (H.A. MacDaniel & M.K. Sheridan, eds). *Rev. sci. tech. Off. int. Epiz.*, **20** (2), 363-371.
15. Meat and Livestock Australia (MLA) (2000). – National beef cattle feedlot environmental code of practice, 1st Ed. MLA, Sydney.
16. Meat and Livestock Australia (MLA) (2005). – Requirements of the Level 1 Livestock Production Assurance – food safety programme. Available at: <http://www.mla.com.au/default.htm> (accessed on 20 February 2006).
17. Meat and Livestock Australia (MLA) (2005). – Requirements of the Level 2 Livestock Production Assurance – quality assurance programme. Available at: <http://www.mla.com.au/default.htm> (accessed on 20 February 2006).
18. Meat and Livestock Australia in the Middle East (2006). – Quality assurance in Australia. Available at: <http://www.meatlivestockaustralia.com/content.cfm?sid=760> (accessed on 20 February 2006).
19. Rocourt J., Moy G., Vierk K. & Schlundt J. (2003). – The present state of foodborne disease in OECD countries. Food Safety Department, World Health Organization (WHO), Geneva.
20. SAFEMEAT Partnership (2000). – National Feedlot Accreditation Scheme (NFAS). Available at: [http://www.safemeat.com.au/English/Meat_Safety/On_farm_feedlot_sale_yard/Livestock+Production+Assurance+\(LPA\)/LPA+Level+2/National+Feedlot+Accreditation+Scheme.htm](http://www.safemeat.com.au/English/Meat_Safety/On_farm_feedlot_sale_yard/Livestock+Production+Assurance+(LPA)/LPA+Level+2/National+Feedlot+Accreditation+Scheme.htm) (accessed on 20 February 2006).

21. SAFEMEAT Partnership (2004). – National Vendor Declaration (Cattle) and Waybill (NVD). Available at <http://www.mla.com.au/NR/rdonlyres/5927A1B7-B866-4D74-9583-BEC8FFADB64F/0/BlankCattleNVD2.pdf> (accessed on 20 February 2006).
 22. SAFEMEAT Partnership (2005). – 2004-2005 SAFEMEAT annual report. SAFEMEAT, Australia.
 23. Stock Feed Manufacturers' Council of Australia (2003). – FeedSafe®. Available at: http://www.sfmca.com.au/feedsafe/about_feedsafe/ (accessed on 20 February 2006).
 24. United States Census Bureau (2005). – US Census Bureau total midyear population for the world: 1950-2050. Available at: www.census.gov (accessed on 20 February 2006).
 25. United States Food and Drug Administration (US FDA) (2001). – HACCP: a state-of-the-art approach to food safety. Backgrounder. US FDA, Washington, DC.
 26. World Health Organization (WHO) (2000). – WHO responds to new challenges in food safety. Press release WHO/4, 25 January 2000. WHO, Geneva.
 27. World Health Organization (WHO) (2002). – Food safety and foodborne illness. Fact sheet No. 237. WHO, Geneva.
 28. World Health Organization (WHO) (2002). – WHO global strategy for food safety: safer food for better health. Food Safety Department, WHO, Geneva.
 29. World Organisation for Animal Health (OIE) (2001). – Editorial from the Director General. Available at: http://www.oie.int/eng/Edito/en_edito_sept01.htm (accessed on 20 February 2006).
 30. World Organisation for Animal Health (OIE) (2001). – International Animal Health Code: mammals, birds and bees, 10th Ed. OIE, Paris.
 31. World Trade Organization (WTO) (1995). – Agreement on the application of sanitary and phytosanitary measures. *In* The results of the Uruguay Round of multilateral trade negotiations: the legal texts. WTO, Geneva.
-