Australian Guide to Implementing Food Traceability

Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Introduction

Welcome message

The ability to verify the safety and product claims, the provenance of food and the chain of custody along the supply chain, is critical to the confidence of consumers in Australia and globally. Visibility in our supply chains is important to industry for many reasons, but first and foremost is the wellbeing of Australian and international consumers. It's why Deakin University's Food Traceability Laboratory was formed, and why developing this Guide for Australia's red meat and livestock supply chains is a priority project.

As our supply chains become longer and more complex – crossing multiple countries and involving multiple intermediaries – end-to-end visibility of product and events has become a "must have" capability. The COVID 19 pandemic shone a spotlight on the vulnerability of our supply chains, and whenever there's a biosecurity threat or a food safety recall, we are reminded of how important it is to be able to quickly locate a product's path rather than piece together information from individual businesses. This Australian Guide for Implementing Red Meat and Livestock Traceability will ensure speed and accuracy when it comes to addressing customer queries, verifying product claims, processing product recalls and maintaining product integrity.

This is the first product-specific Guide following the publication of the generic *Australian Guide to Implementing Food Traceability* (AGIFT).

This Guide will benefit livestock producers, processors, meat product manufacturers, wholesalers, freight transport suppliers, retailers, foodservice, importers and exporters of red meat and livestock. It will assist them with the flow of information between businesses and help fulfil regulatory compliance, it will enhance their capacity to address product counterfeiting, and it will help them meet market requirements and claim the premium associated with Australia's high quality meat products and integrity systems.

The Australian Government has provided a high-level framework for traceability and industry research and development bodies are working to explore how this can be achieved. There is no shortage of technology and information system applications available to support this journey for businesses, but the missing link is to know what events to record, what data to collect, and what to share with others in the product supply chain in order to create visibility. Knowing how to achieve interoperability between business systems so data can flow is at the heart of supply chain visibility. This Guide explains how this can be achieved at a pace and with a focus that can match business priorities.

We wish to thank the many individuals, companies and industry bodies who have contributed to the development of this Guide. We are committed to testing these Guides in real supply chains and delivering knowledge to grow industry capability in Australia.

We trust that industry will find this Red Meat and Livestock Guide a useful resource as businesses work to achieve end-to-end supply chain traceability.

Antony Boll
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Terms of Use

Acknowledgments

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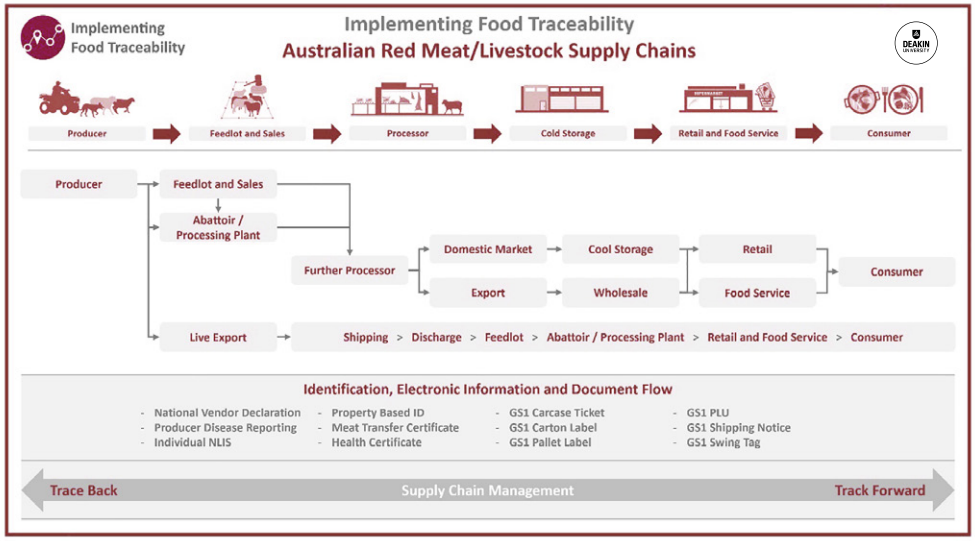
About the Australian Implementing Food Traceability Red Meat Guide



The purpose of the Guide

Australian red meat producers, processors, retailers and exporters have a reputation for producing safe, quality food. These businesses put in place measures and systems that enable them to comply with a range of requirements covering food safety, biosecurity, food labelling, food transport as well as industry codes and buyer specifications.

Mandatory "one back: one forward" recording of the animal and meat product details informs who sold or handled the product prior to arrival at a business and who the business is supplying next.

Heightened concern about health, the environmental and social impact of food production and risk mitigation is driving a demand for more information – end consumers, B2B buyers wishing to verify product claims now demand more information about the product and the circumstances of its production, transformation and distribution.

The *Australian Red Meat Traceability Guide* provides a user-friendly "how to" for tackling traceability across a complete food supply chain. It means that partners working together to supply Australian red meat products will be able to achieve end-to-end traceability at a pace and in priority processes and events along the chain that all agree are important to business success.

The aim of standardising what information is required and how that data is used to identify, capture and share traceable events, is to enable disparate enterprise systems to "talk" to each other with the minimum cost and maximum value capture.

The designers of the Red Meat Traceability Guide have adopted the following principles in preparing the Guide:

- The Guide is designed to work with varying scale of enterprise
- The Guide is based on existing systems and technologies but also allows for the emergence of new technologies, networks and systems. It is technology-agnostic
- The Guide is designed to structure information so that data your business needs to share can flow through your supply chain seamlessly. Interoperability is the touchstone.
- The Guide is standards-based, using GS1 global data standards and other international standards adopted by industry. Most are already ISO compliant.

The Guide has been deliberately structured in the form of modules chosen to cover common events and transactions in food supply chains. Each module covers the typical participants, their roles, the Critical Tracking Events (CTEs) and Key Data Elements (KDEs) for traceability. Each module includes regulatory requirements that are associated with traceability and required record keeping.

Importantly, the Guide addresses protection of your data and best practices in cybersecurity, data sharing and privacy protection.

Who can use this Guide?

The Australian Red Meat Traceability Guide has been developed to assist all businesses engaged in Australia's red meat supply chains and their networks of software and technology providers.

The Guide's scope spans activities from farm inputs, livestock production, meat processing, packing and storage, meat and livestock export, local distribution, transport, retail, foodservice, and end consumer information.

Some of the businesses this Guide has been prepared for are:

- Primary producers
- Farm chemical suppliers
- Fertilizer companies
- Fodder and hay suppliers
- Livestock carriers
- Water cartage operators
- Farm infrastructure and equipment suppliers
- Veterinary suppliers
- Meat processors
- Saleyards
- Stock agents
- Wholesalers
- Packaging suppliers
- Food manufacturers
- Food safety technicians
- Quality assurance personnel
- Cold storage facilities
- Meat Exporters
- Live animal exporters
- Transport operators
- Cargo Terminal Operators
- Shipping and air lines
- Warehouse operators
- Pallet suppliers
- Container yards
- IT companies
- Food retailers
- Foodservice operators

Tracking and tracing at the supply chain level

Food Standards Australia New Zealand (FSANZ) defines traceability as "the ability to track any food through all stages of production, processing and distribution (including importation and at retail). Traceability should mean that movements can be traced one step backwards and one step forward at any point in the supply chain. For food processing businesses, traceability should extend to being able to identify the source of all food inputs such as raw materials, additives, other ingredients, and packaging."[1]

Traceability is the ability to follow the movement of a product through stages of production, processing and distribution (ISO 2007).[2] It is the systematic ability to trace the path of food ingredients and/or finished products throughout their entire lifecycle, using previously captured and stored records. These records catalogue key data elements (KDEs) at critical tracking events (CTEs).[3]

Traceability may be achieved along a supply chain by combining the one-up/one down information from individual businesses. However, it may not constitute a visibility capability for that particular supply chain. The data may be required to be held for regulatory purposes but not necessarily shared with other businesses in the chain to create visibility of the product's journey.

Gaining visibility along the entire supply chain can improve speed and accuracy of food recalls by having a complete set of information on where the product has been, who has handled the product, unique identification of the product (what) and when it was produced, transformed, aggregated and disaggregated as it is physically moved along the supply chain.

The ability to trace a product at the supply chain level creates further benefits beyond faster and more accurate product recalls. It can support market access, improve efficiencies in the flow of product and support product claims associated with brand value, such as provenance, sustainability or organic production.

What are Critical Tracking Events (CTEs) and Key Data Elements (KDEs)

A **Critical Tracking Event (CTE)** is any occurrence involving an item at a specific location and time associated with collection and storage of data useful for associating the item (or related items) to the specific occurrence at a later time and is determined to be necessary for identifying the actual path of an item through the supply chain.

The concept of Critical Tracking Events in an agrifood supply chain allows unique traceability data to remain separate from proprietary commercial data.

For each node, aggregation, de-aggregation, transfer and transformation of the product it will cover:

- A unique location – the "where"
- Unique identification of the parties involved - the "who"
- A unique item identification – the "what"
- A time and date stamp – the "when"

[1] FSANZ Food Traceability 2017 www.foodstandards.gov.au

[2] www.agriculture.gov.au

[3] Global Food Traceability Centre www.ift.org

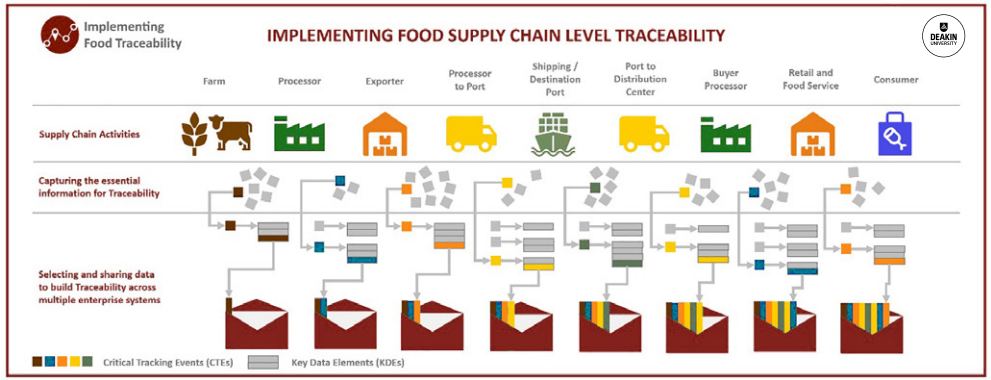
"The CTE approach is a bottom-up approach that is inherently secure in terms of data ownership, data access and proprietary information protection. The CTE approach recognizes that each operator knows their own operations best and provides complete latitude as to how to collect CTE traceability data. The CTE approach shifts focus from the food product itself to the events that manipulate the product in the supply chain. As each operator handles a food product (harvests, creates, receives, mingles, aggregates, palletises, de-palletises, relocates, ships, etc.) its actions are viewed as events that occur at specific locations, dates and times. Some of these events are critical to the ultimate traceability of the product. Therefore, those events are deemed to be "critical tracking events." Since a CTE is essential to ultimately tracking the item in the supply chain, CTE traceability requires a commitment from operators to collect, store and make retrievable, CTE data from every CTE within their operation.

Implementation of CTE traceability does not interfere with any existing business processes. However, CTEs require a commitment by operators to collect, store and make available for retrieval a minimal set of data that is inherently secure through abstraction, separation and restricted accessibility. Operators can choose the most appropriate manner to collect data from manual entry to sophisticated automated scanners. Once CTE data are captured and available for query, investigators will no longer need to stop at each node in the supply chain in order to learn where to go next. CTE based traceability promises to greatly accelerate the rate of trace back investigations as well as the precision and speed of recalls[4]."

A Key Data Element (KDE) is a data input required to successfully trace a product and/or its ingredients through all relevant CTEs.

In terms of data content, these can be categorised into three distinct areas:

- *Master data* relates to locations, businesses, products (input materials, outputs) and their associated attribute data such as addresses, functions, descriptions, packaging configurations etc. These details will be stored in product master data files and retrieved each time a traceable item is scanned or looked up for ordering etc. or a location referenced.
- *Transaction data* that consist of trade transactions, triggering or confirming the execution of a function within a business process. Transaction data is usually captured and stored in internal systems.
- *Visibility event data* that captures the movement of a product through the supply chain detailing when and where a specific event occurred. Visibility data is usually made accessible across the whole supply chain. It makes it possible to track and trace goods with live data along the process.



How does the Guide work?

This guide is specific to red meat. That is, it is designed with cattle, goat, buffalo, sheep and their products in mind. It describes how to create supply chain traceability through identifying traceability requirements and using data standards to create interoperability. Further guides will be product-specific or based on a value stream associated with product claims such as sustainable production, ethical sourcing, Halal, organic.

We've taken a modular approach

The Guide is developed in modules. This is to enable businesses along a food supply chain to focus on achieving traceability within their area of responsibility, understanding what data is needed to complete supply chain level traceability. Supply chain partners can select a module related to priorities in their business strategy or where they wish to improve traceability in their supply chain e.g. export or freight transport.

Collaboration is the basis of supply chain level traceability, so partners working together will need to consider their resources and commitment to working through the modules to build the full capability.

The modules cover:

1. **On-farm production**
2. **Feedlots**
3. **Livestock Transport**
4. **Livestock Sales**
5. **Livestock and Meat Export**
6. **Meat Import**
7. **Meat Processing**
8. **Meat Storage and Distribution**
9. **Meat Retail**
10. **Foodservice**
11. **Consumer information**
12. **Cybersecurity, privacy and data sharing.**

[4] ISO 22000 Resource Center, Traceability in food supply chains: Critical Tracking Events, 2014

In each module, you will find a description of the key processes and events that relate to supply chain level traceability. Within each of these processes, we identify tracking events that are considered critical, or that are required by regulators, related to traceability. For each critical tracking event, we then indicate what data points are relevant to be stored within enterprise systems and then separately, shared with supply chain partners.

For each of these sharable data, we show how to capture the data and how to format the data to standards that allow flow between systems of permissioned supply chain partners safely.

Each module contains useful links so you can quickly check regulatory requirements or the detail of a particular data standard for your solution provider or in-house IT team.

Focusing on the interoperability between technologies and IT systems

You may be dealing with a range of technologies being used across the food supply chains your business interacts with, from suppliers of inputs, government and industry platforms, customer ordering and delivery systems, in addition to operational systems and messaging in your own enterprise.

Regardless of the technology or software used, the Guide focuses on the data you will need to collect and share.

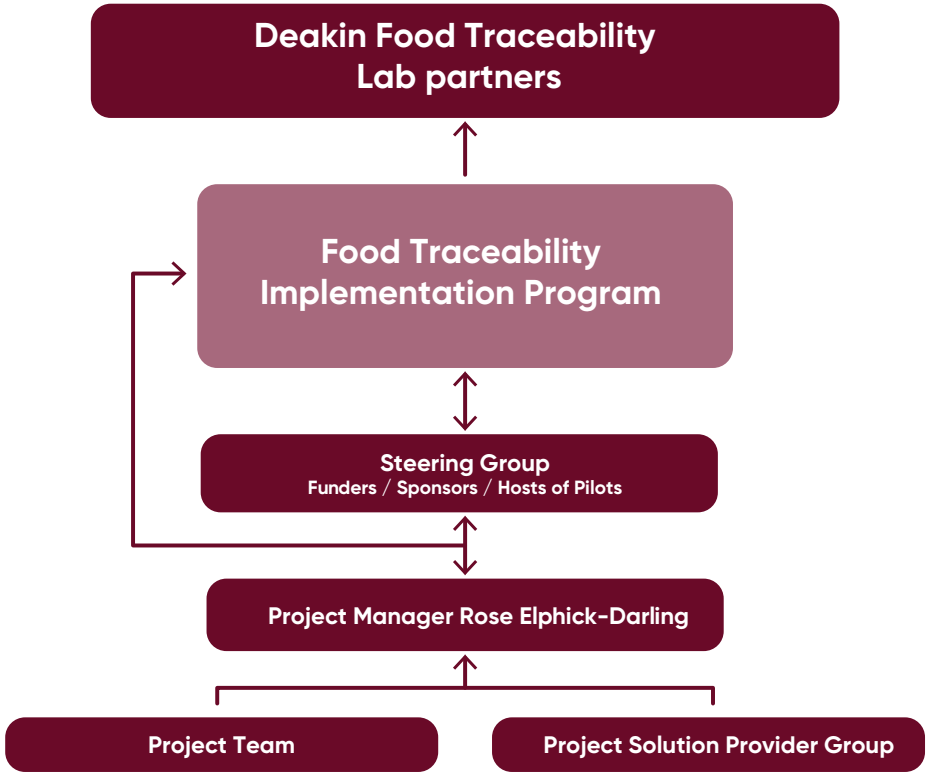
We have a Solution Provider Reference Group experienced in food traceability advising us on how current and emerging technologies and software will use the data standards and framework.

We are not developing a platform or software. Our interest is in the interoperability between systems through using common language for data.

GS1 is the global data standards body for supply chains. GS1 Australia is collaborating in this program to provide data standards for the guide. The standards are already used in Australian and international food supply chains to form the basis of interoperability. The GS1 supply chain standards are compliant with International Standards Organisation (ISO) standards.

The Deakin Food Traceability Laboratory partnership

The Australian *Implementing Food Traceability Program* is an initiative of the Deakin University Food Traceability Lab. This Lab is a partnership of industry, government and dedicated to improving Australian food supply chains and tackling issues that require partnership.



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Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Livestock Production

Livestock Production

This module covers activities that generally take place on the production site or farm. In this module, processes and activities associated with on-farm production are as follows -

1. **Establishment**
2. **Planning and preparation**
3. **Birth**
4. **Farm inputs**
5. **Movement of livestock**
6. **End of life**
7. **Dispatch**

Establishment

The establishment of *unique identifiers* for production location, its ownership and the production business entity are fundamental to traceability. These identifiers provide the common link across the participants in the full supply chain and are collectively referred to as **Master Data** due to their frequency of use.

Master data relates to locations, supplier businesses, products (input materials, outputs) and their associated attribute data such as addresses, functions, descriptions. These details will be stored in product master data files and retrieved each time a traceable item is scanned or looked up for ordering or a location is referenced.

Establishment data may be required by regulators for local, state or national government responsibilities, such as ensuring the property can be located in the circumstance of a biosecurity threat such as a disease outbreak, or that on-farm facilities are fit for purpose and maintain safe food systems.

Location identifiers

Application for a **Property Identification Code** (PIC) is a fundamental establishment task in livestock production. The PIC is issued by state authorities and is used to identify the property owner, lessee or person with stock on agistment and the property location. It is the key data link between the livestock registered under the National Livestock Identification System (NLIS) and their location.

This identifier may be supplemented by the **Global Location Number** (GLN), which provides a more granular level of location identification and traceability. This can be used to link traceability to productivity, such as matching individual paddock pasture types and treatments within the property to meat grading and eating quality. A GLN can incorporate a range of information regarding the property, such as test certificates verifying chemical-free pasture.

It can also be used to identify and locate suppliers of materials and services to the production property, as well as supply chain partners, including stock agents, meat processors or exporters.

Producers may also geofence the property to create a series of **Global Positioning System (GPS)** coordinates to indicate infrastructure, hazards, and lots related to pasture treatment, fodder regimes and livestock status.

Tasks related to traceability

- Register the property with the State Agency to obtain a Property Identification Code (PIC)
- Apply for a Global Location Number (GLN) for the whole property or specific paddock/ geocoded area)
- Request GLN codes for suppliers and supply chain partners
- Collate GPS coordinates for property, boundaries or production sites
- If required, register or license on-farm facilities used for on-farm processing e.g. game meat processing facility.

Key participants

- Property Owner
- Farm Manager, who may be leasing land for production
- Property Identification Code (PIC) Issuing Agency in each state (see Useful Links section in this module)
- Global Location Number (GLN) Issuing Agency – in this case GS1 Australia
  - Suppliers – stock feed, fodder, water, chemicals, infrastructure, veterinarians
  - Supply chain partners – buyers, agents, processing, export.

Planning and preparation

Producers able to demonstrate how they manage risk in the livestock production environment can readily respond to end consumer information requests and achieve certification under quality assurance programs.

The existence of plans and operating procedures (including certification and audit details) and training of staff underpin product assurance. These include –

- Preparation of a Farm Biosecurity Plan
- Property Risk Assessment (see *Livestock Production Assurance* Guide).

By recording inputs to the growing environment, it is possible to trace product claims and authenticate compliance with regulatory requirements for documentation of chemical and fertilizer usage applied to the growing environment. Recording of supplier details and application to the growing environment such as spray diaries can support the speed and accuracy of product recalls.

Assurance programs enable hazard identification, risk management planning and training of staff to be put in place in a systematic way. Livestock production quality assurance parameters are integrated into the Livestock Production Assurance (LPA) Program. LPA covers 7 parameters of livestock production as follows:

- Property risk assessment
- Safe and responsible animal treatments
- Stock feeds, fodder crops, grain and pasture treatments
- Preparation for dispatch
- Livestock transactions and movements
- Biosecurity
- Animal welfare.

Livestock identification and traceability

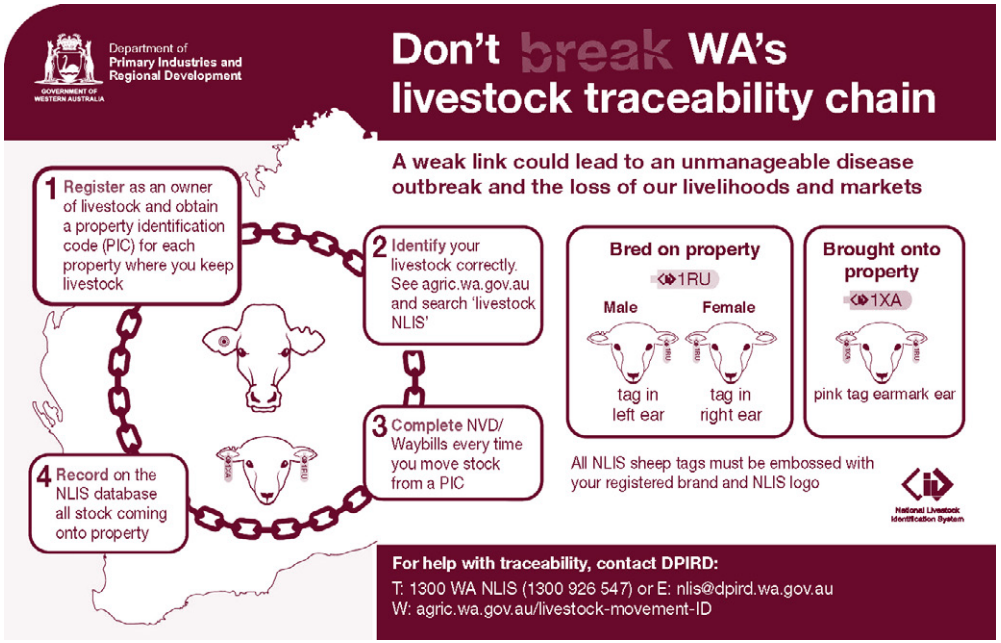
The National Livestock Identification System (NLIS) is Australia's system for the identification and traceability of cattle, sheep and goats.

Unique identification of individual livestock makes it possible to track the movement on and off farm and maintain an accurate record of the animal for its lifespan. Attributes can be linked to the NLIS identification code for the animal, including individual animal breeding information, health status, and location.

Unique animal identification is mandatory for cattle. The national sheep and goat traceability system is mob-based, except for in Victoria where RFID is mandated.

Tasks related to traceability

- Apply identifiers to livestock born on or brought to the farm in accordance with state and territory legislative requirements
- The tag manufacturer registers the device to the PIC
- The receiving producer is responsible for ensuring a movement onto their PIC is registered (it may be individual IDs or a mob-based movement).



Key participants

- Property Owner
- Producer
- Production Manager
- State biosecurity agency
- Tag device manufacturer
- National Livestock Identification System.

Farm inputs and monitoring

Records for monitoring and managing the growth of animals in the production site/property are held in *Farm Records*, which may be kept in electronic farm management systems or paper-based records. Recording inputs to growth includes materials such as veterinary chemicals, feed, water, pesticides and agricultural chemicals.

Data on *withholding periods* in relation to the use of a chemical product is critical to traceability. A withholding period is the minimum period that needs to elapse between the last use of the product and the slaughtering of the animal, or the collection of milk from the animal for human consumption, as the case may be. This is recorded to ensure that product residues fall to or below the maximum limit that the Australian Pesticides and Veterinary Medicines Authority (APVMA) permits.

Tasks related to traceability

- Purchase, receive and apply inputs to the growth of the product
- Record supply and usage of services e.g. veterinary and inputs
- Monitor and report disease incursion.

Key participants

- Property Owner/Producer
- Production Manager
- Environmental Health & Safety Manager
- Quality Manager/Quality Specialist
- Compliance Specialist
- Administrative Staff
- Operations Staff
- Water Company
- Fertilizer Supplier
- Chemicals Supplier
- Veterinary services supplier
- Supplements Supplier
- Stockfeed suppliers
- State primary industry agencies
- Livestock Production Assurance (LPA)
- Farm Biosecurity Australia.

End of life

This process involves disposal or dispatch of deceased livestock. While livestock is generally disposed of on-site, there may be a need to remove deceased or diseased animals off-site. While it is not necessary for deceased bobby calves to be identified using an NLIS tag, removal to a knackery is recorded in a similar way to other livestock movements.

Tasks related to traceability

- Record details of disposal on-farm on the NLIS database
- Complete Animal Health Declarations
- Arrange transport or removal to approved disposal/waste facilities
- The knackery will notify the NLIS database of receival and disposal of the animal.

Key participants

- Property Owner
- Producer
- Environmental Health & Safety Manager
- Administrative Staff
- Operations Staff
- Stock handling staff
- Transport contractor
- Knackery, rendering plant or licensed landfill operation.

Livestock movement

Livestock movements are typically based on sales for breeding, slaughter and export. They are based on the livestock meeting market specifications. Dispatch of livestock from the property may be for a range of other activities, such as relocation of livestock to a different PIC owned by the same entity, further assessment and maturation e.g. agistment, backgrounding, feedlot, or in the circumstance of drought, fire or flood.

Recording these movements based on the location and the unique identification of the animal provides traceability. The requirements to undertake livestock movements are covered in the Livestock Transport module. Prior to moving livestock off the property, preparation of the animals for transport and the documentation to accompany the movement is required under each state and territory's legislative requirements.

Livestock movements may also be inbound to the property as animals are traded between primary producers, loaned or bought at auction and saleyards. In this circumstance, traceability can be achieved by registering the transfer of the animal from one location to another, using a record of the animal or mob/lot NLIS tags that is delivered with the animal/s and registering the new owner's PIC against the animal identifier.

Tasks related to traceability

- Record in and outbound animal identification tag numbers
- Register the transfer from or to the property PIC on the NLIS database
- If it is not possible to record animal identifiers e.g. emergency movement, missing tags, follow the protocol set by the state or territory agency to provide identification of the animal/s.

Key participants

- Origin and Destination Property Owners
- Livestock Producer
- Administrative Staff
- Operations Staff
- Inspection and compliance staff
- Customer
- Buyer
- Transport Company
- Driver.

Critical Tracking Events

For each of the identified livestock production activities, *critical tracking events* (CTEs) establish identity and enable traceability and compliance with traceability-related regulation.

CTEs are events that relate to the identity, movement and transformation of the food product.

Livestock production activity	CTE code	Critical Tracking Events (CTEs)
Establishment master data	**LP CTE1**	Property Identification
	LP CTE2	Registration of facilities
	LP CTE3	Supplier master data
Planning & preparation	**LP CTE4**	Property Risk Assessment
	LP CTE5	Property Biosecurity Plan
	LP CTE6	Food Safety Plan
Farm inputs and monitoring	**LP CTE7-1** **LP CTE7-2**	Water receipt Water Application
	LP CTE8-1 **LP CTE8-2**	Fertiliser receipt Fertiliser application
	LP CTE9-1 **LP CTE9-2**	Chemicals receipt Chemicals Application
	LP CTE10-1 **LP CTE10-2**	Stockfeed and fodder receipt Stockfeed and fodder usage
Livestock identification	**LP CTE11**	Tagging livestock
	LP CTE12	Recording livestock on NLIS
End of life	**LP CTE13**	Animal disposal - identification and notification
Livestock movement	**LP CTE14**	Prepare animals for dispatch
	LP CTE15	Prepare consignment documentation
	LP CTE16	Introduced livestock

Key data elements

Key Data Elements (KDEs) ensure that captured and recorded data can be interpreted and used as relevant and required by all supply chain partners. Key Data Elements can define Who, What, When, Where and Why for each Critical Tracking Event.

Event code	CTE	Key data elements
LP CTE1	Property Identification	**Property Identification Code (PIC)** The PIC is a unique 8-digit code issued by state authorities, developed for biosecurity traceability. While it is the mandated property ID for livestock production properties and some vineyards and nut trees, it is effective for all farm property identification. • Applicant name • Trading name • Business address • name of property • property address • property area in hectares • Lot and DP# (rates notice) • Property owner • Name • Address • Contact details **Global Location Number** The Global Location Number (GLN) is used to identify locations and legal entities. This unique identifier is comprised of a GS1 Company Prefix, Location Reference, and Check Digit. GLNs are used to identify parties to business transactions; functional groups within a company; or real, physical "places" that might receive, process, or hold the livestock. Examples include depots that amass loadings of animals, fodder operations or multiple properties under the one PIC. The GLN number can be used in combination with the PIC. Note: GLN assignment can also be completed by the Livestock Producer based on their existing GS1 membership and allocated number range. In such cases, record of allocated GLNs will need to be shared accordingly for traceability and trading purposes. **Global Positioning System Geocoding** An additional means to identify the overall property or to geocode specific sites is the use of GPS coordinates, e.g. geotagging of property satellite imagery. GPS geocode data may be recorded as an attribute of the Global Location Number. **Location provenance trace/terroir analyses e.g. regional soil analysis** Soil minerals may be tested and associated with growing regions as a supporting provenance verification.

Event code	CTE	Key data elements	
		Key Data Element examples/guidance	
		Request for PIC number	
		Who	PIC Issuing Agency, property owner, producer
		What	Property, Address Details
		When	Date/Time of Registration and Issuance of the PIC
		Where	Issuing Agency
		Why	Registration of property with state agency
		Request for GLN	
		Who	Primary producer GLN Issuing Agency
		What	Property/Field/area/Legal entityv
		When	Date/Time of issuance of Global Location Number (G
		Where	GLN Issuing Agency
		Why	Physical Location set up and identification
		Information to be shared to a traceability platform • Property Identification Code (PIC), • Global Location Number (GLN) • Geocode data – standalone or incorporated into Global Location Number • Location analyses/provenance record code	
LP CTE2	Registration of facilities	**Export Registered Establishment Number** Where exporting from on-farm packing or processing facilities, the Department of Agriculture, Water & the Environment (DAWE) requires export premises to be registered and in some cases, licensed, for export. The purpose of registering an establishment is to ensure that: • the facilities available are fit for the purpose of preparing, handling, storing and/or inspecting product for export • appropriate hygiene and the necessary measures to produce the goods according to trade description and other requirements applicable to a given commodity are maintained • the goods comply with importing country requirements. • The application for registration must include: • the name of the occupier (must be a legal entity). An occupier may nominate one or more registered business names to be approved as an alternate trading name. A registered business name is not a legal entity and it is not acceptable as the name of the occupier of an establishment • the business address of the occupier and the physical location of the premises	

Event code	CTE	Key data elements
		• the particulars of proposed export operations to be conducted in the establishment and other operations likely to affect the export operations • any other information required in the particular case by the relevant Export Control Order. A copy of the certificate of registration must be prominently displayed at the establishment. The certificate must contain: • the name and address of the occupier • the ACN and ABN number of the occupier • the alternate trading names (if applicable) of the occupier • the number allocated to the export registered establishment • the limited period for which the establishment is registered (if applicable) • the export registered operations for the establishment • the eligible country listing for the establishment which has been registered • persons who manage and control the registered establishment • conditions of registration if any. **Key Data Element examples/guidance** **Export Establishment Registration** **Who** Livestock producer with on-site processing Export Establishment Agency (DAWE) **What** Facility/location associated with export supply chain **When** Date/Time of request **Where** Dept of Agriculture, Water & the Environment **Why** Export registration Export Registration Establishment Number **Business Licence and food safety program** Each state and territory have food safety and business licencing requirements for primary producers of meat and meat products. **Identification of on-farm storage facilities** On-farm facilities such as silos or sheds may be used to store stockfeed, fodder and animal bedding. Unique identification of these storage sites can assist in tracing where a feed product may have been contaminated, avoiding all storage units needing to be tested. Information to be shared to a traceability platform • Export Registered Establishment Number • Business Licence Number issued by state agencies • Global Location Number (GLN) of premises and facilities • Geocode data – standalone or incorporated into Global Location Number
LP CTE3	**Supplier master data**	**Supplier Location and Item information** To support end to end traceability and interoperability suppliers to Producers are required to share location and product master data. Information to be shared should provide minimum data to allow for unique identification of locations and products
OFP CTE4	**Property Risk Assessment**	A property risk assessment identifies sites where potential for soil or water contamination are located and details how these are being managed. Data elements held in Farm Management System/Farm Records **Property Risk Assessment** • Property Owner ID • Producer ID • Business/Company ID • Property Risk Management Plan (including map identifying risk) • Property Risk Training record • Property Risks Inspection and Audit date and report **Property Soil Assessment** • Property Owner ID • Producer ID • Business/Company ID • Property Soil Inspection date and report **Key Data Element examples/guidance** **Property Risk assessment** **Who** Livestock Producer Risk Assessment Agency/Auditor **What** Property/location being assessed **When** Date/Time of property risk assessment **Where** Property **Why** Property Risk Assessment Soil Risk assessment **Information to be shared to a traceability platform** Risk Assessment Document Code Date Risk Assessment completed
LP CTE5	**Property Biosecurity Plan**	A biosecurity plan is a document (or range of documents) that outlines all of the biosecurity activities Livestock Producers work through to reduce the risks of pest and disease entry or spread. **Data elements held in the Property Biosecurity Plan** • Property Owner ID • Producer ID • Business/Company ID • Property Biosecurity Inspections and Audit date and report • Property Biosecurity Training records • Property Biosecurity Certification

Event code	CTE	Key data elements
		Key Data Element example/guidance
		Biosecurity Assessment
		Who Livestock Producer Biosecurity Assessor/Auditor e.g. LPA
		What Property being assessed
		When Date/Time of property biosecurity risk assessment
		Where Property
		Why Farm Biosecurity Assurance
		Key data elements to be shared to a traceability platform • Farm Biosecurity Plan document code • Date Biosecurity Report completed (currency)
LP CTE6	**Food Safety Plan**	For farms that store or undertake on-farm processing e.g. game depots, there is a need to prepare a Food Safety Plan and institute a Food Safety Program which is regularly audited by state and local government agencies. **Key data elements to be shared to a traceability platform** • Food Safety Plan document code • Date of audit (currency)
LP CTE7	**Water receipt and application**	Farm water has a number of sources – irrigation supplied through an irrigation scheme entity; dams; surface water in streams and rivers; water transported into the production site; underground water accessed through bores and general rainfall absorption. Water license holders are required to record water usage. Data elements held on farm management systems/farm water records Water received • Water source e.g. rainfall records – date and mms • Date received and applied Water applied • Amount used – mm/hectare • Area watered – hectares • Total water consumption – megalitres **Key Data Element examples/guidance**
		Water receipt
		Who Supplier of Water Livestock Producer
		What Water
		When Date/Time of delivery
		Where Specific Receipt location
		Why Receipt of water References: Farm PO number, Supplier Delivery Note

Event code	CTE	Key data elements
		Water application
		Who Livestock Producer
		What Water consumed, quantity, area?
		When Date/Time of water application
		Where Property/location where water applied
		Why Consumption of water References: Consumption record number
		Key data elements to be shared to a traceability platform • Water receipt date, quantity, supplier ID • Water consumption per hectare – annual
LP CTE8	**Fertiliser receipt and application**	Fertiliser receipt • date received • supplier ID • product ID • batch # • expiry date Fertiliser application • application date • purpose and application rate **Key Data Element examples/guidance**
		Fertiliser receipt
		Who "Livestock Producer Farm/Grower"
		What Fertiliser – Product ID, Batch, Production date, quantity received
		When Date/Time of fertiliser receipt
		Where Specific Receipt location
		Why "Receipt Goods References: Farm PO number, Supplier Delivery Note"
		Fertiliser application
		Who "Livestock Producer Fertiliser applicator (if outsourced)"
		What Fertiliser – Product ID, Batch, Production date, quantity used, other
		When Date/Time of fertiliser usage
		Where Property/Field where fertiliser applied
		Why "Application of Fertiliser Usage record number/farm ID record/spray diary"
		Key data elements to be shared to a traceability platform • Fertiliser ID, Batch Number, Receipt Date, qty, supplier • Fertiliser ID, Batch Number, Usage data, qty, location

Event code	CTE	Key data elements
LP CTE9	**Chemical receipt and application**	Users of an agricultural or veterinary chemical product must ensure that their chemical use is recorded. • Date received • Supplier ID containing company name, contact and location • Product ID • Batch and lot # • Expiry date • Date of applications • Application rate Veterinary chemicals • Treated Animal ID • Withholding period commencement and completion dates **Key Data Element examples/guidance** **Chemical receipt** **Who** Supplier of Chemicals Livestock Producer **What** Chemical – Product Identifier, Batch number, Serial Number (if applicable) Production Date, quantity delivered **When** Date/Time of delivery **Where** Specific Receipt location **Why** LPA/regulator requirement Production record of goods receipt References: Farm PO number, Supplier Delivery Note **Chemical application** **Who** Livestock Producer If applied to specific animal, then Animal Identification **What** Chemical – Product Identifier, Batch number, Serial number (if applicable) Production Date, quantity used **When** Date/Time of chemical usage **Where** Property/Location where chemical used **Why** Chemical usage records Transaction records Withholding periods **Key data elements to be shared to a traceability platform** • Chemicals received, batch, quantity, supplier • Farm chemicals application record document code • Veterinary chemicals application record document code • Withholding periods for eNVD/mNVD/animal health declarations • Application quantity, batch, location

Event code	CTE	Key data elements
LP CTE10	**Stockfeed and fodder receipt and usage**	Farm records will contain records of introduced feed for animals e.g.hay, feed pellets, grain, drought rations • Supplier ID • Feed type and quantity • Date of receipt • Lot/bale identifier • Location of on-farm storage • Feed amount x location x livestock IDs **Fodder receipt** **Who** Fodder supplier Livestock Producer **What** Fodder – Product Identifier, Batch number, Serial Number (if applicable) Production Date, quantity delivered **When** Date/Time of delivery **Where** Specific Receipt location **Why** LPA/regulator requirement Production record of goods receipt References: Farm PO number, Supplier Delivery Note **Fodder usage** **Who** Livestock Producer If applied to specific animal, then Animal Identification **What** Fodder – Product Identifier, Batch number, Serial number (if applicable) Production Date, quantity used **When** Date/Time of fodder usage **Where** Property/Location where chemical used **Why** Fodder usage records Transaction records Withholding periods **Key data elements to be shared to a traceability platform** • Feed records available/record code
LP CTE11	**Livestock identification – NLIS tagging**	An **NLIS electronic tag** consists of 2 identifiers: 1. Visual identification on the outside of the tag (the NLIS number), which includes the PIC 2. Radio Frequency Identification Device (RFID) number, which is the internal transponder number of the device The visually readable NLIS number, or NLIS ID, consists of: • the 8-character PIC of the property on which the tag is to be used • 3 characters coding to represent the manufacturer, device type (for example, whether the tag is a breeder or post-breeder tag), year of supply (using the Australian Breedplan alpha character for that particular year) • a 5-character serial number (the first character may be a letter, except 'I' or 'O')

Event code	CTE	Key data elements
		The following is an example of an NLIS number that might appear on an electronic NLIS (Sheep) breeder tag issued for use on a Victorian property (cattle, sheep and goats require RFID tags) 3ABCD123 X S H 00034 In this example: • 3ABCD123 – Property Identification Code • X – Manufacturer • S – Device type • H – Year of supply • 00034 – Serial number A **non-RFID visual tag,** which may be used for sheep or goat mob-based identification in some states, carries visual data • NLIS logo • Owner brand as registered for the property PIC • Property PIC • Johne's Disease (OJD/JD) vaccine status • Male or female according to which ear is tagged • Colour coding of tags for breeder or post-breeder and year of birth • Breed society mark
		NLIS identification
		Who Livestock Producer
		What Animal
		When Date/Time of NLIS assignment/tagging
		Where Location of tagging
		Why Animal identification, registration
LP CTE12	**Recording livestock on the NLIS database**	Livestock need to be recorded prior to movement. The Livestock Producer will need at open an NLIS account. In most cases the stock agent, saleyard or processor will record the movement of stock from the owner's PIC, but private sales and non-sale movements to different PICs should be recorded by the Livestock Producer. Key data to be recorded • NLIS tag numbers • date the livestock arrived on the property • PIC of the property of dispatch • PIC of the property of receival • National Vendor Declaration serial number • number of head of stock in the consignment (sheep and goats only).
LP CTE13	**Animal disposal identification and notification**	**On-farm disposal** recorded on NLIS database • Animal ID e.g. NLIS tag number • Property PIC number • Date of death/disposal

Event code	CTE	Key data elements
		Off-farm disposal A national vendor declaration and waybill (NVD/eNVD), a transported stock statement (TSS), or a permit issued by an inspector is required. The vendor must as a minimum provide the following information on the NVD or TSS: • Property identification code (PIC) of the property where the journey commenced. This is pre-printed on the NVD and should be written on a TSS. • Number and description (breed, sex, type) of the stock. • Date of movement Knackeries must report dead animals within 7 days of disposal. **Key data elements to be shared to NLIS database** • Animal ID – tag number • Property PIC number • Date of death/disposal Key Data Element example/guidance
		Animal Disposal
		Who Livestock Producer/Transporter/Knackery, Rendering Plant, accredited disposal site
		What Animal disposed ID (NLIS), lot number if mob ID, serial number
		When Date/Time of disposal
		Where location
		Why Disposal regulations References: Disposal Permit Number, waybill number, PIC
LP CTE14	**Preparation of livestock for dispatch**	Before animals leave the farm, an inspection should be completed in accordance with the National Cattle Health Declaration, National Sheep Health Declaration and Goat Health Declaration requirements in each state or territory; also see LPA Preparation for Dispatch of Livestock and Is the animal Fit to Load Guide and checklist • www.integritysystems.com.au, publications.mla.com.au
		Livestock preparation for Dispatch
		Who Livestock Producer Livestock inspector
		What Livestock
		When Date/Time of delivery preparation/inspection
		Where Dispatch area
		Why Animal inspection requirements
		Key data elements to be shared to a traceability platform • Feed and water records (time off water measurement begins) • Time of inspection prior to loading

Event code	CTE	Key data elements
LP CTE15	**Prepare consignment documentation**	A Consignment Note generally contains the information equivalent to the eNVD/ waybill or TSS, with the addition of the transporter's terms and conditions of carriage covering payment and liability. Details of the Owner/Consignor: • Name of owner • Address of owner • Address where stock loaded Details of consigned stock • Type • Sex • Tail tag/ ear tag number • Ear marks • Brands • Number Details of Consignee • Name • Address of consignee • Delivery address Details of driver • Name • Contact number Details of vehicle • Registration number • Start kilometres • Finish kilometres Additionally, the Transporter will require emergency contact details for the journey. • For electronic National Vendor Declaration and Waybill www.integritysystems.com.au • Owner name • Owner address • Property PIC • Destination PIC • NLIS tag #s of consigned animals Buyers will ask for the **Animal Health Declaration** to accompany the National Vendor Declaration and Waybill. www.farmbiosecurity.com.au • PIC from which animal is moving • E-NVD and Waybill/Transported Stock Statement # for the consignment • Number of animals in the consignment

Event code	CTE	Key data elements
		• "Name of person completing the declaration • Date of completing the declaration Key data elements to be shared to a traceability platform • Inspection certificate number for the consignment • Animal Health Declaration Number • e-National Vendor Declaration number/mNVD QR code • Consignment Note number" • Name of person completing the declaration • Date of completing the declaration **Key data elements to be shared to a traceability platform** • Inspection certificate number for the consignment • Animal Health Declaration Number • e-National Vendor Declaration number/mNVD QR code • Consignment Note number
LP CTE16	**Introduced Livestock**	For livestock moving into the property, data to be recorded • NLIS tag numbers • date the livestock arrived on the property • PIC of the property of dispatch • PIC of the property of receival • National Vendor Declaration serial number • number of head of stock in the consignment (sheep and goats only). • Tags allocated to animals missing tags For livestock moving from interstate to the property there are specific requirements in each receiving state and data varies according to species. For example All cattle entering Victoria must: • have an approved National Livestock Identification System (NLIS) device • be accompanied by a completed National Vendor Declaration (NVD) It is the responsibility of the owner or manager of the receiving property to record the cattle movement on the NLIS database. All cattle carcasses, including bobby calves, entering Victoria in transit to a knackery must be NLIS tagged. You don't need an NVD for cattle carcasses.

Data standards that apply to key data elements and shared information are identified in this section.

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Location	Farm location, Field location	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: www.gs1.org
Product Identifiers	Input materials such as Chemicals, Fertilisers, Seeds,	Global Trace Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org
Traceability Attributes	Batch, Serial Number, Production Date		**AN20**	Traceability Attributes, such as Batch or Lot Number, Serial Number, Production Date etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format. List of Application Identifiers: www.gs1au.org
Logistics Units	Shipment of Grain, Pallet of fertiliser		**N18**	A **Logistic unit** is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. **Logistic units** take many forms, a single box containing a limited number of products, a pallet of multiple products, or an intermodal container containing multiple pallets. www.gs1au.org

Useful links

Farm Biosecurity

www.farmbiosecurity.com.au

www.dpi.nsw.gov.au

www.pir.sa.gov.au

www.daf.qld.gov.au

Livestock Production Assurance

www.mla.com.au

Property Identification Codes

www.integritysystems.com.au

Global Location Number Application

www.gs1au.org

Licensing and registration

NSW: www.foodauthority.nsw.gov.au

www.foodauthority.nsw.gov.au

VIC: www.primesafe.vic.gov.au

www.primesafe.vic.gov.au

Glossary

Australian Breedplan

BREEDPLAN is an international beef cattle performance recording and evaluation scheme, based in Armidale, NSW. It is Australia's national beef recording scheme. BREEDPLAN is a modern genetic evaluation system for estimating the breeding value of cattle for a range of economically important production traits. agriculture.vic.gov.au

Australian Pesticides and Veterinary Medicines Authority (APVMA) is the Australian Government statutory agency responsible for the management and regulation of all agricultural and veterinary chemical products in Australia. apvma.gov.au

Department of Agriculture, Water and the Environment (DAWE) is the Australian Government agency which supports Australian agriculture. www.agriculture.gov.au

Export Registered Establishment is a premise that produces edible and /or inedible prescribed goods for export.

Prescribed goods for export must be prepared, stored, handled and/or presented for inspection at a registered establishment under the following legislation:

- *Export Control Act 1982*
- *Export Control (Meat & Meat Products) Orders 2005*
- *Export Control (Prescribed Goods - General) Orders 2005*
- *Export Control (Hay and Straw) Orders 2005*
- *Export Control (Milk and Milk Products) Orders 2005*
- *Export Control (Plants and Plant Products) Orders 2005*
- *Export Control (Eggs and Egg Products) Orders 2005*
- *Export Control (Fish and Fish Products) Orders 2005*
- *Export Control (Wild Game Meat and Wild Game Meat Products) Orders 2010*
- *Export Control (Poultry Meat and Poultry Meat Products) Orders 2010*
- *Export Control (Rabbit and Ratite Meat) Orders 1985*
- *Export Control (Fees) Orders 2001*

HACCP is a food safety and risk assessment plan that was originally developed in the 1960's by NASA and a group of food safety specialists.

HACCP stands for Hazard Analysis and Critical Control Points and outlines seven key principles in food safety:

Hazard Analysis

- Critical Control Points
- Critical Limits
- Critical Control Monitoring
- Corrective Action
- Procedures
- Record Keeping.

HACCP can be applied to all processes throughout each and every stage of the food supply chain. This includes production, preparation, packaging and distribution. www.foodsafety.com.au

Livestock Producer

In the context of this Guide, livestock producing red meat include grass fed and grain fed cattle, sheep and goats.

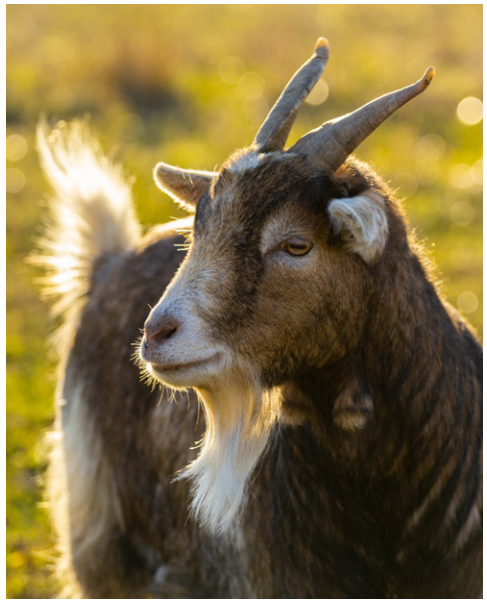
A livestock producer operates at a commercial scale, as defined by the Australian Taxation Office to maintain animals for the purpose of selling them or their bodily produce, including natural increase.

Meat and Livestock Australia

Livestock Production Assurance (LPA)

The Livestock Production Assurance (LPA) program is the Australian livestock industry's on-farm food safety program. It meets the stringent requirements of our export markets, providing an assurance of the safety of red meat grown by Australia's cattle, sheep and goat producers.[1]

[1] Cattle Council of Australia



Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Feedlots

Feedlot Production

This Module addresses the intensive production of red meat livestock, currently cattle or sheep, in a feedlot setting. Feedlots in Australia are intensive livestock production facilities where livestock are confined to a controlled area for a period longer than four weeks for the purposes of wool, meat or milk production, and are dependent on the daily supply of feed and or water provided by human or mechanical means. 1 A feedlot is not defined as a farm and it may operate all year round, periodically or seasonally.

The feedlot facilities and equipment used in intensive lot feeding includes pens, handling yards, stock lanes and feed alleys, water supply, feed mills and feed storage, manure stockpile and composting pads, stock and vehicle washdown facilities.

Feedlot activities generally take place along the food supply chain, post the production site or farm gate and before processing or live export.

There are around 450 accredited cattle feedlots throughout Australia with the majority located in areas that are in close proximity to cattle and grain supplies. Queensland is the largest state in terms of cattle numbers on feed with approximately 60% followed by New South Wales with 30%, Victoria with 7% and the remainder shared between other states and territories. Sheep and lamb feedlots are a growing part of this supply chain.

A feedlot is a recognised primary production activity as a meat producer business or enterprise in FSANZ Standard 4.1.1; 4.2.3 and in AS4696-2007 *Primary Production & Processing Standard for Meat & Meat Products.* Clause 2E requires a meat producer to have a system in place that can identify the persons from whom the meat producer received an animal and to whom the meat producer supplied an animal. This requirement is intended to ensure that an animal can be traced in the event of a food safety problem.

National Feedlot Accreditation Scheme (NFAS)

Meat marketed with the AUS-MEAT 'grain-fed' description must come from feedlots accredited under the NFAS. This is an industry quality assurance scheme administered by AUS-MEAT. [2]

Traceability through feedlot production enables an animal or material used in production to be connected through the supply chain in cases of animal disease, food safety and provenance and to ensure compliance with welfare and treatment standards.

In this module, the following activities are associated with feedlot production:

1. Establishment
2. Planning and preparation
3. Receipt and induction
4. Feedlot inputs and monitoring
5. On Feedlot materials storage and handling
6. End of life
7. Dispatch of livestock.

Establishment

The establishment of *unique identifiers* for production location, its ownership and the production business entity are fundamental to traceability. These identifiers provide the common link across the participants in the full supply chain and are collectively referred to as "Master Data" due to their frequency of use.

Master data relates to locations, businesses, products (input materials, outputs) and their associated attribute data such as addresses, functions, descriptions, packaging configurations etc. These details will be stored in product master data files and retrieved each time a traceable item is scanned or looked up for ordering etc. or a location is referenced.

Establishment data: relates to locations, supplier businesses, products (input materials, outputs) and their associated attribute data such as addresses, functions, descriptions. These details will be stored in product master data files and retrieved each time a traceable item is scanned or looked up for ordering or a location is referenced.

Establishment data may be required by regulators for local, state or national government responsibilities, such as ensuring the property can be located in the circumstance of a biosecurity threat such as a disease outbreak, or that on-feedlot facilities are fit for purpose and maintain safe food systems.

Location identifiers

Application for a Property Identification Code (PIC) is a fundamental establishment task in livestock production. The PIC is issued by state authorities and is used to identify the property owner, lessee or person with stock on agistment and the property location. It is the key data link between the livestock registered under the National Livestock Identification System (NLIS) and their location.

This identifier may be supplemented by the Global Location Number (GLN), which provides a more granular level of location identification and traceability. This can be used to link traceability to productivity, such as matching individual paddock pasture types and treatments within the property to meat grading and eating quality. A GLN can incorporate a range of information regarding the property, such as test certificates verifying chemical-free pasture.

It can also be used to identify and locate suppliers of materials and services to the production property, as well as supply chain partners, including stock agents, meat processors or exporters.

Producers may also geofence the property to create a series of Global Positioning System (GPS) coordinates to indicate infrastructure, hazards, and lots related to pasture treatment, fodder regimes and livestock status.

Tasks related to traceability

- Register the property with the State Agency to obtain a Property Identification Code (PIC)
- Apply for a Global Location Number (GLN) for the whole property and specific grow sites within the feedlot
- Collate GPS coordinates for property, boundaries and individual grow sites within the feedlot
  - Register premises for export production, where product is to be exported.
  - Feedlots supplying livestock for the European Union require EUCAS registration (see www.agriculture.gov.au)
  - Approved Export Program (AEP) and an approved Exporter Supply Chain Assurance System (ESCAS). Australian Standards for the Export of livestock (ASEL).

Participants

- Property Owner
- Feedlot Manager, who may be leasing land for production
- Property Identification Code (PIC) Issuing Agency in each state (see Useful Links section in this module)
- Global Location Number (GLN) Issuing Agency – in this case GS1 Australia
- Suppliers – stock feed, fodder, bedding, water, chemicals, infrastructure, veterinarians
- Supply chain partners – buyers, agents, processing, export
- Department of Agriculture, Water and the Environment (DAWE) for feedlot premises for export livestock or meat accreditation programs.

Planning and preparation

Producers able to demonstrate how they manage risk in the livestock production environment can readily respond to end consumer information requests and achieve certification under quality assurance programs.

The existence of plans and operating procedures (including certification and audit details) and training of staff underpin product assurance. These include –

- Preparation of a Feedlot Biosecurity Plan
- Property Risk Assessment (see Livestock Production Assurance Guide).

By recording inputs to the growing environment, it's possible to trace product claims and authenticate compliance with regulatory requirements for documentation of chemical usage applied to the growing environment. Recording of supplier details and application to the growing environment such as treatment diaries can support the speed and accuracy of product recalls.

Assurance programs enable hazard identification, risk management planning and training of staff to be put in place in a systematic way. Livestock production quality assurance parameters are integrated into the Livestock Production Assurance (LPA) Program. LPA covers 7 parameters of livestock production as follows:

- Property risk assessment
- Safe and responsible animal treatments
- Stock feeds, fodder crops, grain and pasture treatments
- Preparation for dispatch
- Livestock transactions and movements
- Biosecurity
- Animal welfare.

Accreditations:

The National Feedlot Accreditation Scheme – NFAS Accredited certifies Feedlots that demonstrate their commitment to animal welfare, environment, meat quality and food safety.

Feedlot managers able to demonstrate how they manage risk in the growing environment can readily respond to end consumer information requests and achieve accreditation and certification under quality assurance programs, for example National Feedlot Accreditation Scheme (NFAS).[3]

To be accredited a feedlot operator must:

- Have documented procedures in place, specifically for the feedlot which meet the requirements of the industry standards;
- Maintain records that these procedures have been adhered to for all cattle prepared at the feedlot; and
- Undergo a third-party audit of these procedures, records and facilities at the feedlot.[4]
- The existence of plans and operating procedures (including certification and audit details) underpin product assurance. Preparation of a Quality Management System, Feedlot Biosecurity Plan, Property Risk Assessment (e.g. Livestock Production Assurance) enable hazard identification, risk management planning and training of staff to be put in place.

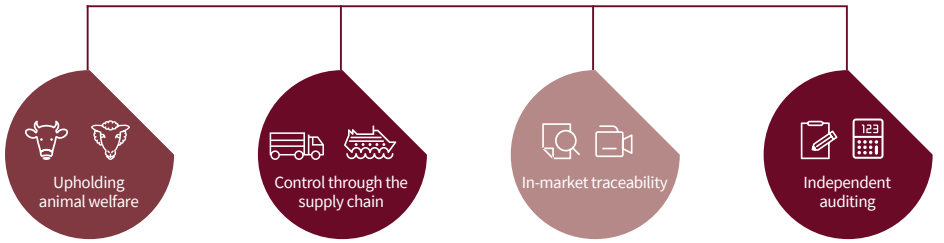
Export market

Exporting producers may require full traceability from their suppliers due to the regulation of importers in overseas markets, for example, manufacturers supplying to the US market under the Foreign Supplier Verification Program.[5]

More detail on livestock exports and meat exports is located in the *Livestock Export* and *Meat Export* modules of the Guide.

The entire livestock export supply chain from on-farm preparation to point of slaughter is regulated and controlled by the Australian Government under two main regulatory systems, The **Australian Standards for the Export of Livestock** (ASEL) and The **Exporter Supply Chain Assurance System** (ESCAS).

Exporters must be licensed by the Australian Government. Exporters must maintain control, traceability and ensure animal welfare of livestock from discharge at the vessel in the destination port, through to the point of slaughter in their supply chains.



Australian Standards for the Export of Livestock (ASEL)

The Australian Standards for the Export of Livestock (ASEL) set the requirements for exporting livestock from Australia by sea and air. The standards outline the minimum animal health and welfare conditions exporters must meet.

Exporter Supply Chain Assurance System (ESCAS)

It places the responsibility on exporters to ensure the welfare of exported feeder and slaughter livestock along the entire post discharge supply chain in overseas markets through to the point of slaughter.

auslivestockexport.com

European Union Cattle Accreditation Scheme EUCAS

The European Union Cattle Accreditation Scheme (EUCAS) is a national animal production scheme that guarantees full traceability of all animals through the National Livestock Identification System (NLIS), linking individual animal identification to a central database. EUCAS accredited feedlots must also be National Feedlot Accreditation Scheme (NFAS) accredited. NFAS establishes and accredits feedlot standards, including EAD Action Plans and Biosecurity Plans. Animals exported to the EU must be raised on properties accredited by Biosecurity Australia under the EU Cattle Accreditation Scheme (EUCAS).[6]

[3] National Feedlot Accreditation Scheme (NFAS) www.ausmeat.com.au

[4] Source: www.ipaustralia.gov.au

[5] US Food Safety Modernisation Act Foreign Supplier Verification Program www.fda.gov

EUCAS allows Australia to meet the European Union (EU) market requirements for beef by segregating cattle that have never been treated with hormonal growth promotants (HGPs) at any time.

EUCAS feedlots and saleyard are audited annually and their ongoing accreditation depends on a successful audit.

Feedlots must be EUCAS and NFAS accredited if they want to produce animals that can be exported as meat to the EU. Feedlots may contain segregated EUCAS and non–EUCAS cattle.

Staff involved in the daily monitoring of livestock health are trained in the early detection of livestock diseases and are aware of and understand their key responsibilities within the Feedlot Emergency Animal Disease (EAD) Action Plan.

An EAD Action Plan describes the activities and management practices that are

to be undertaken by the feedlot in the event of a suspected emergency animal disease outbreak.

All relevant employees are aware of and adhere to their environmental management responsibilities. Environmental performance is reported on an annual basis or as required by the appropriate regulatory authority.

National Feedlot Standards

The National Feedlot Accreditation Scheme (NFAS) is an independently audited quality assurance scheme that was initiated by the Australian Livestock Feedlot Association (ALFA) and is managed by the Feedlot Industry Accreditation Committee.

Tasks related to traceability

- Prepare a property risk assessment
- Prepare a Quality Management System
- Prepare a Biosecurity Plan
- Prepare a Feedlot Emergency Animal Disease (EAD) Action Plan
- Gain accreditations and approvals (NFAS; EUCAS)
- Conduct regular audit/inspection to update operating procedures
- Record provision of water, feed, bedding, treatments, chemicals and supplements to the grow area/s e.g. chemical use diaries
- Prepare the production facility e.g. yarding areas, resting / hospital areas, for livestock
- Train staff in regulatory requirements and record keeping for traceability
- Maintain a register of staff and authorised service providers.

Participants

- Feedlot Manager
- Administrative Staff
- Operations Staff
- Risk Inspector
- Biosecurity Auditor
- Biosecurity Inspector
- Biosecurity Agency
- Feedlot Auditor
- NFAS Program (AUSMEAT).

[6] Australian Government Department of Agriculture Water and the Environment, www.agriculture.gov.au eucas and www.agriculture.gov.au

Feedlot inputs and monitoring

Records for monitoring and managing the growth of animals in the production site/ property are held in Feedlot Records, which may be kept in electronic management systems or paper-based records.

Recording inputs to growth includes materials such as veterinary chemicals, feed, water, pesticides and agricultural chemicals. Inputs also include people, other animals, vehicles, machinery and equipment brought onto or leaving the site.

Data on withholding periods in relation to the use of a chemical product is critical to traceability. A withholding period is the minimum period that needs to elapse between the last use of the product and the grazing of animals on, the crop or pasture, the slaughtering of the animal, or the collection of milk from the animal for human consumption, as the case may be. This is recorded to ensure that product residues fall to or below the maximum limit that the Australian Pesticides and Veterinary Medicines Authority (APVMA) permits.

- Purchase, receive and apply inputs to the growth of the product.
- Record supply and usage of services e.g. veterinary and inputs
- Monitor and report disease incursion
- Register and record contractors, visitors and other animals to the feedlot.

Participants

- Feedlot Manager
- Administrative Staff
- Operations Staff
- Water Company
- Water transporter
- Chemicals Supplier
- Veterinary services supplier
- Supplements Supplier
- Stockfeed supplier
- State primary industry agencies
- Livestock Production Assurance (LPA)
- Farm Biosecurity Australia.

Livestock identification and traceability

The National Livestock Identification System (NLIS) is Australia's system for the identification and traceability of cattle, sheep and goats.

Unique identification of individual livestock makes it possible to track the movement on and off feedlot and maintain an accurate record of the animal for its lifespan. Attributes can be linked to the NLIS identification code for the animal, including individual animal breeding information, health status, and location.

Unique animal identification is mandatory for cattle and sheep and goats in Victoria. Sheep and goats may can also be identified as a mob or lot, for example, lots of rangeland goats that are moved directly to slaughter.

Sheep or goats may have a unique RFID tag as required for cattle, or in some states or territories a visual ear tag which has the owner's PIC serial number, brand and NLIS logo. Ear tags are also colour coded to indicate the year of birth and on or off-farm bred animals (breeders and post-breeder).

The National Feedlot Accreditation Scheme (NFAS) requires all accredited feedlots to develop and implement documented management practices to manage the animal welfare needs of pregnant livestock and newborn calves within the lot feeding sector.

Tasks related to traceability

- Apply identifiers to livestock born on or brought to the feedlot in accordance with state and territory legislative requirements
- Record livestock identifiers associated with the Property Identification Code (PIC) on the NLIS database
- Record location of livestock within feedlot as they are moved internally
- Property Owner
- Producer
- Production Manager
- State biosecurity agency
- Meat and Livestock Integrity Systems National Livestock Identification System
- Stock handling staff.

End of life

This process involves disposal or dispatch of deceased livestock. While livestock can be disposed of on-site, there may be a need to remove deceased or diseased product off-site. While it is not necessary for deceased bobby calves to be identified using an NLIS tag, removal to a knackery is recorded in a similar way to other livestock movements.

Tasks related to traceability

- Record details of product disposal on-feedlot on NLIS database
- Complete Animal Health Declarations
- Arrange transport or removal to approved disposal/waste facilities.
- The knackery will notify the NLIS database of receival and disposal of the animal.

Participants

- Property Owner
- Producer
- Environmental Health & Safety Manager
- Administrative Staff
- Operations Staff
- Stock handling staff
- Veterinary services supplier
- Livestock Transporter
- Knackery, rendering plant or licensed landfill operation.

Livestock movement

Livestock movements to and from feedlots are based on sales for slaughter and export. They are based on the livestock meeting market specifications. Recording these movements based on the location and the unique identification of the animal provides traceability. The requirements to undertake livestock movements are covered in the Livestock Transport module. Prior to moving livestock off the property, preparation of the animals for transport and the documentation to accompany the movement is required under each state and territory's regulations.

State and territory regulations correlate with the registration of livestock movements on the NLIS database; the use of NVDs and related stock movement documentation and the feedlot identifier, the PIC.

Tasks related to traceability

- Record in and outbound animal identification tag numbers
- Register the transfer from or to the property PIC on the NLIS database
- If it is not possible to record animal identifiers e.g. emergency movement, missing tags, follow the protocol set by the state or territory agency to provide identification of the animal/s

Participants

- Consignors of livestock
- Feedlot Operator
- Administrative Staff
- Operations staff
- Inspection and compliance staff
- Transport Company
- Driver.

Critical Tracking Events

For each of the identified feedlot production activities, critical tracking events (CTEs) establish identity and enable traceability and compliance with traceability-related regulation.

Critical Tracking Events (CTEs) are events that relate to the identity, movement and transformation of the food product.

Feedlot activity	CTE code	Critical Tracking Events (CTEs)
Establishment	**FL CTE1.1**	Property Identification
	FL CTE1.2	Permits, licences and accreditation
	FL CTE1.3	Supplier Master Data
Planning and preparation	**FL CTE2.1**	Property Risk Assessment
	FL CTE2.2	Property Biosecurity Plan
Feedlot Inputs and monitoring	**FL CTE3.1** **FL CTE3.2**	Water receipt Water application
	FL CTE4.1 **FL CTE4.2**	Chemicals receipt Chemicals application
	FL CTE5.1 **FL CTE5.2**	Stockfeed, fodder receipt Stockfeed, fodder usage
	FL CTE6.1 **FL CTE6.2**	Livestock bedding receipt Livestock bedding usage
Livestock identification	**FL CTE7.1**	Tagging livestock
	FL CTE7.2	Recording livestock to NLIS
	FL CTE7.3	Entry and exit dates (days on feed)
	FL CTE7.4	On-feedlot livestock movements
End of life	**FL CTE8**	Animal disposal – identification and notification
Livestock dispatch	**FL CTE9.1**	Prepare animals for dispatch
	FL CTE9.2	Livestock Dispatch

Key Data Elements

Key Data Elements (KDE) ensure that captured and recorded data can be interpreted and used as relevant and required by all supply chain partners. Key Data Elements define Who, What, When, Where and Why for each Critical Tracking Event.

Event code	CTE	Key data elements
	Establishment	
FL CTE1.1	**Property Identification**	**Property Identification Code (PIC)** The PIC is a unique 8-digit code issued by State authorities, developed for biosecurity traceability. It is the mandated property ID for livestock production properties, including feedlots. The PIC application contains the data fields • Applicant name • Trading name • Business address • name of property • property address • property area in hectares • Lot and DP# (rates notice) • Property owner • Name • Address • Contact details **Global Location Number** The Global Location Number (GLN) is used to identify locations and legal entities. This unique identifier is comprised of a GS1 Company Prefix, Location Reference, and Check Digit. GLNs are used to identify parties to business transactions; functional groups within a company; or real, physical "places" that might ship, receive, process, or hold the livestock. Note: GLN assignment can also be completed by the Livestock Producer based on their existing GS1 membership and allocated number range. In such cases, record of allocated GLNs will need to be shared accordingly for traceability and trading purposes. **Key Data Element examples / guidance** **Request for PIC number** **Who** PIC Issuing Agency, property owner, Feedlot Operator **What** Property, address details **When** Date/Time of issuance of PIC **Where** Issuing Agency **Why** Registration of property with state agency
		Request for GLN **Who** Feedlot Operator GLN Issuing Agency **What** Property/Field/area/Legal entity **When** Date/Time of request/issuance of Global Location Number (GLN) **Where** GLN Issuing Agency **Why** Physical Location set up and identification **Identification of on-feedlot storage facilities** On-feedlot facilities such as silos or sheds may be used to store stockfeed, fodder and animal bedding. Unique identification of these storage sites can assist in tracing where a feed product may have been contaminated, avoiding all storage units needing to be tested. Global Location Numbers provide unique identifiers for each facility. **Assigning GLNs** **Who** Feedlot Operator **What** Silos, Sheds, locations as required **When** Date/Time of assignment Global Location Number (GLN) **Where** Feedlot **Why** Physical Location set up and identification **Information shared to traceability platform:** • **Property Identification Code (PIC)** • **Global Location Number (GLN)**
FL CTE1.2	**Permits, licences and accreditation**	Each state and territory have planning and environmental approval requirements for the establishment of feedlots. If a feedlot is supplying cattle for live export or meat to be exported to the European Union, it will require approval under the European Union Cattle Accreditation Scheme (EUCAS) which requires a number of specific measures are in place, including full traceability. **Request for Permits/Licenses etc** **Who** Feedlot Operator Relevant agency **What** Feedlot **When** Date/Time of issuance **Where** Feedlot **Why** Permits, licenses and accreditation required for trading (import/export)

Event code	CTE	Key data elements
		Information shared to traceability platform: • **Property Identification Code (PIC)** • **State/local planning scheme Permit or Development approval number** • **EUCAS accreditation code and date of latest audit**
FL CTE1.3	**Supplier master data**	**Supplier Entity and Location** To support end to end traceability and interoperability suppliers to Feedlots are required to share location and product master data. • Supplier GLN • Supplier Food Licence Number • Grower Property Identification Code (PIC) for direct-from-farm deliveries
		Supplier Master Data **Who** Feedlot Operator **What** Supplier Products, Locations **When** New product or new supplier engagement **Where** Property **Why** Supplier products & traceability information
		Information shared to traceability platform: • **Supplier GLN number** • **Supplier PIC number**
FL CTE2.1	**Property Risk Assessment**	The Livestock Production Assurance (LPA) program covers property risk assessment. A property risk assessment identifies sites where potential for soil or water contamination are located and details how these are being managed. Data elements held in Feedlot Management System/Feedlot Records **Property Risk Assessment** • Property Owner ID • Producer ID • Business/Company ID • Property Risk Management Plan (including map identifying risk) • Property Risk Training record • Property Risks Inspection and Audit date and report
		Property Risk Assessment **Who** Feedlot Operator, Risk Assessment Agency/Auditor **What** Property/location being assessed **When** Date/Time of property risk assessment **Where** Property **Why** Property Risk Assessment
		Information shared to traceability platform: • **Risk Assessment Document Code** • **Date Risk Assessment completed**

Event code	CTE	Key data elements
FL CTE2.2	**Property Biosecurity Plan**	• **Property Biosecurity Inspections and Audit date and report** • **Property Biosecurity Training records** • **Property Biosecurity Certification** **Key Data Element examples/guidance** **Biosecurity Assessment** **Who** Feedlot Operator, Biosecurity Assessor/Auditor e.g. LPA **What** Property being assessed **When** Date/Time of property biosecurity risk assessment **Where** Property **Why** Feedlot Biosecurity Assurance **Information shared to traceability platform:** • **Feedlot Biosecurity Plan document code** • **Date Biosecurity Report completed (currency)**
FL CTE3.1	**Water receipt**	Feedlot water has a number of sources – irrigation supplied through an irrigation scheme entity; dams; surface water in streams and rivers; water transported into the production site; underground water accessed through bores and general rainfall absorption. Water license holders are required to record water usage. Data elements held on feedlot management systems/feedlot water records - **Water received** • Water source e.g. rainfall records – date and mms; delivery • Date received and applied **Key Data Element examples/guidance** **Water receipt** **Who** Supplier of Water Feedlot Operator **What** Water **When** Date/Time of delivery **Where** Specific receipt location **Why** Receipt of water, References: Purchase Order number, Supplier Delivery Note
FL CTE3.2	**Water application**	**Water application** • Amount used – mm/hectare • Area watered – hectares • Total water consumption – megalitres **Water application** **Who** Feedlot Operator **What** Water consumed, quantity, area? **When** Date/Time of water application **Where** Property/location where water applied **Why** Consumption of water, References: Consumption record number

Event code	CTE	Key data elements
		Information shared to traceability platform: • **Water receipt date, quantity, supplier ID** • **Water consumption per hectare – annual**
FL CTE4.1	**Chemical receipt**	Users of an agricultural or veterinary chemical product must ensure that their chemical use is recorded. • Date received • Supplier ID containing company name, contact and location • Product ID • Batch and lot # • Expiry date **Key Data Element examples/guidance** **Chemical receipt** **Who** Supplier of Chemicals Feedlot Operator **What** Chemical – Product Identifier, Batch number, Serial Number (if applicable) Production Date, quantity delivered **When** Date/Time of delivery **Where** Specific Receipt location **Why** LPA/regulator requirement Production record of goods receipt References: Purchase Order number, Supplier Delivery Note
FT CTE4.2	**Chemical application**	**Chemical application** • Date of applications • Application rate Veterinary chemicals • Treated Animal ID • Withholding period commencement and completion dates **Information shared to traceability platform:** • **Chemicals received, batch, quantity, supplier** • **Feedlot chemicals application record document code** • **Veterinary chemicals application record document code** • **Withholding periods for NVD/ animal health declarations** **Chemical application** **Who** Feedlot Operator If applied to specific animal, then Animal Identification **What** Chemical – Product Identifier, Batch number, Serial Number (if applicable) Production Date, quantity used **When** Date/Time of chemical usage **Where** Property/Location where chemical used **Why** Chemical usage records Transaction records Withholding periods **Information shared to traceability platform:** • **Chemicals received, batch, quantity, supplier**

Event code	CTE	Key data elements
		• **Feedlot chemicals application record document code** • **Veterinary chemicals application record document code** • **Withholding periods for NVD/ animal health declarations**
FL CTE5.1	**Stockfeed, fodder and bedding receipt**	Feedlot records will contain records of introduced feed for animals e.g.hay, feed pellets, grain, drought rations, and bedding material used • Supplier ID • Feed type and quantity • Date of receipt **Stockfeed, fodder and bedding receipt** **Who** Supplier – Stockfeed, fodder and bedding Feedlot Operator **What** Stockfeed, fodder and bedding – Product Identifier, Batch number, Serial Number (if applicable) Production Date, quantity delivered **When** Date/Time of delivery **Where** Specific Receipt location **Why** LPA/regulator requirement Production record of goods receipt References: Purchase Order number, Supplier Delivery Note
CTE 5.2	**Stockfeed, fodder and bedding usage**	**Usage** • Lot/bale identifier • Location of on-feedlot storage • Feed/bedding quantity used • Location of animals fed/usage of product (e.g. pen GLN) • Date of usage **Key Data Element examples/guidance** **Stockfeed, fodder and bedding application** **Who** Feedlot Operator If applied to specific animal, then Animal Identification **What** Stockfeed, fodder and bedding – Product Identifier, Batch number, Serial Number (if applicable) Production Date, quantity used **When** Date/Time of usage **Where** Property/Location where Stockfeed, fodder and bedding used **Why** Stockfeed, fodder and bedding usage records Transaction records Withholding periods **Information shared to traceability platform:** • **Feed records available/record code**
	Livestock bedding	
FL CTE6.1	**Receipt of livestock bedding**	Feedlot records will contain records of introduced bedding material used • Supplier ID • Bedding type and quantity • Date of receipt

Event code	CTE	Key data elements
		Stockfeed, fodder and bedding receipt
		Who Supplier – bedding Feedlot Operator
		What Bedding – Product Identifier, Batch number, Serial Number (if applicable) Production Date, quantity delivered
		When Date/Time of delivery
		Where Specific Receipt location
		Why LPA/regulator requirement Production record of goods receipt References: Purchase Order number, Supplier Delivery Note
FL CTE6.2	**Record usage of bedding material**	Bedding Usage • Lot/bale identifier • Location of on-feedlot storage • Quantity used • Location of usage of product (e.g. pen GLN) • Date of usage **Key Data Element examples/guidance**
		Stockfeed, fodder and bedding application
		Who Feedlot Operator
		What Bedding – Product Identifier, Batch number, Serial Number (if applicable) Production Date, quantity used
		When Date/Time of usage
		Where Property/Location where bedding used
		Why Bedding usage records Transaction records Withholding periods
		Information shared to traceability platform: • **Bedding records available/record code**
	Livestock identification	
FL CTE7.1	**NLIS tagging**	An **NLIS electronic tag** consists of 2 identifiers: 1. Visual identification on the outside of the tag (the NLIS number), which includes the PIC 2. Radio Frequency Identification Device (RFID) number, which is the internal transponder number of the device The visually readable NLIS number, or NLIS ID, consists of: • the 8-character PIC of the property on which the tag is to be used • 3 characters coding to represent the manufacturer, device type (for example, whether the tag is a breeder or post-breeder tag), year of supply (using the Australian Breedplan alpha character for that particular year)

Event code	CTE	Key data elements
		• a 5-character serial number (the first character may be a letter, except 'I' or 'O') The following is an example of an NLIS number that might appear on an electronic NLIS (Sheep) breeder tag issued for use on a Victorian property (cattle, sheep and goats require RFID tags) 3ABCD123 X S H 00034 In this example: • 3ABCD123 — Property Identification Code • X — Manufacturer • S — Device type • H — Year of supply • 00034 — Serial number A **non-RFID visual tag,** which may be used for sheep or goat mob-based identification in some states, carries visual data • NLIS logo • Owner brand as registered for the property PIC • Property PIC • Johne's Disease (OJD/JD) vaccine status • Male or female according to which ear is tagged • Colour coding of tags for breeder or post-breeder and year of birth • Breed society mark **Information shared to traceability platform:** • **NLIS number** • **RFID number of device**
FL CTE7.2	**Recording Livestock to NLIS**	Livestock need to be recorded prior to movement. In most cases the stock agent, saleyard or processor will record the movement of stock from the owner's PIC, but private sales and non-sale movements to different PICs should be recorded by the Feedlot Operator. **Information shared to traceability platform:** • **NLIS tag numbers** • **date the livestock arrived on the property** • **PIC of the property of dispatch** • **PIC of the property of receival** • **National Vendor Declaration serial number** • **number of head of stock in the consignment (sheep and goats only)**
FL CTE7.3	**Entry and exit to/from feedlot**	Record of days on feed (critical to use of GF symbol under Export Control Act. • Date of arrival at feedlot • Date of departure at feedlot
FL CTE7.4	**Internal livestock movements**	• Record animal movements and location within feedlot (on request) • Record stock handling staff ID (on request)

Event code	CTE	Key data elements
FL CTE8	**Animal disposal – identification and notification**	**On-feedlot disposal** recorded on NLIS database • Animal ID e.g. NLIS tag number • Property PIC number • Date of death/disposal **Off-feedlot disposal** A national vendor declaration and waybill (NVD/eNVD), a transported stock statement (TSS), or a permit issued by an inspector is required. The vendor must as a minimum provide the following information on the NVD or TSS: • Property identification code (PIC) of the property where the journey commenced. This is pre-printed on the NVD and should be written on a TSS. • Property identification code (PIC) of the property where the journey ends, typically a knackery. • Number and description (breed, sex, type) of the stock. • Date of movement Knackeries must report dead animals within 7 days of disposal. **Key Data Element example/guidance**

Animal Disposal	
Who	Feedlot Operator/Transporter/Knackery, Rendering Plant, accredited disposal site
What	Animal disposed ID (NLIS), lot number if mob ID, serial number
When	Date/Time of disposal
Where	location
Why	Disposal regulations References: Disposal Permit Number, waybill number, PIC

Information shared to traceability platform:

- **Animal ID – tag number**
- **Property PIC number**
- **Date of death/disposal**

Event code	CTE	Key data elements
	Dispatch	
FL CTE9.1	**Prepare consignment documentation**	**Transport bookings** Most transport bookings are completed on-line with consignors commonly having a client account established. A Consignment Note generally contains the information equivalent to the eNVD/waybill or TSS, with the addition of the transporter's terms and conditions of carriage covering payment and liability. Consignor • Name of owner • Address of owner • Address of saleyard • Date loaded • Name of consignor • Address of consignor Consigned stock • Breed • Sex • NLIS tag numbers • Ear marks • Ear marks • Brands • Number Consignee • Name • Address • Delivery address Driver • Name • Contact details Vehicle • Registration number Additionally, the Transporter will require emergency contact details for the journey. **For electronic National Vendor Declaration and Waybill** www.integritysystems.com.au/ • Owner name • Owner address • Property PIC • Destination PIC • NLIS tag #s of consigned animals Buyers will ask for the **Animal Health Declaration** to accompany the National Vendor Declaration and Waybill. www.farmbiosecurity.com.au • PIC from which animal is moving • E-NVD and Waybill/Transported Stock Statement # for the consignment • Number of animals in the consignment • Name of person completing the declaration • Date of completing the declaration For livestock consigned to air/sea port destinations, additional documentation such as the Air Waybill of Bill of Lading, Export Certificate number, date of embarkation, and destination PIC EEEEEEEE is required.

Event code	CTE	Key data elements
		Information shared to traceability platform: • **Inspection certificate # for the consignment** • **Animal Health Declaration Number** • **Consignment Note number/ e-National Vendor Declaration number/mobile NVD QR code**
FL CTE9.2	**Livestock inspection pre dispatch**	Before animals leave the feedlot, an inspection should be completed in accordance with the National Cattle Health Declaration, National Sheep Health Declaration and Goat Health Declaration requirements in each state or territory; also see LPA Preparation for Dispatch of Livestock and Is the animal Fit to Load Guide and checklist www.integritysystems.com.au; publications.mla.com.au **Information shared to traceability platform:** • **Feed and water records (time off water measurement begins)** • **Time of inspection prior to loading**

Application of GS1 global data standards

Adoption of global data standards enables data sharing between businesses through using common formats. These formats allow a business to identify participants, locations, products, processes and events in the supply chain.

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Location	Feedlot Location, Field location	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: www.gs1.org
Date/Time	Date of registration, Date of processing	Year -Month- Date / Time /time zone	**YYMMDD**	Whilst human readable date formats can vary e.g., 21 December 2020, December 21, 2020, the structure of the date format to be encoded into systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD
Product Identifiers	Input materials such as Chemicals, Fertilisers, Feed, Outputs such as Animal	Global Trace Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org
Traceability Attributes	Batch/Lot code (AI 10), Serial Number (AI 21), Pack date (AI 13), Production date (AI 11), Best Before Date (AI 15), Expiry Date (AI 17)	Each Traceability attribute has its own data format requirements. Please refer to the detailed information found via the link provided.	**AN20**	Traceability Attributes, such as Batch or Lot Number or Serial Number etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format.

Data Element	Examples	Valid Values	Data Type/ Format	Further information
				For a full list of Application Identifiers applicable to the Meat industry, please refer to the GS1 Standards Module. List of Application Identifiers: www.gs1au.org
Logistics Units	Pallet of Finished Goods, Crate or Box	Serial Shipping Container Code (SSCC)	**N18**	Logistic unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. Logistic units take many forms, a single box containing a limited number of products, a pallet of multiple products, or an intermodal container containing multiple pallets. www.gs1au.org
Assets	Returnable assets (GRAI): e.g. IBC or Individual assets (GIAI): e.g. A crate	Global Returnable Asset Identifier (GRAI) Global Individual Asset Identifier (GIAI)	**N13**	Can be identified as an asset type only or an optional serial number can be added to distinguish individual assets www.gs1au.org

Useful links

Food Safety

Food Safety Australia and New Zealand Food Standards for Primary Production and Processing. Chapters 3 and 4 of the Food Safety Standards.

- www.foodstandards.gov.au

Primary Production & Processing Standard for Meat & Meat Products: Approval Report – Proposal P1014 FSANZ 2014

Australia New Zealand Food Standards Code - Standard 4.2.3 - Production and Processing Standard for Meat (Australia Only)

Or via link: www.legislation.gov.au

- www2.health.vic.gov.au
- www.foodauthority.nsw.gov.au
- www.pir.sa.gov.au
- www.health.qld.gov.au

Biosecurity

National Biosecurity Manual for Beef Cattle Feedlots 2013, Animal Health Australia

- www.farmbiosecurity.com.au

Farm biosecurity for plants and animals. Toolkit and resources to manage feedlot biosecurity

- www.farmbiosecurity.com.au
- www.dpi.nsw.gov.au, www.pir.sa.gov.au
- www.daf.qld.gov.au, www.farmbiosecurity.com.au

Livestock Production Assurance

- www.mla.com.au
- Integrity system for grain-fed beef producers www.integritysystems.com.au

Property Identification Codes by State

Victoria

- agriculture.vic.gov.au

New South Wales

- www.dpi.nsw.gov.au

Queensland

- www.business.qld.gov.au

South Australia

- www.pir.sa.gov.au

Tasmania

- dpipwe.tas.gov.au

Western Australia

- www.agric.wa.gov.au

Northern Territory

- nt.gov.au

Global Location Number Application

GS1 General Specifications, www.gs1au.org

The Numbering and Barcoding Guidelines for Suppliers to the Food Manufacturing Industry 2018, GS1 Australia, www.gs1au.org

National Livestock Identification System (NLIS) nlis.com.au

Feedlot Guidance, Accreditation and Regulation

National Guidelines for Beef Cattle Feedlots in Australia 3rd Edition 2012

futurebeef.com.au

National Beef Cattle Feedlot Environmental Code of Practice, 2nd Edition, 2012 www.mla.com.au

The Australian Lot Feeders' Association (ALFA) www.feedlots.com.au

Livestock Production Accreditation Scheme: for Grain Fed Lamb and Hogget www.ausmeat.com.au

National Feedlot Accreditation Scheme: To provide a Quality System for beef feedlots www.ausmeat.com.au

National Feedlot Accreditation Scheme Rules, Edition: September 2018 www.ausmeat.com.au

Global Good Agricultural Practice – Livestock program covers livestock production - cattle & sheep, dairy cows, calf & young beef, pigs, poultry and turkey.

www.ausmeat.com.au

Animal Welfare

The Australian Livestock Processing Industry Animal Welfare Certification System (AAWCS) amic.org.au

aawcs.com.au

Export Accreditation

European Union Cattle Accreditation Scheme www.ausmeat.com.au

European Union Cattle Accreditation Scheme Feedlot Rules

www.agriculture.gov.au

Glossary

ALFA: Australian Lot Feeders Association - www.feedlots.com.au

AUS-MEAT: Australia and New Zealand's leading providers of agribusiness auditing, certification and training services, supporting over 70 different programs.

Beef feedlot

A beef cattle feedlot is a confined yard area with watering and feeding facilities, where cattle are completely hand or mechanically fed for the purpose of beef production. This definition includes both covered and uncovered yards.

The feedlot complex includes:

- pens
- handling yards
- drains and ponds
- stock lanes and feed alleys
- manure stockpile and composting pads
- feed mill and feed storage facilities
- stock and vehicle washdown facilities.

The above definition does not include the feeding or penning of cattle in the following situations:

- for weaning, dipping or similar husbandry practices
- for milk production
- at a depot operated exclusively for the assembly of cattle for live export
- for drought or emergency feeding purposes
- at a slaughtering facility
- in recognised saleyards.

The feedlot complex does not include manure and effluent utilisation areas. (National Guidelines for Beef Cattle Feedlots in Australia 3rd Edition, 2012)

Export Slaughter Interval (ESI) is the minimum time that should elapse between administration of a veterinary chemical to animals and their slaughter for export. apvma.gov.au

FLIAC: Feed Lot Industry Accreditation Committee www.ausmeat.com.au

National Livestock Identification System (NLIS) is Australia's system for the identification and traceability of cattle, sheep and goats. NLIS reflects Australia's commitment to biosecurity and food safety and provides a competitive advantage in a global market.

The National Livestock Identification System combines three elements to enable the lifetime traceability of animals:

1. All livestock are identified by a visual or electronic ear tag/device.
2. All physical locations are identified by means of a Property Identification Code (PIC)
3. All livestock location data and movements are recorded in a central database

NFAS: National Feedlot Accreditation Scheme

Feedlot Industry Accreditation Committee (FLIAC) has approved the introduction of a new Grain Fed Finished (GFF)Standard for the NFAS

Effective from 1 September 2018, the GFF Standard is an additional standard with separate requirements to the existing Grain Fed (GF)and Grain Fed Young Beef (GFYG)

Recognised terms within the Export Meat Legislation.

GFF (Grain Fed Finished) Standard:

1. Be produced in an NFAS accredited feedlot in accordance with the NFAS Rules and Standards;
2. Have been fed for not less than 35 days (Males (castrated only)*and Females), and for not less than 28 days of that, on a nutritionally balanced ration of a recognised high energy feed of which grain is the highest single component. Rations must have an average metabolizable energy (ME) content greater than 10 megajoules (MJ) per kg of dry matter; and
3. Meet all Meat Standards Australia (MSA) grading requirements at production and meat processing.

The cattle must have been fed in an Accredited Feedlot for not less than 35 days, and for not less than 28 days of that, on a nutritionally balanced ration of a recognised high energy feed of which grain is the highest single component. Rations must have an average metabolizable energy (ME) content greater than 10 megajoules (MJ) per kg of dry matter

GFYG: Grain Fed Young Beef - The cattle must have been fed in an Accredited Feedlot for not less than 70 days, in the case of females not less than 60 days and for not less than 50 days of that, on a nutritionally balanced ration of a recognised high energy feed of which grain is the highest single component. Rations must have an average metabolisable energy (ME) content greater than 10 megajoules (MJ) per kg of dry matter

GF: Grain Fed Beef - The cattle must have been fed in an Accredited Feedlot for not less than 100 days, and for not less than 80 days of that, on a nutritionally balanced ration of a recognised high energy feed of which grain is the highest single component. Rations must have an average metabolisable energy (ME) content greater than 10 megajoules (MJ) per kg of dry matter.

High Quality Beef (HQB) [Handbook of Australian Beef Processing - The Aus-Meat Language 2020 Edition]

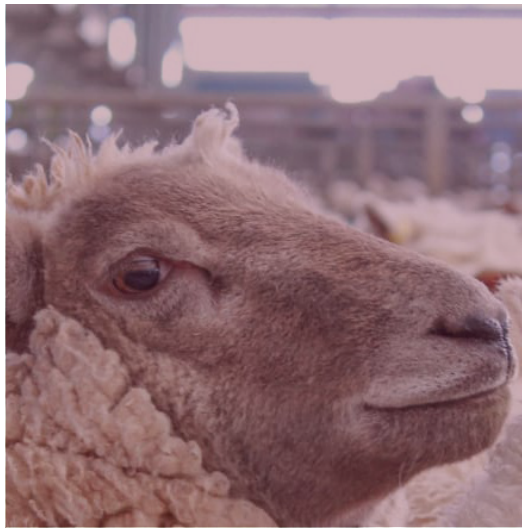
Sheep and lamb intensive production

An operation where sheep are confined for a period longer than four weeks for the purposes of wool, meat or milk production, and are dependent on the daily supply of feed and or water provided by human or mechanical means.

Does not include rams housed for breeding, stud sheep in preparation for showing or sheep held in a containment area. [7]

Standard Cattle Unit (SCU) - A Standard Cattle Unit is equivalent to an animal with a liveweight of 600kg.

[7] *Australian Animal Welfare Standards and Guidelines for the Welfare of Sheep 2016*



Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Saleyards

Saleyards

This module covers key activities that generally take place at livestock saleyards. Saleyard activities involve delivery to, holding and selling livestock. The primary purpose of the establishment is for the gathering of livestock from a number of sources for exchange of ownership; that is, livestock are bought and sold.

The saleyard process includes all the stages involved in handling livestock through a saleyard or depot, including the receival of livestock into the saleyard complex or depot, yarding, holding, handling, drafting, weighing, NLIS scanning, penning into and out of selling pens, provision of feed and water, assembling for dispatch from the saleyard complex or depot.[1]

A Saleyard is classed as a 'scale operation' in Victoria. Scale operators are an important link in the livestock supply chain, as a business involved in the congregation, transportation and mixing of livestock. They ensure robust traceability practices and legislative requirements are met. Scale operators must ensure animals are correctly tagged, Property Identification Codes (PICs) are used correctly, National Livestock Identification System (NLIS) database transfers are completed successfully and on time and accurate vendor declarations are provided.[2]

There are 174 operating saleyards in Australia. In a Meat & Livestock Australia (MLA) Australian Saleyards Survey year to June 2019, there were 92 active cattle facilities and 52 active sheep facilities. Near 4.7 m cattle and 14.3m sheep were transacted through saleyards. *"Of the 107 saleyards that provided information, 62 operate weekly, 23 fortnightly, and 13 monthly."* (MLA Saleyard Survey 2018–2019)[3]

In this module, the following activities are associated with saleyard livestock processing:

1. **Establishing the business identity**
2. **Receiving livestock for sale**
3. **Livestock management**
4. **Livestock born in transit or at the facility**
5. **End of life and waste handling**
6. **Dispatch from saleyard**
7. **Dispatch for live export.**

Establishing the business identity

The establishment of unique identifiers for location, ownership and business entity are fundamental to traceability. These identifiers provide the common link across the participants in the full supply chain and are collectively referred to as "Master Data" due to their frequency of use.

Master data relates to locations, businesses, products (input materials, outputs) and their associated attribute data such as addresses, functions, descriptions, packaging configurations etc. These details will be stored in product master data files and retrieved each time a traceable item is scanned or looked up for ordering etc. or a location is referenced.

Establishment data. Regulators often mandate establishment data. It can be required for local,

state or national government responsibilities, such as ensuring the property can be located in the circumstance of a biosecurity threat such as a disease outbreak, or that facilities are fit for purpose and maintain safe food systems.

States and territories require a Property Identification Code (PIC) to be allocated to saleyards. The PIC is an intrinsic part of linking the location with the identity of animals traded on the premises. NLIS EUAB and EUSY PICs were assigned to some Saleyards and Abattoirs prior to States issuing abattoir and saleyard PICs. These PICs are still in use in some instances.[4]

Licensed stock and station agents may apply for an agent identification code to which cattle may be temporarily transferred on the NLIS database. [NSW Biosecurity Procedure p.25].

Tasks related to traceability

- Register the property with the State Agency to obtain a Property Identification Code (PIC)
- Apply for a Global Location Number (GLN)
- Create a NLIS 'Saleyard' account with a saleyard identifier (Saleyard ID 'EUSY' number), linked to PIC
- Saleyards handling livestock destined for export to European Union countries need to apply for European Union Cattle Accreditation Scheme (EUCAS) accreditation of their saleyard. www.agriculture.gov.au

Saleyards handling livestock destined for export to participating countries need to apply for accreditation to the Exporter Supply Chain Assurance System (ESCAS) www.agriculture.gov.au

Participants

- Property owner
- Saleyard operator
- Global Location Number (GLN) Issuing Agency – in this case GS1 Australia
- EUCAS accreditation body for EU export
- ESCAS auditors for live feeder or slaughter animal export
- Stock owner
- Stock and station agent.

[1] Australian Animal Welfare Standards and Guidelines – Livestock at Saleyards and Depots 2018

[2] VicGov Scale Operator Requirements agriculture.vic.gov.au

[3] www.mla.com.au

Receiving livestock for sale

On arrival the vendor or carrier provides the selling agent with the National Vendor Declaration (NVD) or eNVD/Transported Stock Statement (TSS) or Waybill.

Livestock arriving must be scanned and identified, and this data recorded, in order to reconcile animal/mob movement with NLIS records.

All cattle being consigned to a saleyard must be properly identified with an NLIS device before leaving the property. This includes bobby calves, and calves at foot being sold as a unit with their dam.

The owner or person in charge of the saleyard (the 'saleyard operator') must ensure that all cattle that are sold in the saleyard are scanned and the required transaction information is uploaded to the NLIS database in the required timeframes set out in the NLIS Regulation, i.e., by:

- COB on the day of the sale for stock going to an abattoir (e.g. prime sales)
- COB of the next working day for all other sale transactions (e.g. store sales).

Scanning may be done either pre- or post-sale or both, depending on the layout and facilities at the saleyard and the requirements of buyers. The relevant information that must be uploaded to the NLIS database is:

- particulars of identification (RFID or NLIS number) of the cattle
- PIC of the property where the stock was last held, or the agent code for the agent who last held the stock, before it was sent to the saleyard
- PIC of the property to where, or agent code for the stock agent to whom, the stock is sent after sale
- PIC of the saleyard
- date of sale
- serial number of movement document.

If cattle have been consigned for sale but are passed in and returned to a property, the 'from' PIC and the 'to' PIC will be the same, but the movement must be recorded to reflect their time at the saleyard.

Types of approved movement documentation

National Vendor Declaration and Waybill (NVD) - issued under the Livestock Production Assurance Program; Transport Stock Statement (TSS) - in accordance with the NSW Local Land Services Act 2013; Stock Permit - issued under the NSW Local Land Services Act 2013; Permit - an approved NLIS movement document for NLIS and TSS purposes, but does not meet LPA or food safety standards; Health Statements - The National Sheep Health Statement or Goat Health Statement, recommended for on-farm biosecurity.

Tasks related to traceability

- Seller or transporter provides NVD (or TSS) for livestock delivered to the selling agent
- Agent provides 'from PIC', NVD (or TSS) and NLIS information to the saleyard operator

- Saleyard operator records 'from PIC', NLIS, NVD, TSS serial code and the date of arrival for each incoming animal or mob/lot
- The movement of cattle must be recorded on the NLIS database when sent to a saleyard by the saleyard operator.

Participants

- Livestock seller
- NLIS
- Livestock agents
- Saleyard operator - saleyard managers / superintendents, stock handlers
- Livestock Transporters and drivers
- Saleyard animal welfare officers [Australian Animal Welfare Standards and Guidelines Livestock at Saleyards and Depots 2018]

Livestock management within saleyard

The saleyard will have an animal welfare system that includes an animal welfare incident report register with the ability to:

- record written animal welfare issues and/ or complaints. This written report should detail the welfare issue, livestock involved, selling agency, owner /consignor, animal identification, place (pen number), time, date, and the person reporting issue
- record the action taken to address the issue (time, date, action, person/s performing action).
- Monitor and record animal welfare incidents and action taken to address the issue
- Monitor and record biosecurity incidents and action taken to address the issue
- Record animal movements within saleyard property
- Record animal births and deaths within the saleyard property and action taken to address the issue
- Monitor and record feed, water and veterinary treatments provided to animals
- Assess animals unfit to load or put for sale.

Participants

- Saleyard operator
- Saleyard managers / superintendents,
- Saleyard staff,
- Stock persons,
- Saleyard animal welfare officer [Australian Animal Welfare Standards and Guidelines Livestock at Saleyards and Depots 2018].

Tasks related to Traceability

A calf born at or in transit to a saleyard does not have to be identified with an NLIS device if it is sold with its dam and is sent directly to the buyer's property. It must subsequently be identified with a post-breeder device for the buyer's property. If separated from the dam, the calf must be identified with a special identifier before it leaves the saleyard.

[4] www.nlis.mla.com.au

End of life

If any cattle die or are destroyed while still at a saleyard, the saleyard operator must transfer the cattle to the 'deceased' listing on the NLIS database by the close of business on the next working day after the event. Injured cattle that are sent from a saleyard to a knackery must be transferred to the knackery PIC, where they will be recorded as deceased.

Injured cattle that are being humanely transported to a knackery for slaughter, or which have been euthanised by a knackery operator on a property and the carcase is being sent to a knackery for processing, must be properly identified with an NLIS device, be accompanied by an NVD or TSS with the PIC of the property from which the animal has been sent. This applies to all stock sent to a knackery from a property, saleyard, abattoir or any other place.

Dead stock may be sent without an NLIS device to a Council waste management facility for disposal.[5]

Tasks related to Traceability

- Saleyard operator must transfer the NLIS of cattle that are destroyed or die to 'deceased' on the NLIS database
- Saleyard operator must transfer NLIS of injured cattle sent to knackery to knackery PIC and be accompanied by an NVD or TSS with the PIC of the property from which the animal has been sent
- Disposal of dead stock to a Council waste facility may be sent without NLIS device.

Participants

- Saleyard operator
- Saleyard managers / superintendents
- Saleyard staff
- Stock persons
- Saleyard animal welfare officer [Australian Animal Welfare Standards and Guidelines Livestock at Saleyards and Depots 2018].

Livestock, not destined for export may be dispatched from a saleyard to an abattoir, new owner, another saleyard, or returned to original owner if unsold. The operator of a saleyard (owner or manager) must ensure that relevant information about all cattle sold in the saleyard is provided to the NLIS database by on the day of the sale.

Tasks related to Traceability

- The buyer must provide the PIC of the property to which the stock are to be sent to the selling agent before the stock leave the saleyard;
- The agent then provides this information to the saleyard operator before any purchased cattle leave the saleyard.

Movement from a saleyard to a TSR (Travelling Stock Reserve):

- Must be recorded by the saleyard
- The purchaser of the stock must advise the saleyard of the TSR PIC and the stock permit identifier as soon as the sale is concluded
- They must then ensure the arrival of the cattle on their property is recorded on the NLIS database within two days or before they are moved to another property, whichever occurs first.

The saleyard operator:

- Must transfer cattle to a buying agent's PIC code if the agent has bought the cattle on behalf of one or more clients or themselves and does not know which property which cattle will be sent to.
- May transfer cattle to the selling agent's code if neither the agent nor the buyer has provided the saleyard operator with the PIC for the property of destination by the end of the sale. This arrangement is sanctioned by the industry's own code of practice and provided by the Regulation if the selling agent is deemed to still be in possession of the cattle. The saleyard operator does not need the agent's permission to do this and the agent may be unaware that this has happened.
- The agent must make a record of the actual location of cattle while they are assigned to the agent code, keep that record for at least two years, and produce the record for an authorised officer on request.

Participants

- Saleyard operator
- Selling agent
- Livestock buyer/ purchaser
- Buying agent.

Tasks related to Traceability

Cattle being exported must be properly identified with an NLIS device before leaving their NSW property. The owner or person in charge of cattle at the point of embarkation in NSW for overseas export must provide the relevant delivery information to the NLIS database with two days of the date of embarkation.

The relevant delivery information includes:

- Particulars of identification (radio frequency identification device (RFID) or NLIS number) of the cattle
- PIC of the property where the stock was last held
- EUSY number (if being traded into the European Union)
- Date of embarkation, and
- That the cattle have been exported. This is recorded on the NLIS database as eight (8) Es (EEEEEEEE) as the PIC of the property of destination, together with the export certificate number as the NVD number.

Participants

- Saleyard operator
- Livestock owner or person in charge of livestock
- Livestock agent.

For each of the identified saleyard activities, **critical tracking events** (CTEs) establish identity and enable traceability and compliance with traceability-related regulation are summarised as follows.

[5] NSW Biosecurity Procedure

Critical Tracking Events (CTEs)

are events that relate to the identity, movement and transformation of the food product.

Saleyard activity	CTE code	Critical Tracking Events (CTEs)
Establish master data identification of saleyard	**SY CTE1**	**Property Identification** Apply for Global Location Number (GLN) Apply for Property Identification Code (PIC)
	SY CTE2	**Registration of facilities** Create a NLIS 'Saleyard' account with a saleyard identifier (Saleyard ID 'EUSY' number) European Union Cattle Accreditation Scheme (EUCAS) accreditation for exporting saleyardsExport Establishment Number received
	SY CTE3	**Supplier master data** For suppliers of feed, water, veterinary and cleaning chemicals to the saleyard
Receiving livestock for sale	**SY CTE4**	Receive NVD/Waybill/TSS Record received livestock to NLIS Record pen location within saleyard property
	SY CTE5 **SY CTE5-1**	Water receipt Water application
	SY CTE6 **SY CTE6-1**	Chemical receipt Chemical application
	SY CTE7 **SY CTE7-1**	Stockfeed and fodder receipt Stockfeed and fodder usage
Livestock born in transit or at saleyard	**SY CTE8**	Record animal births during transit Record animal births at saleyard property and actions taken
End of life and waste handling	**SY CTE9**	Animal disposal – identification and notification - NLIS – 'deceased' Injured - Transfer PIC to knackery NVD or TSS with dispatch property
Dispatch from saleyard	**SY CTE10**	Transport booking
	SY CTE11	Prepare animals for dispatch
	SY CTE12	Prepare consignment documentation
Dispatch for live export	**SY CTE13**	Identify cattle / livestock NLIS PIC where last held Embarkation date PIC of destination property, export certificate

Key data elements

Key Data Elements (KDE) ensure that captured and recorded data can be interpreted and used as relevant and required by all supply chain partners. Key Data Elements define Who, What, When, Where and Why for each Critical Tracking Event identified above.

Event code	CTE	Key data elements
SY CTE1	**Saleyard property identification**	**Property Identification Code (PIC)** The PIC is a unique 8-digit code issued by state authorities, developed for biosecurity traceability. Input data is • Applicant name • Trading name • Business address • name of property • property address • property area in hectares • Lot and DP# (rates notice) • Property owner • Name • Address • Contact details

Request for PIC	
Who	Saleyard Operator, PIC Issuing Agency
What	Saleyard Facility address details
When	Date/Time of issuance of Global Location Number (PIC)
Where	Issuing Agency
Why	Registration of property with state agency

Information to be shared to a traceability platform

- Property Identification Code (PIC) of Saleyard

Global Location Number (GLN)

A unique identifier for supply chain partners using a consistent format for whole-of-supply-chain ID

Request for GLN	
Who	Saleyard Operator GLN Issuing Agency
What	Saleyard, location legal entity
When	Date/Time of request/issuance of Global Location Number (GLN)
Where	GLN Issuing Agency
Why	Physical Location set up and identification

Event code	CTE	Key data elements
SY CTE 2	**Registration of facilities**	Create an NLIS 'Saleyard' account with a saleyard identifier (Saleyard ID 'EUSY' number), linked to PIC Saleyards handling livestock destined for export to European Union countries, managers to apply for European Union Cattle Accreditation Scheme (EUCAS) accreditation of their saleyard. www.agriculture.gov.au Saleyards handling livestock destined for export to participating countries, managers apply for accreditation to the Exporter Supply Chain Assurance System (ESCAS) www.agriculture.gov.au **Request for Export Establishment Licence Number** **Who** Saleyard operator Issuing Agency **What** Saleyard Facility **When** Date/Time of request/issuance **Where** Issuing Agency **Why** EUCAS Export registration number Information to be shared to a traceability platform • Saleyard PIC • Global Location Number (GLN) • EUCAS EUSY/ESCAS registration numbers
SY CTE3	**Supplier Master Data**	**Supplier record** Create Master Data records for suppliers to the Saleyard • Name/Supplier ID • Location/GLN • Date of receipt • Name of product • Date of application • Export Slaughter Interval **Supplier Master Data** **Who** Saleyard Operator, Supplier of feed, water, veterinary and cleaning chemicals to the saleyard **What** Supplier Products, Locations **When** New product or new supplier engagement **Where** Saleyard **Why** Supplier products & traceability information
SY CTE4	**Receiving livestock for sale**	For livestock received into the property, data to be recorded – generally on NVD • NLIS tag numbers • date the livestock arrived on the property; date of sale • for livestock PIC of the property of dispatch (or agent code) • PIC of the property of receival (or agent code) • Saleyard PIC • National Vendor Declaration serial number (NVD) or TSS • Stock permit number • Number of head of stock in the consignment (sheep and goats only) • Tags allocated to animals missing tags • Health Statements – serial codes Check EW (Early Warning) status within the National Livestock Identification System (NLIS) database for livestock with a high biosecurity risk. For livestock moving from interstate to the property there are specific requirements in each receiving state and data varies according to species. **Livestock Receipt** **Who** Livestock Supplier, Property Owner **What** Purchase Order, Delivery Note, Logistics/Pallet ID, Product ID, Quantity, Batch, Date Information, Saleyard PIC **When** Date/Time of Receipt **Where** Receipt location **Why** Receipt of product **Information shared to a traceability platform** • eNVD serial number for each animal/mob/ lot of livestock receival • Attached Animal Health Declarations – serial codes • Livestock ID moved to Saleyard PIC on NLIS database
SY CTE5	**Water receipt and application**	Saleyard water has a number of sources –dams; surface water in streams and rivers; roof collected; water transported into the production site; underground water accessed through bores and general rainfall absorption. Water license holders are required to record water usage. Data elements held on saleyard management systems/saleyard water records Water received • Water source • Date received and applied Water applied: • Amount provided to/consumed by livestock • Total water consumption – megalitres

Event code	CTE	Key data elements
		Chemical application
		Who Saleyard Operator If applied to a specific animal, then Animal Identification
		What Chemical – Product Identifier, Batch number, Serial number (if applicable) Production Date, quantity used
		When Date/Time of chemical usage
		Where Property/location where chemical used
		Why Chemical usage records Transaction records Withholding periods/Export Slaughter Intervals
		Information shared to a traceability platform • Chemicals received, batch, quantity, supplier • Farm chemicals application record document code • Veterinary chemicals application record document code • Withholding periods for eNVD/mNVD/animal health declarations • Export Slaughter Intervals
SY CTE7	**Stockfeed and fodder receipt and usage**	**Saleyard records will contain records of introduced feed for animals** • Supplier ID • Feed type and quantity • Date of receipt • Lot/bale identifier • Location of on-property storage • Feed amount x location x livestock IDs
		Key Data Element example/guidance
		Stockfeed and fodder receipt
		Who Supplier – Stockfeed and fodder Saleyard Operator
		What Stockfeed and fodder– Product Identifier, Batch number, Serial Number (if applicable) Production Date, quantity delivered
		When Date/Time of delivery
		Where Specific Receipt location
		Why LPA/regulator requirement Production record of goods receipt References: Purchase Order number, Supplier Delivery Note
		Stockfeed, fodder and bedding application
		Who Saleyard Operator If applied to specific animal, then Animal Identification
		What Stockfeed and fodder– Product Identifier, Batch number, Serial Number (if applicable) Production Date, quantity used
		When Date/Time of usage
		Where Property/Location where Stockfeed and fodder were used
		Why Stockfeed, fodder and bedding usage records Transaction records Withholding periods

Event code	CTE	Key data elements
		Information shared to a traceability platform • Feed records available/record code
SY CTE8	**Livestock born in transit to or at saleyard facility**	Livestock born in transit and sold with their dam do not require an NLIS. The animal must be subsequently identified with a post-breeder device at the buyer's property. Separated young must be identified with a 'special identifier' before it leaves the saleyard.
		Key Data Element example/guidance
		Livestock Birth
		Who Saleyard operator /Transporter, Buyer
		What Special Identifier for newly born livestock
		When Date/Time of birth
		Where location
		Why Livestock Birth record
		Information shared to a traceability platform • Seller's PIC • 'special identifier' number • Post breeder device • Buyer's PIC
SY CTE9	**Animal Disposal – Identification and notification**	**Council waste management facility disposal** Deceased stock may be sent without a NLIS device to a Council waste management facility. A national vendor declaration and waybill (NVD/eNVD), a transported stock statement (TSS), or a permit issued by an inspector is required. The vendor must as a minimum provide the following information on the NVD or TSS: • Property identification code (PIC) of the property where the journey commenced. This is pre-printed on the NVD and should be written on a TSS. • Property identification code (PIC) of the property where the journey ends, typically a knackery. • Number and description (breed, sex, type) of the stock. • Date of movement
		Key Data Element example/guidance
		Animal Disposal
		Who Saleyard operator /Transporter/Knackery, Rendering Plant, accredited disposal site
		What Animal disposed ID (NLIS), lot number if mob ID, serial number
		When Date/Time of disposal
		Where location
		Why Disposal regulations References: Disposal Permit Number, waybill number, PIC

Event code	CTE	Key data elements
		Information shared to a traceability platform • Animal ID – tag number • Property PIC number of knackery • Date of death/disposal
SY CTE10	**Transport booking** **[Dispatch from saleyard]**	Most transport bookings are completed on-line with consignors commonly having a client account established. A Consignment Note generally contains the information equivalent to the eNVD/ waybill or TSS, with the addition of the transporter's terms and conditions of carriage covering payment and liability. Consignor • Name of owner • Address of owner • Address of saleyard • Date loaded • Name of consignor • Address of consignor Consigned stock • Breed • Sex • NLIS tag numbers • Ear marks • Ear marks • Brands • Number Consignee • Name • Address • Delivery address Driver • Name • Contact details Vehicle • Registration number

Dispatch	
Who	Saleyard operator /Transporter/Knackery,
What	Animal dispatch ID (NLIS), lot number if mob ID, serial number
When	Date/Time of dispatch
Where	location
Why	Product dispatch

Event code	CTE	Key data elements
		Information shared to a traceability platform • Consignment Note number • Product ID, Qty, batch • Vehicle details • Customer Order number
SY CTE11	**Prepare animals for dispatch** **[Dispatch from saleyard]**	Before animals leave the saleyard, an inspection should be completed in accordance with the National Cattle Health Declaration, National Sheep Health Declaration and Goat Health Declaration requirements in each state or territory; also see LPA Preparation for Dispatch of Livestock and Is the animal Fit to Load Guide and checklist • www.integritysystems.com.au; publications.mla.com.au **Information shared to a traceability platform** • Feed and water records (time off water measurement begins) • Time of inspection prior to loading
SY CTE12	**Prepare consignment documentation** **[Dispatch from saleyard]**	**For electronic National Vendor Declaration and Waybill** • www.integritysystems.com.au • Owner name (or buying agent name) • Owner address • Saleyard PIC • Destination PIC (or agent's code; agent to record actual location) • NLIS tag #s of consigned animals Movement from a saleyard to a TSR (Travelling Stock Reserve): • must be recorded by the saleyard • the purchaser of the stock must advise the saleyard of the TSR PIC and the stock permit identifier as soon as the sale is concluded • They must then ensure the arrival of the cattle on their property is recorded on the NLIS database within two days or before they are moved to another property, whichever occurs first. • Buyers will ask for the Animal Health Declaration to accompany the National Vendor Declaration and Waybill. www.farmbiosecurity.com.au • PIC from which animal is moving • E-NVD and Waybill/Transported Stock Statement # for the consignment • Number of animals in the consignment • Name of person completing the declaration • Date of completing the declaration

Event code	CTE	Key data elements	
		Order Preparation	
		Who	Saleyard Operator Customer/Buyer
		What	Product ID, Batch, Quantity Dispatched, Order number, Logistics Unit ID (SSCC), Container Number, Transfer Certificate, Bill of Lading
		When	Date/Time of load preparation
		Where	Buyer Location
		Why	Order Preparation, stock picking
		Information shared to a traceability platform	
		• Inspection certificate # for the consignment • Animal Health Declaration Number • e-National Vendor Declaration number/eNVD QR code	
SY CTE13	**Dispatch for live export**	Addition documentation • EUSY number – European Saleyard number / code – to be linked to saleyard PIC	
		Delivery to Port	
		Who	Saleyard Operator/ Livestock Exporter Transport Company
		What	Product ID, Batch, Quantity Export Order number, Logistics Unit ID (SSCC), Container Number, Transfer Certificate, Bill of Lading, Shipment ID, Carrier ID
		When	Date/Time of delivery
		Where	Warehouse despatch location
		Why	Delivery to Port
SY CTE13-1	**Receipt at Port**	**Receipt at Port**	
		Who	Transport Company Port/Terminal
		What	Product ID, Batch, Quantity Export Order number, Logistics Unit ID (SSCC), Container Number, Transfer Certificate, Bill of Lading, Shipment ID, Carrier ID, Export Declaration Number
		When	Date/Time of receipt
		Where	Port/Terminal Location
		Why	Receipt at Port
		Information shared to a traceability platform	
		• Receipt Record • Bill of Lading • Receipt Date • Shipment ID • Port ID	

Event code	CTE	Key data elements	
SY CTE 13-2	**Goods loaded onto Vessel**	**Transfer to Vessel**	
		Who	Port/Terminal
		What	BIC Number, Vessel ID, Bill of Lading
		When	Date/Time of transfer
		Where	Port/Terminal Location
		Why	Transfer to Vessel
		Information shared to a traceability platform	
		• Vessel Number • Location • Date of Transfer • Container ID • Bill of Lading	
SY CTE 13-3	**Delivery to Importer**	**Final Delivery**	
		Who	Transport Carrier
		What	Customer Order, Bill of Lading, Logistics Units, Product ID, Batch
		When	Date/Time of delivery
		Where	Port/final destination
		Why	Final Delivery
		Information shared to a traceability platform	
		• NLIS ID of the animal/mob • Saleyard PIC • EUSY number as required • date of embarkation, and • that the cattle have been exported. This is recorded on the NLIS database as eight (8) Es (EEEEEEEE) as the PIC of the property of destination, together with the export certificate number as the NVD number	

Application of GS1 global data standards

Adoption of global data standards enables data sharing between businesses through using common formats. These formats allow a business to identify participants, locations, products, processes and events in the supply chain.

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Locations	Sales Yard	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: https://www.gs1.org/standards/id-keys/gln
Date/Time	Date of Sale	Year -Month-Date/Time/Time zone	**YYMMDD**	Whilst human readable date formats can vary e.g., 21 December 2020, December 21, 2020, the structure of the date format to be encoded into systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD
Product Identifiers	Stock Feed	Global Trace Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org
Traceability Attributes	Batch/Lot code (AI 10), Serial Number (AI 21), Pack date (AI 13), Production date (AI 11), Best Before Date (AI 15), Expiry Date (AI 17)	Each Traceability attribute has its own data format requirements. Please refer to the detailed information found via the link provided.	**Varying depending on Traceability attribute**	Traceability Attributes, such as Batch or Lot Number or Serial Number etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format. List of Application Identifiers: www.gs1au.org
Logistics Units	Pallet of Finished Goods, Crate or Box	Serial Shipping Container Code (SSCC)	**N18**	Logistic unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. Logistic units take many forms, a single box containing a limited number of products, a pallet of multiple products, or an intermodal container containing multiple pallets. www.gs1au.org
Shipment	Grouping of logistics units	Global Shipment Identification Number (GSIN)	**N17**	The Global Shipment Identification Number (GSIN) is a number assigned by a seller and shipper of goods to identify a shipment comprised of one or more logistic units that are intended to be delivered together. www.gs1au.org
Consignment	Grouping of logistics units assigned by the transport company	Global Identification for Consignment (GINC)	**N30**	The Global Identification Number for Consignment can be used by companies to identify a consignment comprised of one or more logistic units that are intended to be transported together. www.gs1au.org
Weights & Measures	Variable count of items. Count of items on a logistics unit. Total weight of pallet in NET Kilos. Total Length of goods delivered in Metres. Total volume of goods delivered in Cubic Metres	Must be accompanied with a GTIN	**Varying**	Variable measure trade items use GS1 Application Identifier data fields that contains the quantity or dimension of a variable measure trade item. It also denotes the unit of measure. These element strings are used to complete the identification of a variable measure trade item. They contain information such as the weight, size, volume, or dimension of a variable measure trade item.
Assets	Returnable assets (GRAI): e.g. IBC or Individual assets (GIAI): e.g. A crate	Global Returnable Asset Identifier (GRAI) Global Individual Asset Identifier (GIAI)	**N13**	Can be identified as an asset type only or an optional serial number can be added to distinguish individual assets. www.gs1au.org

Useful Links

Licences

QLD ablis.business.gov.au

Standards and Guidelines

NLIS Cattle Traceability Standards
www.nlis.com.au

Animal Health Australia Australian Animal Welfare Standards and Guidelines: Livestock at Saleyards and Depots Saleyard Welfare Standards 2018
www.animalwelfarestandards.net.au

MSA Standards Manual: Saleyards
www.mla.com.au

NSW www.dpi.nsw.gov.au

Glossary

eNVD

From January 2021 the eNVD - an electronic version of the paper-based LPA National Vendor Declaration (supersedes eDEC)
www.integritysystems.com.au

Export Slaughter Interval (ESI)

The **ESI** is the minimum time recommended after an animal is treated before slaughter for consumption in an overseas country that has a lower maximum residue limit than applies in Australia.

EUCAS

The European Union Cattle Accreditation Scheme (EUCAS) is a national animal production scheme that guarantees full traceability of all animals through the National Livestock Identification System (NLIS). EUCAS allows Australia to meet EU market requirements for beef by segregating cattle that have never been treated with hormone growth promotants (HGPs).

Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Livestock & Meat Export

Image: Meat & livestock Australia (MLA)

Livestock Export

The Australian livestock export industry is valued at AUD $1.8 billion annually. Best practice animal traceability systems through identification, location and movement tracking provide monitoring of these supply chains in transportation, handling and processing. Australia supplies breeding stock for many countries to improve their national herds and these animals are regularly shipped by air and sea.

The activities that generally take place along the Australian live animal export supply chain include:

- Establishment
- Livestock Export Depots
- Preparation of Export documentation
- Loading live animals for shipment
- In-transit monitoring
- In-country traceability until slaughter
- Breeder livestock export (no traceability requirement post disembarking at export port).

Livestock export is highly regulated. The following description from the Australian Livestock Exporters Council indicates the regulatory requirements to establish a live export business –

- Exporters must be licensed by the Australian Government
- Livestock must be selected, prepared and cared for in compliance with legislated animal welfare standards
- Livestock must only be prepared in Australian Government-approved quarantine premises, known as registered premises
- Skilled personnel including industry-accredited stockpersons, and in some cases government approved veterinarians, must accompany and care for the livestock on the voyage (via sea and air).
- Livestock export vessels must hold an Australian Certificate for the Carriage of Livestock issued by the Australian Maritime Safety Authority (AMSA)
- Exporters must maintain control, traceability and ensure animal welfare of livestock from discharge through to the point of slaughter in their supply chains
- Facilities in exporter supply chains must be independently audited on a regular basis in line with the government's auditing and risk management requirements
- Exporters must report on the outcomes of each voyage, including mortalities, which are then reported on a six-monthly basis to the Australian Parliament. If mortalities exceed legislated levels, a comprehensive investigation is undertaken and conditions may be placed on future shipments to mitigate risks
- Exporters must provide the Australian Government with an end of processing (EOP) report (within 10 days of the slaughter of the last animal within a consignment for cattle and buffalo). An exporter must also submit an independent performance audit report (IPAR).

ALEC auslivestockexport.com/

Establishment

In order to export live animals, a livestock exporter needs to have an Approved Export Program (AEP). The Australian Standards for Export of Livestock (ASEL) apply, from the production site, through export quarantine feedlots,depots and air and sea shipment to the destination/import port. If exporting feeder/slaughter animals, an Approved Exporter Supply Chain Assurance System (ESCAS) is required, which covers the livestock from the import port through transport and lotfeeding to slaughter.

Registration of export premises

Registration of livestock export premises is needed to hold, assemble or prepare livestock for export. The license defines the need to obtain recognition/certification and registration to undertake the business activity. To be eligible for this registration the exporter needs to provide the relevant key information:

- An accurate map or plan clearly showing the location, boundaries and topographic layout of the premises in relation to adjoining property;
- Detailed plans and specifications of the premises showing fences, water and feed troughs, shelters, drainage, food and water storage, isolation areas and entry and access points;
- A copy of an operations manual;
- Evidence that the applicant has control of the day-to-day operation of the premises and has any approval or licence necessary to operate the premises from the responsible State and Territory authority;
- The proposed species, and class or classes, of livestock that the applicant proposes to prepare at the premises;
- The greatest number of livestock that the applicant proposes to hold and assemble at the premises at the one time (and, if the livestock will not all be of the same species, the greatest number of each species);
- The months of operation which the premises are proposed to be used to hold and assemble livestock for export;
- Meteorological evidence regarding the weather in the area of the premises during the months of operation;
- Evidence showing that there is adequate shelter on the premises for livestock during the months of operation; and
- A declaration that the operations manual and premises are unchanged if renewing premises registration.

Tasks related to traceability

- Register the live animal and meat export premises and for the relevant export licenses and create the relevant master data

Participants

- Export company
- Department of Agriculture, Water and the Environment
- State and local authorities managing food safety and business registrations
- State property identification code (PIC) issuing agency
- Issuing body for Global Location Numbers (GS1).

Compliance with livestock export standards

Health, welfare and traceability of Australian livestock being exported are covered by the *Australian Standards for the Export of Livestock* (from Australian feedlot to landing in destination port) and the *Exporter Supply Chain Assurance System* (required for monitoring livestock until slaughter in market destination).

Compliance with Australian Standards for Export of Livestock

The Australian Standards for the Export of Livestock (ASEL) sets the basic standards, as required by Australian, state and territory government legislation, for sourcing and on-farm preparation of livestock; land transport of livestock for export; management of livestock in registered premises; vessel preparation; loading; on-board management; and air transport of livestock.

ASEL set the requirements for exporting livestock from Australia by sea and air. The standards outline the minimum animal health and welfare conditions exporters must meet. The current version that exporters must comply with is ASEL 3.1.

ASEL covers operating standards relating to:

- Sourcing and preparation of livestock for export by sea
- Land transport requirements for the export of livestock by sea
- Management of livestock in registered premises for exports by sea
- Planning and vessel preparation for export of livestock by sea
- Loading onto vessels and onboard management of livestock for export by sea
- Sourcing, preparation, land transport and export of livestock by air.

The ASEL Standard for animal identification (Standard 1.1.8) requires that the state and territory National Livestock Identification System (NLIS) requirements for animal identification are the standard for export livestock identification.

Figure 1: Live animal export supply chain steps **Source:** DAWE[1]

Compliance with Exporter Supply Chain Assurance System (ESCAS)

ESCAS sets the standards the Australian Government requires once a consignment arrives in the importing country. Key components of the traceability aspects of export of livestock are contained in the ESCAS as an assurance system based on four principles:

1. *Animal welfare:* animal handling and slaughter in the importing country conforms to World Organisation for Animal Health (OIE)
2. *Control through the supply chain:* the exporter has control of all supply chain arrangements for livestock transport, management and slaughter. All livestock remain in the supply chain
3. Traceability through the supply chain: the exporter can trace all livestock through the supply chain
4. *Independent audit:* the supply chain in the importing country is independently audited (see www.agriculture.gov.au).

Exporters are required to have an ESCAS in place for all feeder and slaughter livestock. ESCAS does not apply to export of breeder livestock. In order for the Department of Agriculture, Water and the Environment to consider a NOI (and Consignment Risk Management Plan (CRMP) for sea) for approval, exporters must have an approved ESCAS in place for the relevant market.

Livestock Global Assurance Program (LGAP)

In 2016, the Australian Government made a commitment to implement LGAP, a third-party quality assurance and conformity assessment scheme. LGAP is an industry-initiated program designed to deliver on ESCAS requirements and ensure the welfare of exported feeder and slaughter livestock from discharge in-market up to and including the point of slaughter.

Tasks related to traceability

- Obtain approved Exporter Supply Chain Assurance System (ESCAS)
- Comply with the ESCAS standards, e.g. As part of ESCAS traceability auditing, transport dockets are inspected – "what left and what arrived" is reconciled.

Participants

- Producer, Feedlot Operator
- Export company
- Importer
- Livestock transport operators In-country feedlot operator
- Department of Agriculture, Water and the Environment
- World Organisation for Animal Health (OIE).

Livestock Export Depots

Traceability requirements are described in sections of this Red Meat and Livestock Traceability Guide which cover on-farm production, livestock transport and feedlots. Livestock export depots are specific to the holding and loading of livestock for air and sea shipment at air and sea ports in Australia.

The *NLIS (Cattle) Traceability Standards* (2016) cover the traceability requirements for livestock export depots as follows -

S8.1.1 Property identification

S8.2.1 Cattle identification

S8.2.2 National Vendor Declaration

S8.3 Movement information

S8.3.2 PIC of export

S8.3.3 Reporting of living head exported

S8.3.4 Reconciling numbers at the end of each shipment

S8.3.5 Resolving inconsistencies in records

S8.3.6 Acting on outstanding issues and messages from NLIS

S8.4 Dealing with food safety, biosecurity, market eligibility, device or PIC status alerts and notifying buyers prior to sale.

For goats and sheep, identification may be at a mob/lot level, depending on state and territory requirements. The above standards apply, with cattle identification replaced by mob/lot identification.

Tasks related to traceability

- Comply with the NLIS traceability standards

Participants

- Livestock Exporter
- Livestock Export Depot
- Airline and Livestock Carrier
- Importer
- Livestock transport operators
- Department of Agriculture, Water and the Environment
- NLIS.

Obtaining an Approved Export Program (AEP)

As a part of an exporter's approved arrangement, an Approved Export Program (AEP) contains instructions to Australian Government Accredited Veterinarians (AAVs) preparing livestock for export (land based AAVs) or accompanying livestock on sea voyages (see www.agriculture.gov.au).

An AAV may undertake several activities while preparing animals for export through to their disembarkation in the importing country, such as:

- Monitoring the health and welfare of the eligible live animals
- Examining, testing or treating the eligible live animals
- Keeping records on how the AEP is implemented
- Making declarations attesting that the requirements of the AEP were completed
- Otherwise reporting on the implementation of the AEP.[2]

[1] www.agriculture.gov.au

[2] Australian Government Veterinarians www.agriculture.gov.au

Tasks related to traceability

- Obtain Approved Export Program (AEP)

Participants

Australian Government Accredited Veterinarians (AAVs)

- Department of Agriculture, Water and the Environment.

Preparation of export documentation

Submitting a Notice of Intention to Export (NOI)

A licenced exporter must submit their Notice of Intention to Export (NOI) livestock at least 10 working days before the proposed export, or 10 working days before any required quarantine or isolation begins. This is required under the Export Control (Animals) Order 2004.

The NOI must be submitted for each consignment of livestock. The NOI must identify the ESCAS approval that will apply to the proposed export.

The Tracking Animal Certification for Export (TRACE) system is being implemented to manage the application and approval processes for consignments of all live animals exported from Australia.

The TRACE system currently provides functionality for livestock exports and related applications, including electronic submission of Notice of Intention to Export livestock by sea and air transport for licensed livestock exporters, and livestock export licence, registration of premises and Accredited Veterinarian applications.
It is expected that exporters use the TRACE electronic submission system to submit the NOI.

Tasks related to traceability

- Submit the Notice of Intention to Export (NOI)

Participants

- Export company supplier
- Department of Agriculture, Water and the Environment

Loading live animals on shipping vessels and aircraft

Among other things, the Australian Standards for the Export of Livestock (ASEL) sets the basic standards, as required by Australian state and territory government legislation, for loading of live animals on aircraft and vessels.

Preparation of a loading plan

Before loading of livestock for transport to the port of embarkation, a loading plan for the vessel on which the livestock are to be transported must be prepared in writing by the exporter. The plan needs to be compliant with relevant vessel safety standards.

It is important to ensure that all movement documents and paperwork travelling with the livestock are complete and signed. These may include, for example, an LPA NVD/Waybill, Animal Health Declarations, Travelling Stock Statement or Waybill.

The Livestock Production Assurance (LPA) program is the on-farm assurance program that underpins market access for Australian red meat. LPA National Vendor Declarations (eNVDs) provide evidence of livestock history and on-farm practices when transferring livestock through the supply chain.

Animal Heath Declarations are a way for producers to provide information about the animal health status of their flocks and herds. Buyers should ask for a copy and use the information provided to determine the health risks associated with the animals offered for sale.

Loading for sea transport

Livestock shipment relies on experienced livestock handlers, veterinary inspection and the use of a Loading Plan for shipment.

Key activities based on animal identification for traceability at loading of livestock are –

- Recording the identity of all animals/mobs that are fit to load
- Recording the live animals remaining at the end of a shipment at the livestock export depot
- Reconciling loaded livestock on the NLIS database
- Recording livestock that are disposed of from the port, in compliance with relevant state and territory legislation.

Loading for air transport

For livestock that are *en route* or at the airport but required to return to an approved premises or other premises:

- in addition to any requirements under the Land Transport Standards, the livestock must be rested for a minimum of 24 hours prior to being reloaded for transport; and
- the exporter must keep records of animal movements, time off food and water, and rest periods, and retain these for at least 2 years after the date of export.

Livestock exported by air must be exported in compliance with the International Air Transport Association (IATA) Live Animal Regulations (LARs). Where there is a variance between the IATA Live Animal Regulations and these standards, ASEL applies.

Where cattle are moved to the final export destination (i.e. the port of departure where they are loaded onto the export vessel or aircraft), the exporter must ensure that the cattle are transferred on the NLIS database to the port PIC then to the default export PIC, 'EEEEEEEE' (also known as the '8Es'), within two days of that movement.

Tasks related to traceability

- Book live animal ship/air transport
- Prepare the live animal loading plan for the vessel/aircraft
- Inspect the livestock for fitness to travel
- Load live animals on shipping vessels/ aircrafts according to the loading plan
- Record livestock movement to NLIS database
- Record animal disposal to NLIS database

Participants

- Exporter
- Shipping Line/Airline
- Australian Government Accredited Veterinarian (AAV)
- Stock handler
- Vessel/Aircraft Captain
- NLIS.

In-country traceability until slaughter

ESCAS sets the standards the Australian Government requires once a consignment arrives in the importing country. Under ESCAS, exporters are required to demonstrate they have a supply chain that delivers internationally agreed tracking /accountability (i.e. traceability and control) of animals throughout the supply chain; and independent auditing and reporting to government.

Under ESCAS, all exporters must be able to trace or account for and control livestock through the supply chain, to demonstrate that all livestock went only to facilities that had been independently audited, found to be compliant and included in the approved supply chain. Supply chains differ in complexity, which has flow-on effects for traceability requirements.

Simple linear supply chains are easier for demonstrating traceability. However, complex supply chains use multiple facilities which may also be included in other exporter supply chains, increasing the complexity of reporting necessary to demonstrate traceability.

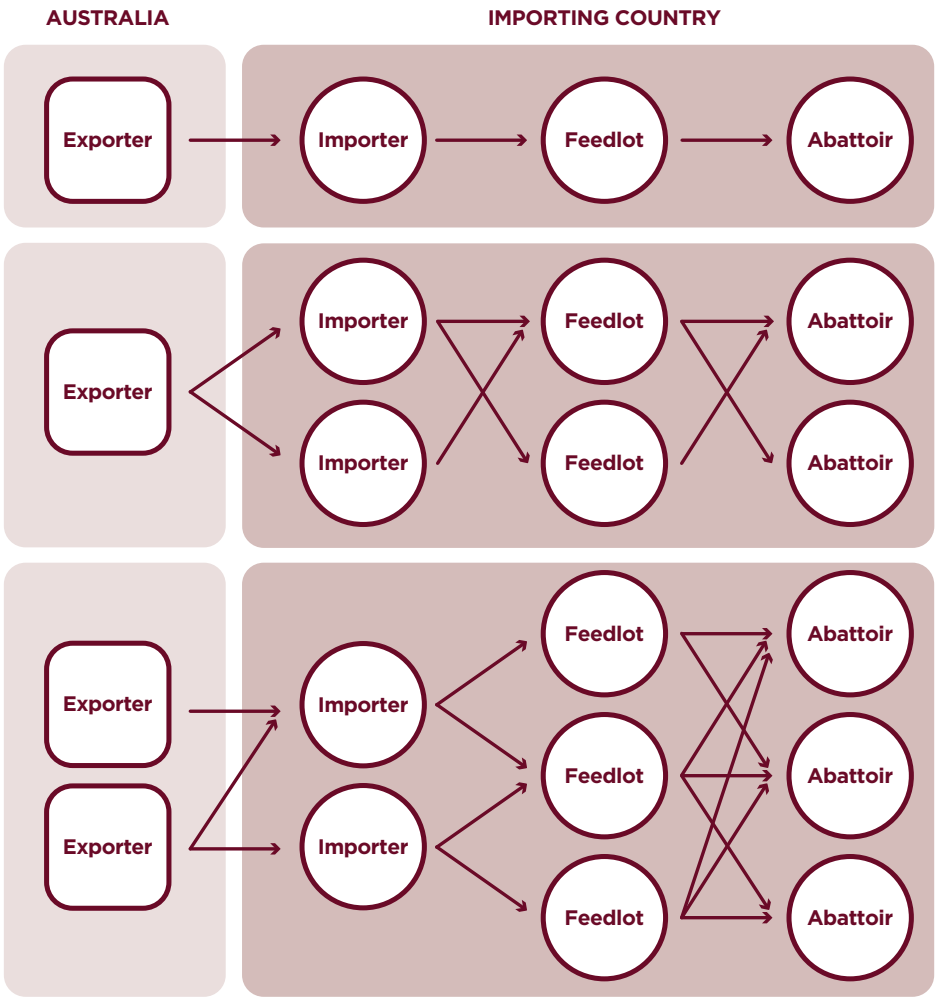
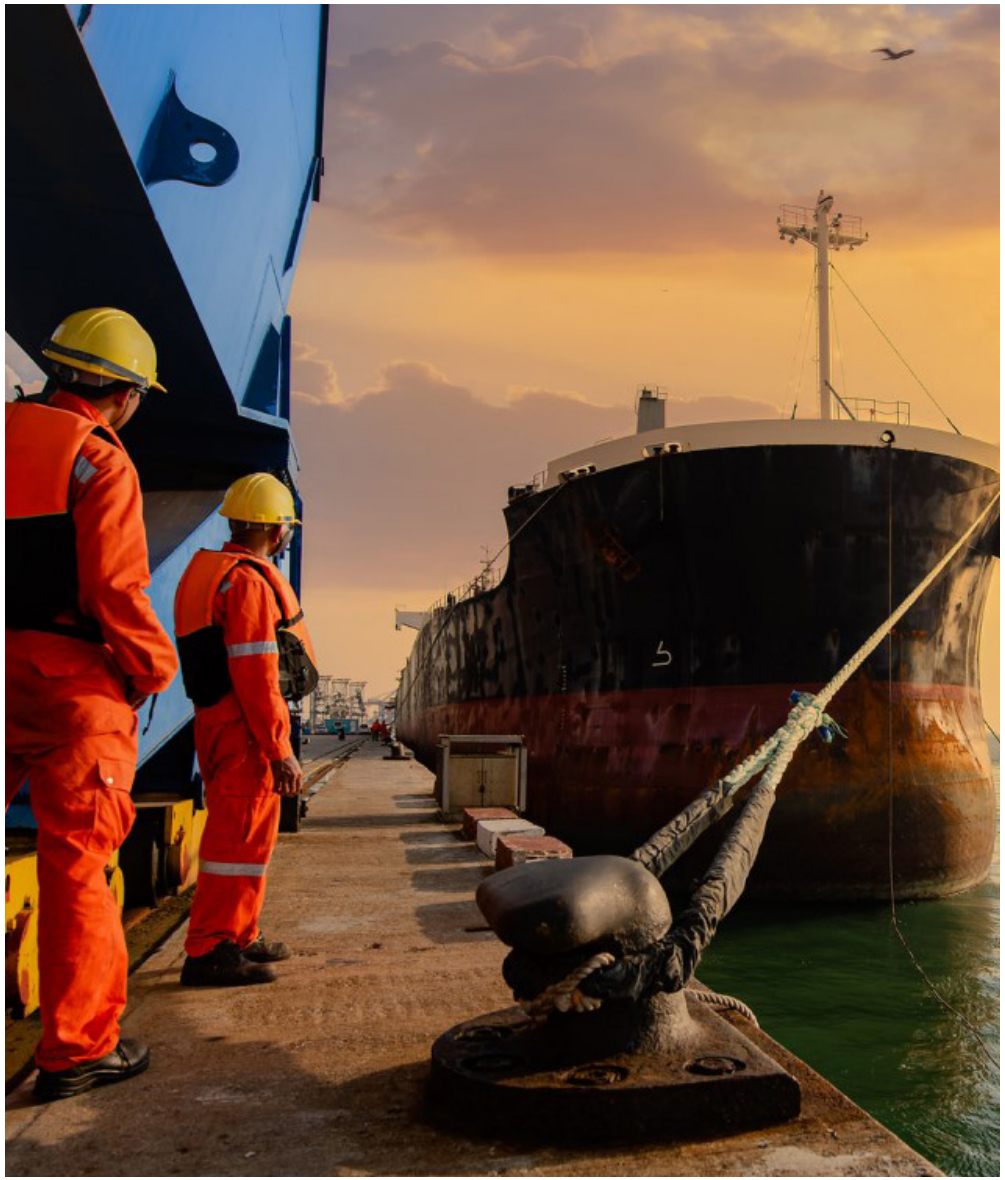


Figure 2: Examples of ESCAS supply chain types
Source: DAWE

www.agriculture.gov.au

Australia does not have any jurisdiction to regulate in another country, particularly in the context of in-country traceability. Australian exporters and government are working actively to support increased capability in traceability in key livestock export markets.



Meat Export

The Australian meat export industry is valued at AUD $16 billion annually. Increasingly, traceability requirements for Australian meat exports are determined by the regulators in destination market jurisdictions. For example, the European Union market requirement for full supply chain traceability EU Cattle Accreditation Scheme (EUCAS) means that full traceability from Australian farm, saleyard, feedlot is required for meat shipped to EU countries.

Traceability requirements are articulated in Guide modules covering on-farm production, livestock transport, saleyards, feedlots and meat processing. Export-specific requirements are detailed as below.

Establishment

Approved Arrangements

The Export Control (Meat and Meat Product) Orders require that the occupier of an establishment engaged in the preparation of meat and meat products for export has an Approved Arrangement.

The purpose of the Approved Arrangement is to clearly describe those processes and practices which, when correctly applied by the occupier, underpin certification of meat and meat products for export. The approved arrangement describes how occupiers will meet legislative requirements, including the assurance of compliance.

In relation to traceability, the requirement is "to provide product integrity through the application of product identification, segregation, and traceability practices ensuring that product is accurately described and maintains relevant importing country identification."

www.agriculture.gov.au

Most meat export businesses are accredited as Tier 2 establishments, which are audited to comply with Australian Standards and qualify annually under Approved Arrangements set by the Department of Agriculture, Water and the Environment, based on importing country requirements. Establishments under Tier 1, where the Australian Standard (AS) is adopted by the importing country, are assessed under State authorities regulating domestic meat supply.

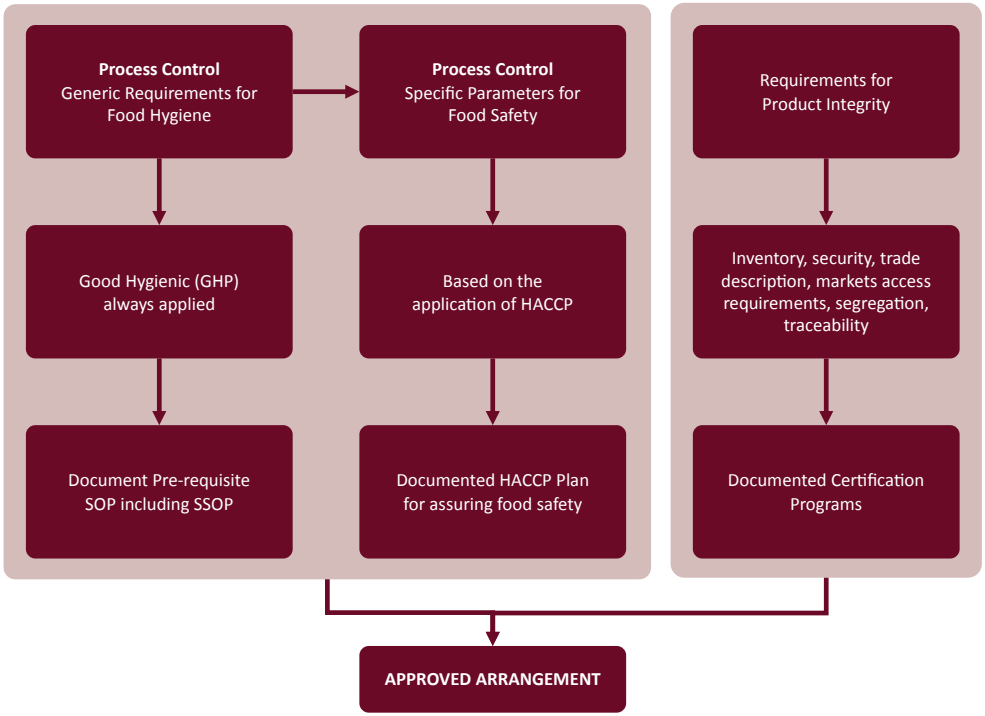


Figure 3: Fundamental components of an Approved Arrangement
Source: DAWE

Audits of meat establishments

Meat establishment systems audits are required annually (Tier 2) and each 24 months (Tier 1). An audit certificate is received by the establishment detailing the establishment name, the establishment number, the issue date and carries the official stamp of the issuer.

The Department of Agriculture outlines product identification along an integrated supply chain, showing the processes and key identification records once livestock is received for processing into meat for export.

Transfer between approved export establishments

The Export Control (Meat and Meat Products) Orders 2005 requires that integrity of meat and meat products is maintained during transport of product between approved export establishments. To achieve this, approved arrangements must describe the occupier's procedures for product traceability and documentation, including:

- Practices for effective segregation and identification according to trade description and market eligibility for transport
- Procedures for responding to reports, from other establishments, of unsatisfactory transfer of meat and meat products
- Procedures for reporting to other establishments when unsatisfactory transfers of meat and meat products are received
- Corrective/preventive action procedures in place to manage any non-compliance
- A Meat Transfer Certificate is used to identify shipments of meat moving from meat processing to meat storage and packing into unit load devices and shipping containers ready for sea and air shipment.

Meat Messaging for the US market

In transferring meat between businesses (for example, between producers in Australia and US import houses and manufacturers who receive imported red meat products from Australia), there is a need for the relevant product information to be optimized and increase transparency in the import process.

The "Meat Messaging" system is based on the GS1 standards for numbering and barcoding of meat products and the GS1 EANCOM electronic message standards. It meets the US Food Safety and Inspection Service (FSIS) Directive 9900.5 Rev 1 for the use of the industry portal for carton/carcase verification and traceability.

Meat Messaging is administered by AUS-MEAT with program management through a committee comprising industry representatives including AUS-MEAT, DAWE, AMPC, AMIC and MLA (see www.meatmessaging.info).

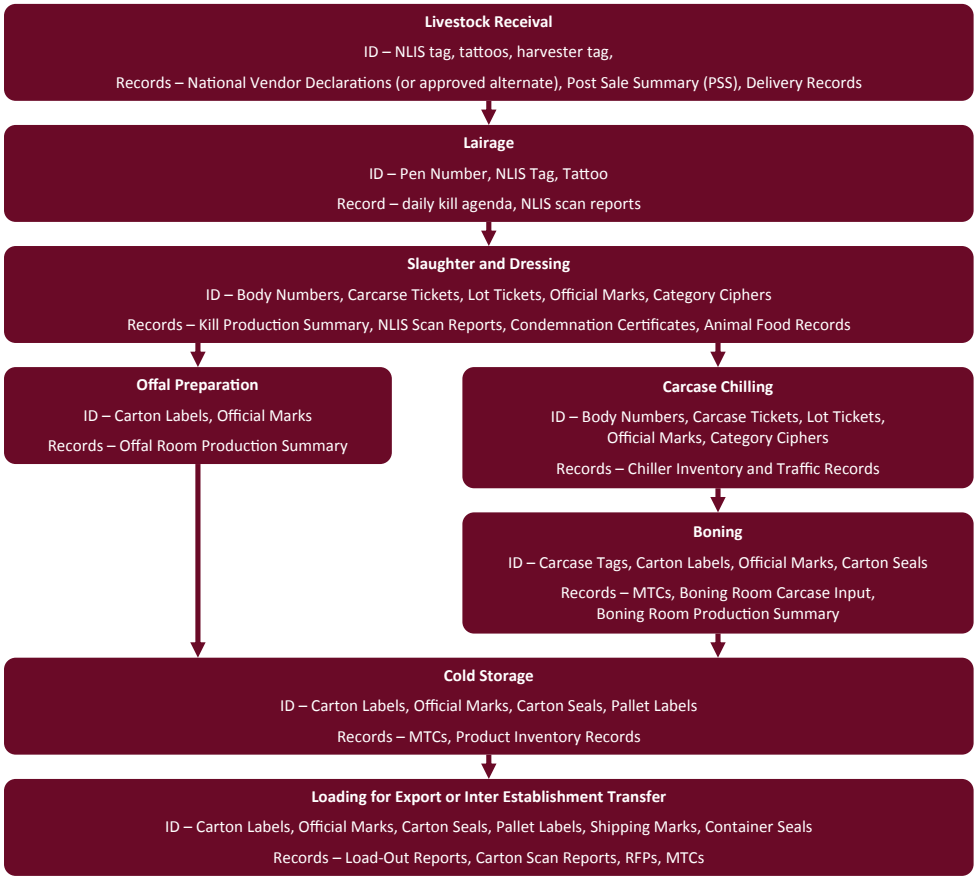


Figure 4: Identity and documentation in export meat supply chain
Source: DAWE www.agriculture.gov.au

Meat Messaging is an industry cloud portal operated by the Australian Meat Industry to hold export consignment and case level information. Meat Messaging is used by:

Australian meat exporters to upload consignment information (through a EDI 856 GS1 ASN) including the GS1 barcode and production details on each case in a consignment.

- Inspection Houses to verify specific cases belong to a consignment when the shipping mark is missing or eligible (USDA FSIS Directive 9900.5) or as part of the Pallet Pilot (FSIS Notice 37-19 Pilot Program).
- End Users (value adding or further processing) to access information on individual cases such as Chemical Lean value, production data etc. (see www.meatinstitute.org).

Note: The Department of Agriculture, Water and the Environment has started a transition of generating export documentation of commodities from the Export Documentation System (EXDOC) to their Next Export Documentation System (NEXDOC) which is a web-based system. The NEXDOC allows clients to request export documentation for primary produce via the web or a software program.

NEXDOC will eventually replace EXDOC (see www.agriculture.gov.au).

Source: See www.meatinstitute.org

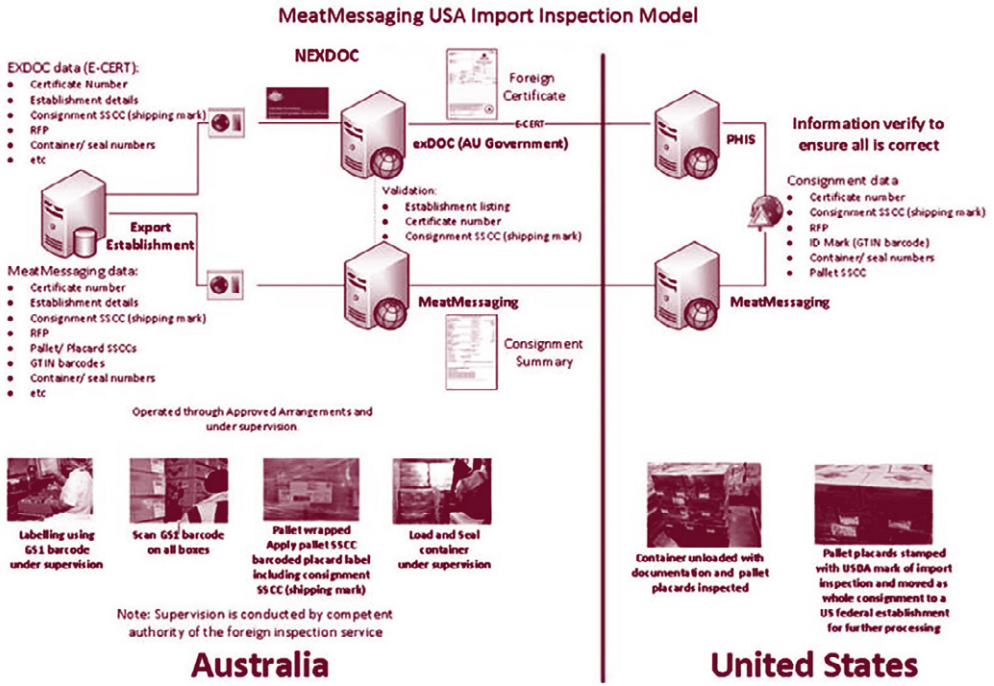


Figure 5: Illustration of Meat Messaging Steps using Australian meat exports to the US

Critical Tracking Events (CTEs) and Key Data Elements (KDEs)

Critical Tracking Events (CTEs) are events that relate to the identity, movement and transformation of the relevant product

Live animal export activity	CTE code	Critical Tracking Events (CTEs)
Livestock Export		
Establishment - Registration of livestock export premises and business master data	**LE CTE1**	Registration of live animal export premises data and master data
Approved Export Program (AEP) obtained	**LE CTE2**	SOPs for traceability
Compliance with ASEL/NLIS and ESCAS standards	**LE CTE3**	NLIS records ESCAS approved supply chain number/s
Preparation of Livestock consignment for export by sea/air	**LE CTE4.1**	Submit the Notice of Intention to Export (NOI) via the Tracking Animal Certification for Export (TRACE) system
	LE CTE4.2	Livestock Export Permit granted
Shipping documentation	**LE CTE5**	Complete LPA eNVD for consignment sign Air Waybill/Bill of Lading from carrier, Animal Health Declarations, Complete any additional requirements according to MICOR
Inspect livestock	**LE CTE6**	Signed Livestock Inspection Declaration (AAV and Exporter)
Load livestock on vessel/aircraft (IATA LARs SOPs/CSEP)	**LE CTE7** **LE CTE8**	Livestock handler records live animals loaded Livestock Export Depot records animals loaded to vessel/aircraft live animals post-shipment animals disposed of from port
Port of Discharge	**LE CTE9** **LE CTE10**	Unloading and inspection of livestock Voyage Report
In-country traceability	**LE CTE11**	End of Processing Report Independent Performance Audit Report

Red meat export activity	CTE code	Critical Tracking Events (CTEs)
Meat Export		
Establishment	**ME CTE1.1** **ME CTE1.2**	Meat Export Establishment Registration Obtain a Meat Export Licence
Prepare export and shipping documentation	**ME CTE2.1** **ME CTE2.2** **ME CTE3**	Lodge NEXDOC and SEW Export Declarations Receive Export Permit (valid for 28 days from issue) for shipment Consignment Note and instructions for carrier
Export Order preparation	**ME CTE4**	Create Customer Order and pick/pack shipment
	ME CTE5	Labelling of carton/carcase and pallets
	ME CTE6	Product packed into container/ULD Shipping container seal affixed
Transport to Port Terminal	**ME CTE7**	Transport to port terminal
	ME CTE8	Meat Transfer Certificate (MTC) as required
Port handling	**ME CTE9**	Container "gated in" message received from Container Terminal Operator
	ME CTE10	Carrier issues Airway Bill/Bill of Lading Container loaded on aircraft/vessel Aircraft/vessel leaves port
Arrival at port of discharge and port clearance	**ME CTE11**	Notice of Arrival to Exporter/Importer/notify party Cargo Status Message received
Delivery to importer	**ME CTE12** **ME CTE13** **ME CTE14**	Container released to transport "Gate out" at import port terminal Arrival at Importer and delivery order/proof of delivery signed by Importer
Meat inspection (Biosecurity/food safety inspection and clearance (may be conducted at port clearance facility or Importer)	**ME CTE15**	Container seal removed for quarantine/food agency inspection, Clearance received

Key data elements

Key data elements provide information related to the who, when, what, where and why of a critical tracking event. Some relate to specific regulatory or mandated data for compliance.

Event code	CTE	Key data elements
	Establishment	
LE CTE1	**Registration of Livestock export premises data and busines master data**	**Identity and location of businesses** • Property Identification Code (PIC) serial numbers (on- farm production, feedlot, livestock export depot and port of loading) • Global Location Number of Exporter
LE CTE2	**Approved Export Program**	**Approved Export Program number** • Standard Operating Procedures (SOPs) for livestock identity and traceability reference documents – document code
LE CTE3	**ASEL (NLIS) and ESCAS compliance**	**ASEL/NLIS** • NLIS ear tag number/bolus device ID/mob ID • Registered PIC location ID • eNVD livestock movement record **ESCAS** • ESCAS approved supply chain number **Information shared to traceability platform:** • **Property Identification Code for locations along Australian livestock export supply chain (to record on eNVDs/Waybills/Manifests)** • **Exporter Global Location Number (GLN)** • **AEP serial number** • **ESCAS approved supply chain number/s**
LE CTE4.1	**Prepare for livestock export consignment** Approved Notice of Intention to Export and Consignment Risk Management Plan (TRACE system) to manage livestock from discharge port to slaughter	**TRACE system** • Livestock Export Licence number • Exporter name and contact details • Importer name and contact details • Premises ID (depot) • Vessel or aircraft (carrier) ID • Livestock arrival and departure dates • Importing country • Port of loading • Port of discharge • Permit required • Proposed arrival date • AAV • Stockperson • Transport mode in Australia and travel arrangements
		• Source of livestock • ESCAS Supply Chain Number/s • Exporter Declaration (signature/date/name) • Consignment-specific export plan (CSEP) • Core documents – an import permit of the importing country – any existing dispensations – transit permits (between differing countries) – blood test results – tag lists – animal treatments – heat stress risk assessment models or heat stress management plans – load plans – reject lists – Property of Origin Certificates – any variations.
LE CTE4.2	**Livestock Export Permit granted**	**An LNC number is issued on submission to the TRACE system** • Livestock Export Permit number NOTE: Approvals only apply to the one consignment of livestock **Information shared to traceability platform:** • **NOI approval serial number** • **Livestock Export Permit number** • **Approved Export Program (AEP) serial number** • **Consignment-specific export plan ID** • **Approved ESCAS Supply Chain number** • **Date of independent audit in the importing country (LGAP)**
LE CTE5	**Prepare/sign shipping documents**	**Bill of Lading/Air Waybill issued by carrier** • Contract terms for carriage of livestock • Date • Confirmation of receipt on vessel/aircraft • Load port • Destination port • Livestock description – eNVD of consignment - quantity, breed, weight, NLIS ID • Specific instructions related to ESCAS/Load Plan/AAV requirements

Event code	CTE	Key data elements
		Supporting documentation required by importing country (MICOR) see TRACE system example LE CTE4.1 • Signed AAV and Exporter Declaration
LE CTE6	**Livestock consignment inspection**	**Information shared to traceability platform:** • **Signed Bill of Lading/Airway Bill serial number** • **Health Declarations** • **AAV and Exporter Declaration** • **Livestock Export Permit number**
	Load Livestock	
LE CTE7	**Load live animals on shipping vessels/ aircraft** (ASEL and IATA LARs SOPs) and Consignment-specific export plan	**Livestock loaded consistent with Bill of Lading** • Vessel/Aircraft ID • Voyage • Port terminal ID • Date • Livestock handler ID
LE CTE8	**Livestock Export Depot records ID of livestock from the consignment on NLIS database** • Loaded livestock • Post-shipment/ rejected • Disposed of from port	**NLIS database record/reconciliation of** • Loaded livestock by animal or mob ID • Live animals post-shipment (rejected) • Animals disposed from port **Information shared to traceability platform:** • **Livestock loaded ID** • **Vessel name and ID** • **Voyage/flight number** • **Port of loading** • **Date** • **Live animals post-shipment (rejected)** • **Animals disposed of from port terminal**
LE CT9	**Port of Discharge** Discharge and import clearance	**MICOR and Import Customs/Quarantine clearance requirements met. Clearance documents** • Bill of Lading/ Airway Bill (signed) • Cargo Release Order • Commercial Invoice • Declarations as required • Inspection report • Health certificate • Terminal handling charges paid Voyage report
LE CTE10	**Voyage report**	**Voyage report** • Vessel name • Voyage number • Departure port • Date

Event code	CTE	Key data elements
		• Total animals by species • Discharge port • Date • Total unloaded by species • Livestock born • Livestock deceased **Information shared to traceability platform:** • **Import clearance completed** • **Cargo release order** • **Live animals unloaded** • **Livestock born** • **Livestock deceased**
LE CTE11	**In-country traceability**	**ISO Traceability Standard 11785 RFID identification of livestock** • NLIS ear tag/ bolus device ID • GLN allocation of feedlots/animal depots/meat processors **Information shared to traceability platform:** • **Animal ID** • **Location and entity ID (GLN codes)** • **Movement records** • **End of Processing Report** • **Independent Performance Audit Report**

Meat Export

Event code	CTE	Key data elements
	Establishment	
ME CTE1.1	**Registration as a Meat Export Establishment** (EX26a form)	• Export Registered Australian Standard Meat Establishment number (see Meat Processing section for other establishment requirements)
ME CTE 1.2	**Obtain a Meat Export Licence**	• Meat Export Licence number • AUS MEAT certificate number **Information shared to traceability platform:** • **Export establishment number** • **Approved Arrangement** • **Meat Export Licence number**
	Prepare for Shipment	
ME CTE2.1	**Submit NEXDOC papers and SEW Export Declaration**	• Export Declaration Number (ABF) • Declarations and MICOR documents for the shipment • Export permit number
ME CTE2.2	**Receive Meat Export Permit for the shipment**	**Information shared to traceability platform:** • **EDN** • **Meat Export Permit number**
ME CTE3	**Shipping documentation** Shipping documentation prepared	• Consignment Note/Inland Waybill for transport to Port terminal • NEXDOC generated forms (biosecurity clearances, declarations) • MICOR documentation as required **Information shared to traceability platform:** • **Consignment note number** • **Meat Export Permit number**
	Export Order preparation	
ME CTE4	**Purchase Order confirmed with Buyer/meat Importer** • Customer Order created • Packing list generated	**Purchase Order** • Supplier ID • Supplier contact details • Supplier location • Buy ID • Buyer contact details • Buyer location • Product name and description • Quantity, unit type, unit price, total cost • Purchase order placement date • Customer order delivery date • Incoterms code Transport label on pallet

Event code	CTE	Key data elements
ME CTE5	**Shipping labels applied to carcase/carton of product**	**Transport label on pallet** • Unique identifiers assigned and labels attached (GTIN barcodes, SSCC identifiers) • MICOR country labelling requirements
ME CTE6	**Product packed into load unit devices** Container seal affixed and recorded (sea freight)	**Container/ULD** • Export Container Number (BIC code); ULD code • Container seal number
MT CTE7	**Transport to port terminal**	• Transport company name and GLN • Vehicle registration number • Signed Consignment Note/Meat Transfer Certificate **Information shared to traceability platform:** • **Purchase Order number** • **SSCCs of consignment** • **Pallet SSCC** • **Container number (ECN/BIC/ULD identifier code)** • **Container seal number** • **Vehicle registration** • **Consignment note number** • **Time of dispatch**
ME CTE8	**Transfer of product between approved arrangement export establishments**	**Meat Transfer Certificate** • Description of the meat and meat products (including chilled or frozen) • Details of the dispatching establishment (name, address, establishment number) • Details of the receiving establishment (name, address, establishment number) • Details of the establishments where the goods were prepared, including date/s of slaughter and preparation • Quantities and kinds of packages • Identification of vehicle transporting the meat, and description of security applied to the meat • Markets/countries the meat is eligible for • A declaration that: • the goods being transferred in compliance with the conditions and restrictions for export • importing country requirements have been met. **Information shared to traceability platform:** • **MTC serial number**

Event code	CTE	Key data elements
	Port handling	
ME CTE9	**Container "gate in" message received from Container Terminal Operator** Container loaded on aircraft/vessel	• Time and date • CTO ID • Export Container Number/BIC number/ULD number • Container acceptance message from CTO • Container loaded on vessel/aircraft message from shipping line/aircraft
ME CTE10	**Carrier issues Bill of Lading/Airway Bill**	**Bill of Lading serial number** • Meat Export Company name and address • Meat Importer/buyer name and address • Purchase Order/Customer Order reference number • Date of pick up • Consignment details – load unit ID (pallet/carton), product description, weight, carcase ID, number of load units • Specific notes for carrier e.g. temperature, humidity **Air Waybill serial number** • Exporter/Consignor name and address • Importer/consignee name and address • Carrier agent name and IATA code • Airport of departure (and subsequent routing via additional airports) • Airport of destination • Flight and date • No of units (refrigerated) • Weight and dimensions • Description of goods • Instructions for carrier • Exporter/consignor signature • Date signed **Information shared to traceability platform:** • **Airway Bill number** • **Bill of Lading number** • **Import permit**
ME CTE11	**Arrival at port of discharge and port clearance** Importer/Customs Broker submits all documents for port clearance All taxes and duties paid	**Cargo status advice** • Container number • Consignor (Australian Exporter) • Import Declaration number • Cargo code/s • Airway Bill/Bill of Lading reference • Cargo is clear, held, or subject to underbond movement message in Customs system

Event code	CTE	Key data elements
	consignee/Importer Cargo Status Advice or Underbond Approval from Customs to CTO/	**Information shared to traceability platform:** • **Cargo status advice message – Customs and quarantine clearance** • **Container available for collection message to Importer/notify party** **Typical documentation required for Customs/Quarantine clearance** • Import Declaration • Commercial Invoice • Packing list • Bill of Lading number • NEXDOC documentation required under MICOR for destination country
ME CTE12	**Delivery to Importer** Container released to transport	**Electronic Import Delivery Order (EIDO)** • Date and time • Consignee • Discharge voyage and vessel numbers • Arrival date • Bill of Lading number • Container number (ECN) • Container type • Seal number • Gross weight • Port of Load/Discharge/Final Discharge • Container location • Container Status • Signature of issuing officer (shipping line) • Date and time of signing • Transport Company • Driver signature • Container inspection report • Date and time of signing • EIDO pin number
ME CTE13	**Cargo leaves final destination port**	**Gate out** • Date and time • Vehicle registration • ECN/BIC code/ULD code
ME CTE14	**Cargo delivered to Importer**	**Proof of Delivery EDI 861/EDIFACT Receiving Advice** • Date and time • Job number • Freight paid by • Collected from • Delivered to

Event code	CTE	Key data elements
		• ECN (or if de-consolidated) number of pallets or cartons • Contact • Phone • Acceptance of terms and conditions • Signature
		Final Delivery
		Who Transport Carrier
		What Customer Order, Bill of Lading, Logistics Units, Product ID, Batch
		When Date/Time of delivery
		Where Port/final destination
		Why Final Delivery
		Information shared to traceability platform: • **EIDO number** • **Original Customer Order number** • **Gate out message** • **Proof of Delivery number**
ME CTE15	**Meat inspection** (this may take place at a port meat clearance facility or the Importer)	**Inspection and clearance by food inspection agency** • Meat Inspection facility certification number • Import Permit number **Information shared to traceability platform:** • **Inspection Agency clearance of shipment message**

Application of GS1 data standards

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Locations	Livestock exporter	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: www.gs1.org
Date/Time	Date of export	Year -Month-Date/ Time/Time zone	**YYMMDD**	Whilst human readable date formats can vary e.g., 21 December 2020, December 21, 2020, the structure of the date format to be encoded into systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD
Product Identifiers	Processed Meats Packaged Meats (Fixed Weight) Packaged Meats (Variable weight)	Global Trace Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org Information on how to allocate a GTIN to a variable weight or variable measure trade item: www.gs1au.org (for VM non-retail items) and www.gs1au.org (for VM retail POS items)
Traceability Attributes	Batch/Lot code (AI 10), Serial Number (AI 21), Pack date (AI 13), Production date (AI 11), Best Before Date (AI 15), Expiry Date (AI 17)	Each Traceability attribute has its own data format requirements. Please refer to the detailed information found via the link provided.	**Varying depending on Traceability attribute**	Traceability Attributes, such as Batch or Lot Number or Serial Number etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format. List of Application Identifiers: www.gs1au.org

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Logistics Units	Pallet of Finished Goods, Crate or Box of finished Goods	Serial Shipping Container Code (SSCC)	**N18**	Logistic unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. Logistic units take many forms, a single box containing a limited number of products, a pallet of multiple products, or an intermodal container containing multiple pallets. www.gs1au.org
Shipment	Grouping of logistics units	Global Shipment Identification Number (GSIN)	**N17**	The Global Shipment Identification Number (GSIN) is a number assigned by a seller and shipper of goods to identify a shipment comprised of one or more logistic units that are intended to be delivered together. www.gs1.org
Consignment	Grouping of logistics units assigned by the transport company	Global Identification for Consignment (GINC)	**N30**	The Global Identification Number for Consignment can be used by companies to identify a consignment comprised of one or more logistic units that are intended to be transported together. www.gs1.org
Weights & Measures	Variable count of items. Count of items on a logistics unit. Total weight of pallet in NET Kilos. Total Length of goods delivered in Metres. Total volume of goods delivered in Cubic Metres	Must be accompanied with a GTIN	**Varying**	Variable measure trade items use GS1 Application Identifier data fields that contains the quantity or dimension of a variable measure trade item. It also denotes the unit of measure. These element strings are used to complete the identification of a variable measure trade item. They contain information such as the weight, size, volume, or dimension of a variable measure trade item www.gs1.org
Assets	Returnable assets (GRAI): e.g. IBC or Individual assets (GIAI): e.g. A crate	Global Returnable Asset Identifier (GRAI) Global Individual Asset Identifier (GIAI)	**N13**	Can be identified as an asset type only or an optional serial number can be added to distinguish individual assets www.gs1au.org

Useful links

NEXDOC/EXDOC Exporter Interface System Data Standards

Export documentation includes

- export permits as required by the Export Control Act
- export certificates as required by importing country authorities.

Issuance of export permits and e-certificates to accompany meat shipments are created using the Exporter Interface System operated by the Department of Agriculture, Water and the Environment.

Trade documents are generally detailed in the Manual of Importing Country Requirements (MiCOR www.micor.agriculture.gov.au).

United Nations EDIFACT messages are widely used for government to government health and phytosanitary certificates. They underpin the exporter interface.

See **EXDOC** Exporter Interface System Specification Version 9.1 Issue date: 12 January 2021 www.agriculture.gov.au

Live animal export registration

ablis.business.gov.au www.agriculture.gov.au

Approved Export Program
www.agriculture.gov.au.

ASEL and ESCAS standards
www.agriculture.gov.au

www.agriculture.gov.au www.agriculture.gov.au

TRACE system

trace.agriculture.gov.au

www.agriculture.gov.au

micor.agriculture.gov.au

www.agriculture.gov.au

trace.agriculture.gov.au

www.agriculture.gov.aun

Approved arrangement

haveyoursay.awe.gov.au

www.agriculture.gov.au

www.agriculture.gov.au

www.agriculture.gov.au

Meat Export Licence

www.agriculture.gov.au

Loading live animals to vessels/aircrafts

www.agriculture.gov.au

aviationsafetywiki.org

www.iata.org

aviationsafetywiki.org

Meat Messaging tool

www.meatmessaging.com

www.meatmessaging.info

www.meatinstitute.org

meatmessaging.info

www.mintrac.com.au

In-country traceability

www.agriculture.gov.au

www.agriculture.gov.au

www.agriculture.gov.au

www.agriculture.gov.au

Breeder livestock export

www.agriculture.gov.au

AUSMEAT Red Meat Supply Chain Committee – Supply chain information Beef – www.rmscc.org

Sheep – www.rmscc.org

Glossary

Australian Government Accredited Veterinarian (AAV)

A veterinarian who is accredited by the Australian Government under Part IIA of the *Export Control Act 1982* to conduct duties in relation to the export of livestock, in accordance with relevant Australian and importing country requirements.

Approved arrangement

An arrangement for the preparation of livestock for export by an exporter that is approved under the Export Control (Animals) Order 2004.

Approved Export Program (AEP)

An exporter's program of activities, approved by the Secretary, for AAVs preparing livestock consignments for export or accompanying livestock consignments on ships.

Australian Standards for the Export of Livestock (ASEL)

The standards represent the basic animal health and welfare requirements for the conduct of livestock exports, which the Australian Government require exporters to meet.

Container BIC code

The Bureau of International Containers (BIC) code on the outside of a shipping container is a unique global identifier. It consists of -

- A 4 digit alpha carrier number identifying the shipping line owner/lessee of the container
- A 6 digit serial number
- A check digit supplied to the exporter by the shipping line to distinguish the unique trip for the container.

Class

The export grouping of animals based on their end use, be it feeder, slaughter or breeder. The term breeder includes any subsets of this class such as productive heifers.

Consignment

A group of livestock that are under export preparation by one exporter and are destined for export, or have been exported, from a single seaport or airport.

Export Documentation Operating System (EXDOC/NEXDOC)

The computer system controlled by the department for receiving electronic Notices of Intention to export and for issuing Export Permit and Government certificates.

Export permit

A permit issued by the Secretary, or delegate, under the Export Control (Animals) Order 2004 to enable the export of live animals from Australia.

Fit to travel

The animal:

- can walk on its own by evenly bearing weight on all 4 legs
- is free from visible signs of injury or distress or conditions likely to further compromise its health or welfare during transport
- is strong enough to make the journey and is not dehydrated or emaciated
- is not blind in either eye and can see well enough to walk, load and travel without impairment or distress
- has had adequate access to water prior to loading.

Health certificate

A certificate, issued by an authorised officer, which states that the livestock meet the requirements of a specified importing country relating to the health status of the livestock.

Incoterms

Incoterms refers to the terms of international trade between an Exporter and Buyer/Importer. Incoterms are the standard contract terms used in importing/exporting sales contracts. https://www.tradefinanceglobal.com/freight-forwarding/incoterms/

Livestock export licence

Licence to export livestock granted by the secretary or their delegate following the satisfaction of certain criteria in accordance with the AMLI Act.

Loading Plan

A plan which details the number and species of livestock, where they will be placed on the vessel or aircraft and how much space they are allocated.

Meat transfer certificate (MTC)

A form approved by the Secretary of the Department of Agriculture, Water and the Environment for use when export eligible meat and meat products are transferred between export registered establishments. This form may be electronic.

National Livestock Identification System (NLIS)

Australia's system for the identification and tracing of cattle, buffalo, sheep and goats.

National Vendor Declaration (eNVD)/Waybill

A declaration that a livestock owner or person responsible for the livestock signs and acts to trace an animal's movement between premises throughout its life. NVDs/Waybills link the traceability of livestock from the farm, to other farms, through to saleyards, transport and processing.

Notice of Intention (NOI)

The notice of intention to export livestock, received by the department from an exporter.

Property Identification Code (PIC)

A unique identification code allocated by the relevant authority in a state or territory to a block (or blocks) of land usually used for agricultural purposes.

Registered premises

A premises registered for holding and assembling livestock for export under the Export Control (Animals) Order 2004.

Stock handler

A person who can demonstrate that they have the requisite knowledge, skills, experience, attitude and behaviour to perform the required activity, and has the ability to manage and handle animals humanely, efficiently and capably. Supporting evidence of competency includes:

induction training; and/or records of on-the-job training; and/or recognised training and staff training registers; and/or relevant experience; and/or supervisor sign-off for specific tasks; and/or demonstrable ability.

Unit Load Device (ULD)

A pallet or container used for air freight, designed to match the fuselage design of various aircraft types.

Each ULD has a unique identifier in order to track and trace airfreight.

See www.dsv.com

Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Meat Import

Images: Meat & livestock Australia (MLA)

Meat Import

Meat and meat product is classified as a risk food in relation to biosecurity for import into Australia. Meat products,defined as beef and beef products for human consumption, are classified as risk food as these foods are associated with hazards that pose an increased risk to human health. Beef and beef products have been grouped below based on the product type, risk management requirements for that product type and the testing to be applied at the border. **Beef** includes meat, bone and offal of cattle, buffalo and bison. A **beef product** is a food prepared from or containing beef (whether cooked or uncooked and either chilled or frozen).[1]

Import processes covered in this module include

- Establishment for the Australian food importer and overseas suppliers
- Mandated food safety traceability requirements for Importers
- Tracing product origin and composition through offshore suppliers
- Arrival and clearance at final discharge port
- Re/labelling of imported food products to meet Australian standards.

It is important to note that once any imported food product has received border clearance, all domestic food regulations will apply. If the imported food is for retail sale, the Importer is required to register as a food business.

Establishment

Create master data for trading partners and locations

Sourcing of product for import usually requires the creation of master data for grower, manufacturer and exporter in the country of origin of the product as well as for the Australian Importer and key nodes in the supply chain. This will enable unique identification of the entities and locations engaged in the product's journey, including packing houses, distribution centres or warehouses the product moves through. For many overseas jurisdictions, registration of the food grower, manufacturer and exporter are required by responsible authorities.

Create master data for the Food Importer

Master data relates to unique identifiers for the business entity and business location. The creation of unique identifiers enables the business and trading partners to have consistency and interoperability between systems.

Master data is the consistent and uniform set of identifiers and extended attributes that describes the core entities of the enterprise including customers, prospects, citizens, suppliers, sites, hierarchies and chart of accounts.[2]

Business licences and notifications

If a food Importer sells product for retail, the business must register with the local Council. If the Importer sells wholesale products, they must notify their state food authority. For some products, a licence will be required.

Tasks related to traceability

- Create master data for Importer and key supply chain partner entities and locations
- Registration/notification of Food Business.

Participants

- Supplier country producer, wholesaler, manufacturer exporting to Australia
- Export company supplier (non-producer/ manufacturer)
- Importer
- State and local authorities managing food safety and business registrations
- Issuing body for Global Location Numbers.

Mandated Food Safety Traceability requirements for importers

Food safety requirements apply to Food Importers and Wholesalers are listed below.

Food receipt

In relation to food receipt, a food business must be able to provide information about what food, it has on the premises and where it came from.

A food business must provide, to the reasonable satisfaction of an authorised officer upon request, the following information relating to food on the premises:

1. the name and business address in Australia of the vendor, manufacturer or packer or, in the case of food imported into Australia, the name and business address in Australia of the Importer; and
2. The prescribed name or, if there is no prescribed name, an appropriate designation of the food.

This means that a food business must not receive a food unless it is able to identify the name of the food and the name of the supplier.

Food recall

A food business engaged in the wholesale supply, manufacture or importation of food must have a system, set out in a written document, to ensure it can recall unsafe food. The system should include records covering:

- Production
- What products are manufactured or supplied
- Volume or quantity of products manufactured or supplied
- Batch or lot identification (or other markings)
- Where products are distributed
- Any other relevant production records.

This information should be readily accessible in order to know what, how much and from where product needs to be recalled.

Tasks related to traceability

- Record the identity of the food or ingredient and the identity of the supplier
- Document a Recall System for the business which compiles the identity and location of customers and the identity, date, volume, batch or lot of product sold.

Participants

- Importer
- Distribution agent
- Customer (purchase orders and sales receipts)
- Food safety inspector
- Food safety auditor.

Tracing product origin and composition through offshore suppliers

Depending on the capacity of the producer of the animal and other source ingredients, a minimum of lot number identification of

the product from the farm can be traced.[3] The lot number and Sales Receipt issued from the Processor or Wholesaler back to the source producer can then be identified as the animal becomes an input to processing or manufacturing.

See *On-Farm Production* and *Processing and Manufacturing* Modules for Critical aTracking Events and Key Data Elements for producers, processing/manufacturing traceability.

Methods to establish and verify product origin and authenticity relate to analytical sampling, test certificates and auditing of the producer or supplier.

Tasks related to traceability

- Request proof of origin/provenance documentation from the supplier
- Undertake a traceability audit of suppliers to identify product origin and inputs to product manufacturing
- Document the Supplier policies and SOPs for traceability, recall and sourcing
- Record lot/batch numbers of incoming product.

Participants

- Producer
- Wholesaler/Stock Agent
- Meat Processor/Supplier
- Importer.

[1] Department of Agriculture, Water and the Environment www.agriculture.gov.au

[2] Gartner www.gartner.com

[3] FAO Traceability Guide www.fao.org

Arrival and clearance at Australian port of discharge terminal

A series of documents are required to enable the physical movement of the product from the vessel or aircraft on arrival in Australia. These include:

- Bill of Lading/Air Waybill
- Commercial invoice
- Packing list
- Packing Declaration (packing materials)
- Certificate of Origin
- Fumigation Certificate
- Import Delivery Order.

These documents record dates, times, authorisation signatures associated with the event-based movement of the product and support traceability through the import process. The Air Waybill and Bill of Lading contain detailed descriptions of the product, including supplier lot and batch numbers on each carton.

The *Air Waybill* and *Ocean Bill of Lading* are critical documents that detail the shipment. Until the airline or shipping line authorises these documents to be handed over to the party nominated by the shipper (Exporter or their Freight Forwarder/Importer or their Freight Forwarder) the cargo remains in the custody of the carrier (airline or shipping line).

For ocean shipping, notice is required from the ship's Master that the vessel is arriving in port in order to prepare for biosecurity inspection. On arrival at the port of discharge/destination, the nominated party on the Bill of Lading (Customs Broker, Importer) is notified of the discharge of the container and once clearance is completed, the availability of the container for collection.

Biosecurity inspection may be required. This may be undertaken at the port of discharge, or once the container is transported to a facility that is licensed for inspection.

The *Incoterms* of the transaction between Exporter and Importer determine the responsibility for port clearance and subsequent delivery to the Importer. Arrangements will be made via the Exporter (often via an International Freight Forwarder and their international partnering Customs Broker) to hire a Transport Company to collect the container from the terminal and deliver at the instruction of the Importer to a nominated warehouse/DC. Shipping lines may arrange the transport delivery (carrier haulage) or the Exporter or Importer may take this responsibility (merchant haulage).

An electronic *Import Delivery Order* which the Airline/Shipping Line issues as per the Bill of Lading/Airway Bill enables the container to be loaded on the transport and leave the terminal. Gate Out date and time stamp at the port terminal are recorded.

On leaving the port, tracking of the transfer to the Importer premises or Distribution Centre is typically undertaken using a Transport Booking reference issued by the Transport Company, or via GPS tracking. In Australia, staging of containers is common, with the container being held at a transport depot overnight before being delivered to the Importer.

On arrival at the delivery destination, a *Proof of Delivery* by the Transport Company is signed by the Importer. The Importer will then check and remove the container seal (with IFIS inspector present as required), examine the goods as listed on the Bill of Lading/Airway Bill, packing list and commercial invoice and advise the Exporter of any variances.

Tasks related to traceability

- As per Bill of Lading, Shipping Line/Exporter/Importer or Forwarder will book transport to collect the container from the port terminal
- An electronic Import Delivery Order will enable the transport (road or rail) to clear the terminal
- The Container Terminal Operator (CTO) records gate out details
- Proof of Delivery is signed by the Importer/Distribution Centre
- Goods delivered are inspected and scanned/recorded in Importer goods receival system/Warehouse Management System.

Participants

- Airline/shipping line
- Transport Company
- International Freight Forwarder and Customs Broker
- CTO
- Australian Border Force/Customs
- Department of Agriculture, Water, Environment (IFIS inspection).

Border Clearance regulation

Regulation at Australian borders relates to –

- Biosecurity control preventing the introduction and/or spread of harmful organisms to animals and plants in order to minimize the risk of transmission of infectious disease.
- Food Safety control and inspection to ensure imported food complies with Australian food safety standards
- Food Import Declaration to ensure the goods are not prohibited for importation and the correct taxes and duties are paid.

Biosecurity and Food Safety

As with domestic food distribution, all importers are required to provide documents on request, demonstrating the traceability of imported food, one step forward and one step backward along the food supply chain.

The Australian Department of Agriculture, Water and the Environment (DAWE) is responsible for biosecurity risk and food safety of imported foods. It will confirm whether the product to be imported is able to be brought into Australia and under what conditions. The *Biosecurity Import Conditions System* (BICON) on-line site identifies whether the product is permitted, is subject to conditions, requires supporting documents or needs an Import Permit.

Food is classified by Food Safety Australia New Zealand (FSANZ) as being a *Risk Food* with a medium to high risk or microbial or chemical hazard; a *Surveillance Food* with a low risk; or a *Compliance Agreement Food* for regular importers who have qualified for this scheme. Meat products are deemed as a risk food. They are further classified in relation to the amount of processing the raw meat has undergone.[4]

Depending on the classification of the food to be imported, an Import Permit may be required. Addition documentation that may be required includes:

- Health Certificate
- Phytosanitary certificate
- Manufacturer's Declaration
- Import Declaration
- Lot code listings with best-before dates.

Inspections of food take place at the premises of the Importer or a warehouse area that has an Approved Arrangement with DAWE.[5]

Record keeping requirements for food Importers relating to traceability of imported foods are as follows –

Food importers, or the owner of the food at the time of importation, must keep the following information in relation to the food being imported:

- A name or description of the food sufficient to indicate its true nature
- Batch or lot identification for the food
- Name of the person, business name, street address and telephone number or email address of the producer of the food
- Name of the person, business name, street address and telephone number or email address of customers that have received the food
- The date the food was received and the date when it was dispatched to customers
- The volume or quantity of the food involved in each transaction.

Records may be kept in a manual or electronic system but must be kept for five years.[6]

Customs

All food importers are required to complete a *Full Import Declaration* (FID) on the Australian Border Force (Customs) *Integrated Cargo System* site. This declaration relates to the value of the cargo, to ensure all taxes and duties are paid.

Tasks related to traceability

- Maintain information to comply with the traceability requirements of state and Commonwealth legislation.

Participants

- Importer
- Australian Border Force Customs
- Distributor
- State food safety authorities
- DAWE Imported Food Inspection Service (IFIS) inspector.

[4] Meat Import classifications www.agriculture.gov.au

[5] www.agriculture.gov.au

[6] DAWE Imported Food Notice INF18-19

Re/labelling of imported food products to meet Australian standards

Importers should contact all suppliers, or put systems in place, to ensure that the labelling on their food products comply with the Code prior to importing food products or ensure that labelling is compliant prior to inspection. The Imported Food Control Act 1992 *provides for the labelling of food products to be amended after importation and before inspection by the department.*[7]

If the imported product does not comply with Australian food labelling standards, the Importer may need to re-label the product. Key information required on the label relates to –

- Best-before/use-by dates – the product may have an expiry or BBE date which is not compliant
- Country of Origin
- Nutritional information
- Ingredients.

For product requiring re-labelling prior to IFIS inspection, there is an opportunity to ensure the items are allocated a unique identifier on the label, to establish traceability in distribution within Australia.

Tasks related to traceability

- Include unique identifier on re-labelled products prior to distribution

Participants

- Importer
- Labelling supplier.

[7] www.agriculture.gov.au

Critical Tracking Events

For each of the identified Import activities, **critical tracking events** (CTEs) establish identity and enable traceability and compliance with traceability-related regulation are summarised as follows:

Critical Tracking Events (CTEs) relate to the identity, movement and transformation of the food product

Import activity	CTE code	Critical Tracking Events (CTEs)
Establishment Creation of Master data for Australian Importer, foreign Producer, Supplier and International Exporter Registration and Notification of Food Business and Premises	**MI CTE1.1** **MI CTE1.2**	Create master data for key supply chain partner identities and locations Obtain import permit as required Food premises licence/notification
Tracing product origin and composition through offshore suppliers Undertake a traceability audit of suppliers to identify product origin and inputs to product manufacturing Document Supplier policies and SOPs for traceability, recall and sourcing Request proof of origin/provenance documentation from the supplier	**IM CTE2**	Proof of Origin/provenance documentation of sourced product
Arrival and discharge at Australian port	**MI CTE3.1** **MI CTE3.2**	Vessel arrives at Australian final destination port. Maritime Arrivals Reporting System (MARS) biosecurity requirements met. Importer/ notified of vessel arrival (NOA) Container discharged from vessel to CTO custody
Cargo clearance	**MI CTE4**	Australian Import Biosecurity Conditions (BICON) requirements met as required Import documentation completed through Cargo Online Lodgement Scheme (COLS) **Documents –** • Import Permits • Health Certificates • Phytosanitary Certificates • Treatment Certificates • Manufacturers Declarations • Import Declarations • Lot Code Listings.

Import activity	CTE code	Critical Tracking Events (CTEs)
		Biosecurity clearance completed (or inspection at Approved Arrangement premises booked). Note Australian Trusted Traders can use a consolidated clearance. Customs duties paid. Container cleared for pick up.
Pick up from port terminal As per Bill of Lading, Shipping Line/Exporter/ Importer or Forwarder will book transport to collect the container from the port terminal. An **Import Delivery Order will enable the transport (road or rail) to clear the terminal** **The CTO records gate out details**	**MI CTE5.1** **MI CTE5.2**	Importer notified of availability of container for collection. Transport pick up arranged through 1-Stop Vehicle Booking System Gate Out message from port terminal notified to Importer/notify party
Product arrives at Importer Warehouse **Proof of Delivery is signed by the Importer/ DC** Goods delivered are inspected and scanned/recorded in Importer goods receival system/Warehouse Management System	**MI CTE6.1** **MI CTE6.2**	Proof of Delivery signed by Importer Goods receival process completed and recorded in inventory system.
Storing traceability records Maintain information to comply with the traceability requirements of state and Commonwealth legislation	**MI CTE7**	Maintain records for mandated traceability
Re/labelling of imported food products to meet Australian standards Include unique identifier on re- labelled products prior to distribution	**MI CTE8**	Apply unique identifier on re-labelled product prior to domestic distribution

Key Data Elements

Event code	CTE	Key data elements
MI CTE1.1	**Establishment** **Create master data for key supply chain partner identities and locations**	• Global Location Number • Import Licence number • Food Premises Licence/Notification certificate number
MI CTE1.2	**Obtain export licence for premises/ establishment/s**	**Request for GLN** **Who** Importer Issuing Agency **What** Importer, location, business entity **When** Date/Time of Issuance **Where** Issuing Agency **Why** Requirement for Global location numbers, establishment **Request for Food Licence Number** **Who** Importer, Issuing Agency **What** Importer business entity **When** Date/Time of Issuance **Where** Issuing Agency **Why** Food Licence **Information shared to traceability platform:** • **Global Location Number** • **Food Import Licence number** • **Food Premises Licence/Notification certificate number**
MI CTE2	**Proof of Origin/ provenance documentation of sourced product**	• GLN of source of product e.g. growers, processors • Sales receipt recording sale to Wholesaler • Provenance/Analytical Verification Certificate **Proof of Origin/Provenance** **Who** Importer Supplier **What** Product ID & Quantity, Batch/Lot, Provenance, proof of origin **When** Date/Time of issuance **Where** Importer **Why** Proof of Origin, Provenance **Information shared to traceability platform:** • **Proof of Origin verification** • **Source of ingredients GLN** • **Product ID, Quantity and Batch linked to above.**

Event code	CTE	Key data elements
MI CTE3.1	**Vessel Arrives at Port** Vessel arrives at Australian discharge port terminal. Maritime Arrivals Reporting System (MARS) biosecurity requirements met. Importer/ notified of vessel arrival (NOA)	**Vessel arrival** • Vessel ID • Bill of Lading • Port Location • Shipment ID • Date of Arrival • Container ID • Customer Order Number **Vessel Arrives** **Who**: Vessel ID; Port Location/ID **What**: Vessel ID, Bill of Lading, Shipment ID **When**: Date/Time of Receipt **Where**: Receipt location **Why**: Receipt of product
MI CTE3.2	Container discharged from vessel to CTO custody	**Container discharge to CTO** **Who**: Vessel ID Transport ID; Port ID **What**: Vessel ID, Bill of Lading, Shipment ID **When**: Date/Time of Transfer **Where**: Port **Why**: Transfer from Vessel **CTO container status message** • Vessel ID • Voyage ID • CTO ID • Container number **Information shared to traceability platform:** • **Vessel ID** • **Voyage ID** • **CTO ID** • **Bill of Lading** • **Container ID** • **Shipment ID** • **Date and time of container discharge**

Event code	CTE	Key data elements
MI CTE 4	**Cargo Clearance**	• Vessel ID • Bill of Lading • Port Location • Shipment ID • Date of Arrival • Container ID • Customer Order Number **Border Clearance** **Who**: Importer Customs Agency **What**: Bill of Lading, Shipment ID **When**: Date/Time of Clearance **Where**: Product location at time of Clearance **Why**: Border Clearance **Information shared to traceability platform:** • **Vessel ID** • **Bill of Lading** • **Product ID** • **Batch** • **Quantity** • **Container ID** • **Border Clearance Documentation** • **Date of Border clearance**
MI CTE 5.1 **MI CTE5.2**	**Pick up container from port terminal** Importer notified of availability of container for collection. Transport pick up arranged through 1-Stop Vehicle Booking System Goods depart port terminal Gate out recorded and notified to Importer/ notify party	**Electronic Import Delivery Order (EIDO)** • Container ID • Shipment number • Product ID • Border Clearance status • Batch • Quantity • Transport ID **For transport company** • Container Weight Declaration – gross weight • Container number

Event code	CTE	Key data elements
		Container departs port terminal
		Who Transport company ID Port ID
		What Vessel ID, Bill of Lading/Air Waybill, Shipment ID, Container ID, EIDO
		When Date/Time of Departure from Port
		Where Port Location
		Why Departure from Port
		Information shared to traceability platform: • **Transport ID** • **Shipment number** • **Product ID** • **Batch** • **Quantity** • **Container ID number** • **Border Clearance Status** • **Date and time of gate out**
MI CTE6.1	**Product arrives at Importer Warehouse** Proof of Delivery signed by Importer	• Date and time • Job number • Freight paid by • Collected from • Delivered to • ECN (or if de-consolidated) number of pallets or cartons • Contact • Phone • Acceptance of terms and conditions • Signature • Receival data and time • Supplier ID and location • Lot/Batch number and use-by date • Item description • Quantity
MI CTE6.2	**Goods receival process completed and recorded in inventory system.**	• Units • Load unit SSCC • Product requirements (temperature, humidity) • Proof of Delivery

Event code	CTE	Key data elements
		Receipt at Importer DC
		Who Transport company ID Importer ID
		What Container ID, Bill of Lading, Shipment ID, Logistics units, Product ID, Quantity, Batch, EIDO
		When Date/Time of Receipt
		Where Receipt location
		Why Receipt of product/container
		Information shared to traceability platform: • **Proof of Delivery number** • **Shipment ID** • **Container ID** • **Product ID** • **Quantity received** • **Batch** • **Date of Receipt** • **Import Delivery Order/Air Waybill/BOL/Purchase Order reconciliation**
MI CTE7	**Maintain records for mandated traceability**	Maintain records for 5 years of • a name or description of the food sufficient to indicate its true nature • batch or lot identification for the food • name of the person, business name, street address and telephone number or email address of the producer of the food • name of the person, business name, street address and telephone number or email address of customers that have received the food • the date the food was received and the date when it was dispatched to customers • the volume or quantity of the food involved in each transaction. **Information to be shared to a traceability platform:** • As requested above
MI CTE8	**Label/Re-label product** **Apply unique identifier on re- labelled product prior to domestic distribution**	**Label** • GTIN • Batch • Quantity • Use By/Best Before date

Event code	CTE	Key data elements
		Product re-labelling for local market
		Who Importer ID
		What Product ID original, Product ID new, Batch, Use By/Best Before, Quantity
		When Date/Time of re-labelling
		Where Warehouse
		Why Re-labelling, re-packing
		Information to be shared to a traceability platform • New GTIN of product • Batch • Use by/Best Before date • Quantity • Importer name and location

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Locations	Manufacturing Plant, Finished Goods Location, Dispatch Dock	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: www.gs1.org
Date/Time	Production Date and/or time, Use By date, Best Before Date, Pack Date	Year -Month-Date	**YYMMDD**	Whilst human readable date formats can vary e.g. 21 December 2020, 21December 2020, the structure of the date format to be encoded into systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD
Product Identifiers	Input materials such as raw ingredients and packaging, Outputs such as finished goods, packaged or processed goods	Global Trace Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org Information on how to allocate a GTIN to a variable weight or variable measure trade item Insert link
Traceability Attributes	Batch/Lot code, Serial Number,		**AN20**	Traceability Attributes, such as Batch or Lot Number or Serial Number etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format. List of Application Identifiers: www.gs1au.org

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Logistics Units	Pallet of Finished Goods, Crate or Box of finished Goods	Serial Shipping Container Code (SSCC)	**N18**	Logistic unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. Logistic units take many forms, a single box containing a limited number of products, a pallet of multiple products, or an intermodal container containing multiple pallets. www.gs1au.org/
Assets	Returnable assets Ie: IBC or individual assets Ie: A crate	Global Shipment Identification Number (GSIN)	**N13**	Can be identified as an asset type only or an optional serial number can be added to distinguish individual assets www.gs1au.org
Consignment	Grouping of logistics units assigned by the transport company	GINC	**N30**	The Global Identification Number for Consignment can be used by companies to identify a consignment comprised of one or more logistic units that are intended to be transported together. www.gs1.org
Shipment	Grouping of logistics units	GSIN	**N17**	The Global Shipment Identification Number (GSIN) is a number assigned by a seller and shipper of goods to identify a shipment comprised of one or more logistic units that are intended to be delivered together. www.gs1.org
Assets	Returnable assets (GRAI): e.g. IBC or Individual assets (GIAI): e.g. A crate	Global Returnable Asset Identifier (GRAI) Global Individual Asset Identifier (GIAI)	**N13**	Can be identified as an asset type only or an optional serial number can be added to distinguish individual assets www.gs1au.org

Useful links

Labelling of imported food
www.agriculture.gov.au

Food safety standards of imported foods
www.foodstandards.gov.au

Imported Food Inspection

www.agriculture.gov.au

BSE and meat inspection
www.agriculture.gov.au

Approved Arrangements for Import
www.agriculture.gov.au

Food import business
www.foodauthority.nsw.gov.au

Food Recall Plan and procedures
www.foodstandards.gov.au

Australian Trusted Traders
www.abf.gov.au

Glossary

Approved Arrangements

This is a voluntary scheme operated by the Department of Agriculture, Water and the Environment which allows Import establishments such as cold storage to register arrangements that comply with inspection regimes for biosecurity. These arrangements allow operators to manage biosecurity risks and/or perform the documentary assessment of goods in accordance with departmental requirements, using their own sites, facilities, equipment and people, and without constant supervision by the department and with occasional compliance monitoring or auditing.

See: www.agriculture.gov.au

Air Waybill and Ocean Bill of Lading

The Air Waybill (AWB) is a critical air cargo document that constitutes the contract of carriage between the shipper and the carrier (airline). The Electronic Air Waybill Resolution 672 (MeA) removes the requirement for a paper AWB. There is therefore no longer a need to print, handle or archive the paper, largely simplifying the air cargo process. (IATA)

An ocean bill of lading (OBOL, BOL, BL) is a document required for the transportation of goods overseas across international waters. The contract is legal and outlines the type, quantity, and destination of goods being carried. The shipper and carrier sign the ocean bill of lading upon shipment, and the receiver signs the document upon receipt. (Investpedia).

BICON

Australian Biosecurity Import Conditions (BICON) houses the Australian Government's Biosecurity import conditions database for more than 20,000 plants, animals, minerals and biological products.

Customs Broker

The **Customs** Act 1901 (**Customs** Act) provides that only the owner of goods or a **Customs Broker** licensed by the Comptroller-General of **Customs** for the Department of Home Affairs (the Department) can submit an **import** declaration to enter goods for home consumption in connection with the importation of those goods.

Customs Brokers also check all clearance documentation to ensure it's correct and can provide advice on the best way to obtain clearance of your goods into and out of Australia. A licensed Customs broker can lodge Customs entries in all states of Australia, and can clear cargo by air, sea, and post.

Cargo Terminal Operator (CTO)

Air CTOs undertake a wide range of activities. They may be an airline in their own right or act on behalf of other airlines. CTOs are responsible for the carriage or arranging the carriage of the cargo, the discharge of cargo from the aircraft, the release of the cargo and arranging to move it according to contractual obligations and operational requirements. (ABF).

Sea port CTOs manage terminal operations and load/unload vessels, oversee short term storage of cargoes, monitor security and transport access to the terminal.

Full Import Declaration (FID)

Customs brokers and importers must complete FIDs for imported food. FIDs are lodged through the Department of Home Affairs' Integrated Cargo System (ICS). For more information www.agriculture.gov.au

International Freight Forwarder

The international freight forwarder is a business specialising in international trade and transport. A Freight Forwarder manages shipping documents, freight rates, customs clearance, packing, insurance, road transport and delivery of cargo to its intended destination.

Import Delivery Order/Electronic Import Delivery Order

An Import Delivery Order is provided by the Importer/Forwarder to the carrier (shipping line/airline) to release cargo to a third party (Transport Company) for delivery to the Importer. Until this is received, the cargo cannot be released to the transport to collect from the Cargo Terminal Operator.

For this process to be automated for containerised cargo, see www.1-stop.biz

Incoterms

The Incoterms® rules are the world's essential terms of trade for the sale of goods. Whether you are filing a purchase order, packaging and labelling a shipment for freight transport, or preparing a certificate of origin at a port, the Incoterms® rules are there to guide you. The Incoterms® rules provide specific guidance to individuals participating in the import and export of global trade on a daily basis. iccwbo.org

Maritime Arrivals Reporting system (MARS)

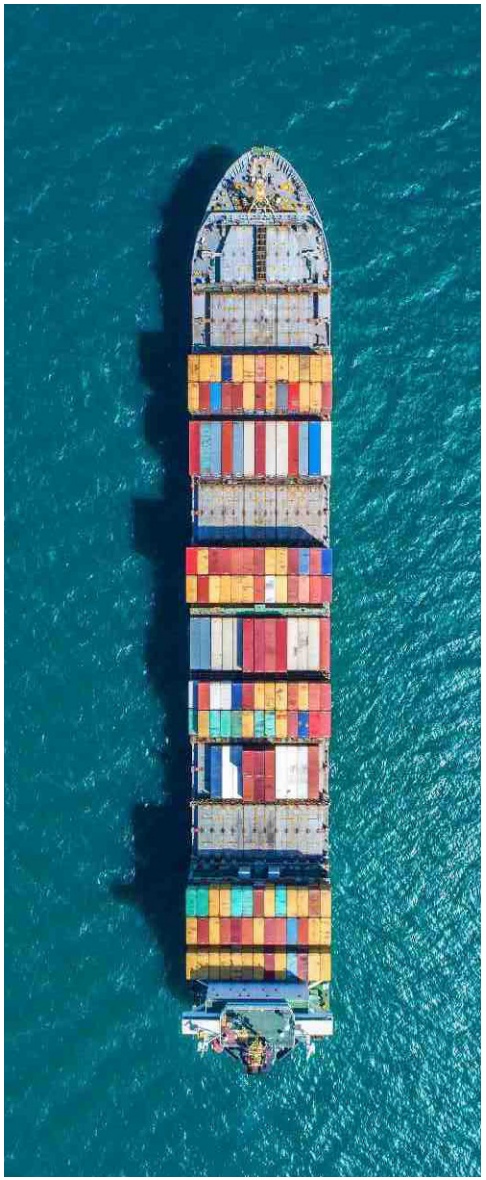
MARS is an online web portal to be used by commercial vessel masters and shipping agents to submit pre-arrival documents required of all international, commercial, vessels seeking Australian biosecurity clearance. www.agriculture.gov.au

Notice of Arrival (NOA)

This notice is issued by the shipping line/airline to the Importer/Notify party. Lines may use their customer portal to advise the Importer/notify party of the pending and actual arrival by messaging or they may search by container number, vessel number, airway bill/bill of lading number, reference number, vessel name, voyage, port of discharge, or estimated time of arrival (ETA).

Proof of Delivery (POD)

A commercial document used by the Consignee or their Logistics Service Provider to notify the Consignor of the receipt and acceptance of a delivery. A signed POD enables the Transport Company to raise an invoice.



Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Meat Processing

Meat Processing And Packing

Livestock Receival

ID – NLIS tag, tattoos, harvester tag,

Records – National Vendor Declarations (or approved alternate), Post Sale Summary (PSS), Delivery Records

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Lairage

ID – Pen Number, NLIS Tag, Tattoo

Record – daily kill agenda, NLIS scan reports

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Slaughter and Dressing

ID – Body Numbers, Carcarse Tickets, Lot Tickets, Official Marks, Category Ciphers

Records – Kill Production Summary, NLIS Scan Reports, Condemnation Certificates, Animal Food Records

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Offal Preparation

ID – Carton Labels, Official Marks

Records – Offal Room Production Summary

↓

Carcase Chilling

ID – Body Numbers, Carcase Tickets, Lot Tickets, Official Marks, Category Ciphers

Records – Chiller Inventory and Traffic Records

↓

Boning

ID – Carcase Tags, Carton Labels, Official Marks, Carton Seals

Records – MTCs, Boning Room Carcase Input, Boning Room Production Summary

↓

Cold Storage

ID – Carton Labels, Official Marks, Carton Seals, Pallet Labels

Records – MTCs, Product Inventory Records

↓

Loading for Export or Inter Establishment Transfer

ID – Carton Labels, Official Marks, Carton Seals, Pallet Labels, Shipping Marks, Container Seals

Records – Load-Out Reports, Carton Scan Reports, RFPs, MTCs

This module covers activities that disaggregate the livestock into a range of products, including those for human consumption. The Australian Standard (AS4696-2007) requires that meat businesses have a documented system that provides for the accurate identification of, and the ability to trace and recall, meat and meat products produced by the business.

In this module, activities associated with meat processing include:

1. Establishment of identities – entities; locations; products
2. Sourcing and procurement of livestock
3. Receival of livestock
4. Slaughter and grading
5. Processing (chill, cut, bone, etc) on site or at another establishment
6. Meat packing and labelling

These subsequent activities may take place on the meat processing site or be contracted to a third party engaged in meat storage or further processing:

7. Meat storage
8. Order preparation and outbound product dispatch.

Establishment

All meat processing establishments are required to comply with national and state standards, including the *Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption* (AS 4696:2007) - currently under revision.

In order to be licensed, the business must have in place a traceability program. The Australian Standard details this under Part 6 Identification, Traceability and Integrity requiring "Meat businesses have a documented system that provides for the accurate identification of, and the ability to trace and recall, meat and meat products produced by the business."

Additionally, the National Livestock Identification System (NLIS) requires meat processors to have a unique **Property Identification Code** (PIC) issued by the relevant state authority.[1] This code is utilised to identify the facility location and business identity. It is essential for recording of livestock movements and it is part of the key documentation that accompanies livestock arriving at the processing establishment.

Meat processing establishments that supply meat for export are required to be licensed as export establishments under Tier 1 or 2 certification programs administered by the Commonwealth or State governments (see Meat and Livestock Export module of this Guide).

For the purposes of international tracking, a meat processing establishment may also utilise a **Global Location Number** (GLN) to associate a number of attributes to this unique code recognised in international supply chains.

Supplier identification is currently via the NLIS Property Identification Code recorded on the National Vendor Declaration that accompanies the consignment of livestock. This records the previous location of the livestock supplied to the processor.

Key tasks related to traceability

- registration and licensing as a meat processing establishment. Preparation of a Traceability Program is a requirement for registration and licensing
- creation of master data for the business and supply chain parties (including PIC).

Participants

- Meat processor
- Registration and licensing agencies – Commonwealth and state-based e.g. PIC issuing authorities.

Souring and Procurement of livestock

Meat processors undertake due diligence in sourcing livestock that is fit for processing, relying on the NLIS database to identify the source and history of animals offered for sale. Of particular interest is the risk associated with chemical residue and biosecurity status that may attach to the animal. This risk is associated with market access, such as the European Union Cattle Accreditation Scheme (EUCAS) residue status requirements.

Random audits of cattle, sheep and goats is undertaken by Commonwealth and State government agencies, however the key records available to processors is accurate information supplied on the National Vendor Declaration completed by livestock producers.

Key tasks related to traceability

- Risk analysis of sourcing livestock with chemical residue or hormone growth promotants inaccurately reported on NVDs
- Check of available data from NLIS regarding residue status including withholding periods/ export slaughter intervals, health statements, by-product stockfeed list, residue reports and clearances, treatment details

Participants

- Meat processor
- Livestock Producer
- NLIS

[1] NLIS Traceability Standard S.6.1.1

Receival of livestock

Livestock welfare is covered by the Australian Land Transport Standards (LTS) as adopted in each state jurisdiction. Abattoirs, including export registered abattoirs, are required to monitor fit to load conditions for livestock being sent for slaughter.

Management is required to monitor animals upon receival and if any arrive in what may be an unfit condition, then management is required to raise an Animal Welfare Incident Report (AWIR). The purpose of the AWIR is to notify the relevant state/territory animal welfare regulatory authority who has the jurisdictional power where necessary to prosecute.

Livestock identification is created through physical marking of the animal in accordance with the National Livestock Identification System, through ear tags, bolus devices and lot numbers, RFID active or visual in the case of sheep or goats. These devices or visual tags enable the animal's life history of movement to be traced via the NLIS database.

NLIS Traceability Standard S6.3.1 states:

Cattle must not be slaughtered or processed unless they are identified by an NLIS device, except –

a) where cattle, are moved under a state or territory authority permit, that have been deemed to be dangerous or unsafe to tag, providing the conditions of that permit are being met and the animal is being slaughtered at an abattoir or knackery; or b) under the direction of the state or territory authority, or one of its officers; or c) due to an animal welfare emergency situation; d) where permitted under an Approved Program describing the processor's system for managing untagged cattle. Where cattle arrive without an NLIS accredited device the establishment must report the arrival of cattle to the state jurisdiction within 24 hours.

Livestock are delivered and unloaded into holding yards at the meat processing establishment. The paper/electronic or mobile NVD/waybill/TSS/permit accompanying the livestock will detail the NLIS identification of the individual animal, mob or lot received.

A weekly audit is required of live animals received. NLIS Traceability Standard S6.3.5 states that *"The abattoir, knackery or other processing plant operator must monitor the numbers of live cattle linked to its PIC on the NLIS database compared with the number of live cattle remaining on the premises at the end of each kill week with the view of managing the account numbers."*

Records of livestock receival are to be kept for 2 years by the meat processor.

Key tasks related to traceability

- eNVD/mNVD received from the Consignor and Livestock Transporter
- Livestock count against eNVD details
- Audit live animals on-site weekly against NLIS database.
- If inconsistencies are noticed in the weekly live animal and kill sheet audit, the operator must resolve it on the NLIS database by close of next business day.

Participants

- Meat processor
- NLIS.

Slaughter

The Australian Standard AS4696:2007 contains the following requirements for traceability in the process of slaughter and dressing of animals:

- The date of slaughter
- The species of animals slaughtered
- Places of production or the saleyards of animals in the consignment
- Locations where wild animals were captured.

The NLIS Traceability Standard 6.3.3 requires:

In the case of processing establishments, the - a) body number; b) PIC of consignment c) processing establishment number or PIC d) date of kill e) NLIS device number or RFID (not necessary where the animal was slaughtered without an NLIS device)

Note – the operator number and NVD serial number may be required in some jurisdictions.

As they enter the slaughter floor, animals generally enter a race where their individual identification RFID ear tag, bolus RFID or visual ear tag identification is captured (generally through use of a scanner) and recorded in the enterprise system. The NLIS number from the animal may also be recorded when the animal is stunned prior to slaughter.

At slaughter, the identity of the animal is linked via the kill sheet to the carcase identifier as the NLIS identifier is removed and disposed of, to ensure it cannot be used again. A carcase ticket/swing tag is assigned to each carcase half or quarter at carcase inspection and grading.

Key tasks related to traceability

- Record livestock (individual animal or mob/lot) to the processing plant on NLIS database.
- Record identity of animal slaughtered on kill sheet and remove animal identification from ear/bolus devices and visual tags.
- Attach swing EAN barcoded tag/ticket to the carcase to link carcase ID with livestock ID once inspection and grading is completed.

Participants

- Meat processor
- NLIS.

Processing

Carcases are split down the spine on the slaughter floor and the sides are placed together in the chiller overnight. Sheep and goat carcases remain intact. Offal is moved to the offal preparation area. The carcase is then chilled.

Grouping carcases for boning is generally carried out the next morning prior to commencement of the boning process. After carcase measurements have been taken, each carcase is identified by a boning group number. Boning groups collate carcases of similar qualities that meet a particular market specification.

Carcases with the same boning group are drafted, boned and the cuts packed together.

Carcase halves or quarters remain identifiable by tag if they are sold in this form for wholesale or for further processing by a manufacturer or butcher. However, most of the carcases are further cut and boned.

Traceability of cut, boned meat portions/offal and other products at this transformative stage is a challenge, as at this point tag identification ceases to be available. The means by which the meat product is linked to the carcase and, in turn, to the animal ID, is generally through batching of carcase identifiers processed in a time period, e.g. each hour. For example, there may be up to 600 carcases processed per hour in a large boning room. This ceases to be a one piece-to-one carcase traceability, becoming a batch until a packed portion is identified. Technologies and systems are currently being developed to enable carcase to primal cut matching if required. As the traceability system stands, the processor bears the risks associated with this lack of precision in the traceability system.

Producers and processors able to exchange information about the animal via the **Livestock Data Link** program operated by Integrity Systems Company. This program, which is voluntary, enables processors to provide feedback on carcase compliance, animal disease and defect, breeder information and lean meat yield (LMY). See Livestock Data Link www.integritysystems.com.au/.

Key tasks related to traceability

- Record batches associated with carcase ID
- Affix carcase/batch ID to carton.

Participants

- Meat processor
- Technology provider.

Labelling and packing

Specific cuts or carcases may be labelled individually at this stage e.g. caterer pack/ primal cuts/half or quarter carcase with a range of information. When portions of meat are packed, their identification for traceability is usually established at the carton level.

The Australian Standard AS 4696:2007 requires that:

- The meat/meat products are identified as unique products or in a processing or packaging batch.
- At packing, identification of each product or processing batch details the species of animal; the date of packaging and the identity of the meat processor.
- A system is in place to enable each batch to be traced back and all raw ingredients can be identified
- The source of any ingredients used
- Each batch and the size of the batch identified
- The date of processing
- The source of all meats in the one batch
- The location of the batch on the premises
- All other information that may determine whether the batch requires recall (e.g. analytic samples)

Source: AUSMEAT handbook of Australian Sheep Meat Processing 2020

The above label is an example of a sheepmeat product label applied to a carton of meat

1. **Generic:** Bone-in or boneless statement as well as species identification.
2. **Carcase Identification:** Category cipher which identifies carcase age and sex.
3. **Product Name:** Primal cut description as shown in the Handbook of Australian Meat.
4. **Grainfed Description:** Identifies the product as meeting Grainfed requirements.
5. **MSA Description:** Identifies the product as MSA graded with eating quality outcomes.
6. **Net Weight:** The meat content of the carton minus the carton weight.
7. **AI Stamp:** Australian Federal Government Inspected stamp.
8. **Refrigeration Statement:** Indicates the product has been held in controlled chilling.
9. **Company Details:** Indicates the name of the packer of the product

Traceability of packaging

Records of suppliers and receival details for plastic liner bags for cartons, plastic used for cryogenic packaging, cartons and labels need to be kept in relation to their potential to come in contact with and contaminate the meat product.

Key tasks related to traceability

- Where individual carcase or cut requires identification, affix carcase/batch ID to primal cuts before packaging and labelling the carton
- Label carton with batch identification
- Record packaging materials.

Participants

- Meat processor
- Packaging supplier
- AUSMEAT standards provider.

Meat storage

For meat stored onsite at the processor, cartons of processed meat and carcase cuts may be moved to the storage facility via a conveyor system or transported off-site to a dedicated storage or retail packing facility. Carton labels and brands of the processor, market eligibility as well as product specifications are often pre-printed on the carton.

Note: For export meat requiring transfer to an off-site storage facility, a Meat Transfer Certificate is required. Storage facilities for export meat are also required to be registered as an export establishment (see *Meat and Livestock Export* module).

In storage, traceability data is now captured in the warehouse management system (WMS). Cartons of meat are frozen or chilled in storage. Boxed product may be palletised for storage, with the pallet serial shipping container code (SSCC) recorded. Each carton is associated with the pallet for storage and recorded in the WMS. This system will support the monitoring of slaughter dates and best-before dates on cartons, location of inventory, temperature recordings and preparation of outbound shipments.

Some processing plants undertake additional packing on-site into retail-ready packs at the specification of the retail customer, requiring labelling and re-packing into cartons. Others remain in cartons as originally packed.

Key tasks related to traceability

- Record carton/carcase ID scanned at receipt
- Record pallet number and associated cartons
- Record slaughter/processing date and best-before dates
- If retail packing on-site, re-label packs recording carcase/batch in the barcode.

Participants

- Meat transport
- Meat processor
- Storage operator
- Packing staff.

Order preparation and outbound product dispatch

The meat processor will receive a Purchase Order from the Customer. Inventory will be checked and an Order Confirmation is returned to the Customer. The consignment is prepared in the storage facility/meat packing plant, with a picking list used to fulfil the Customer Order. Refrigerated Transport is then booked for delivery of the cartons/carcase sections and a Consignment Note and Delivery Order prepared. A Meat Transfer Certificate will also be required for transiting export product.

These processes are detailed in the *Meat Storage and Distribution Module*.

Key tasks related to traceability

- Receive and confirm Purchase Order
- Create Customer Order and Picking List
- Complete transport booking, create Consignment Note/Sea or Air Waybill/ Delivery Order
- Complete additional shipment documentation e.g. Meat Transfer Certificate if required
- Palletise/pack container for outbound consignment
- Record outbound inventory, time and date of dispatch.

Participants

- Meat processor
- Storage operator
- Packing staff
- Meat Transport Company.

Critical Tracking Events

For each of the identified meat processing activities, critical tracking events (CTEs) establish identity and enable traceability and compliance with traceability-related regulation are summarised as follows:

Critical Tracking Events (CTEs) are events that relate to the identity, movement and transformation of the food product.

Processing/manufacturing activity	CTE code	Critical Tracking Events (CTEs)
Establishment	**MP CTE1**	Registration of processing plant PIC Preparation of a Traceability program Meat processor licence issued Export Establishment Number received Global Location Number issued PIC and GLN of suppliers created in master data
Sourcing and procurement	**MP CTE2**	Risk analysis of livestock offered for processing Checking of NLIS/NVD records
Livestock receival	**MP CTE3-1**	Livestock Receipt and count Inspection of livestock against eNVD from Consignor and Livestock Transporter
	MP CTE3-2	Complete weekly audit of kill sheet and live animals on-site and report to NLIS database
Slaughter	**MP CTE4.1**	Record movement of livestock (individual animal or mob/lot) entering slaughter floor
	MP CTE4.2	Record identity of animal slaughtered on kill sheet and remove animal identification device from ear/bolus.
	MP CTE4.3	Attach EAN barcoded tag/ticket to carcase to link carcase ID with livestock ID
Processing	**MP CTE5**	Record batches associated with carcase ID Affix carcase/batch ID to primal cuts
Labelling and packing	**MP CTE6.1**	Affix carcase/batch ID to primal cuts before packaging and labelling the carton Label carton with batch/carcase ID
	MP CTE6.2	Record packaging materials

Processing/manufacturing activity	CTE code	Critical Tracking Events (CTEs)
Meat storage	**MP CTE7.1**	Receival at meat storage • Record carton/carcase ID scanned at receipt • Record pallet number and associated cartons • Record slaughter/processing date and best- before dates
	MP CTE7.2	Retail ready packing If retail packing on-site, re-label packs recording carcase/batch/lots in the barcode
Order preparation and outbound product dispatch	**MP CTE8.1**	Prepare Customer Order • Receive Purchase Order • Confirm Purchase Order • Create Customer Order and Picking List • Palletise/pack container for outbound consignment
	MP CTE8.2	Complete transport booking and create shipping documentation • Consignment Note/Sea or Air Waybill/Delivery Order • Complete additional shipment documentation e.g. Meat Transfer Certificate if required
	MP CTE8.3	Record outbound inventory, time and date of dispatch in WMS

Key data elements

Key Data Elements (KDE) ensure that captured and recorded data can be interpreted and used as relevant and required by all supply chain partners. Key Data Elements define Who, What, When, Where and Why for each Critical Tracking Event identified above.

Event code	CTE	Key data elements
MP CTE1	**Establishment**	Property Identification Code (PIC) Traceability Program reference code and currency of audit (may be part of a Food Safety Plan) Meat Processor Licence number Global Location Number The Global Location Number (GLN) is used to identify locations and legal entities. This unique identifier is comprised of a GS1 Company Prefix, Location Reference, and Check Digit. GLNs are used to identify parties to business transactions; functional groups within a company; or real, physical places that might ship, receive, process, or hold the product. **Request for GLN** **Who** Processor Issuing Agency **What** Processing Facility **When** Date/Time of issuance of Global Location Number (GLN) **Where** Issuing Agency **Why** Identification of Processing Facility **Export Registered Australian Standard Meat Establishment** **Supplier GLN and PIC codes** • Livestock suppliers PIC and other suppliers GLN **Information shared to traceability platform:** • **Property Identification Code (PIC)** • **Global Location Number (GLN)** • **Export Establishment number and date of latest audit** • **Meat Processor Licence number** • **Traceability Program reference code and audit date** • **Supplier GLNs and PICs**
MP CTE2	**Sourcing and procurement**	• NVD health status from livestock producer – chemical treatment, hormone growth promotant usage, withdrawal period, export slaughter interval • NLIS database records of animal history

Event code	CTE	Key data elements
		Information shared to a traceability platform • Livestock health status • Residue status • Use of hormone growth promotants
	Livestock Receival	
MP CTE3.1	**Livestock Receipt and count** Inspection of livestock against eNVD from Consignor and Livestock Transporter	• Date and time of receival • eNVD number • Livestock count • NLIS ID of animals received at processor PIC
MP CTE3.2	Complete weekly audit of live animals on-site and report to NLIS database	• Count of live animals on-site **Livestock Receipt** **Who** Processor Livestock supplier Transport provider **What** Livestock, Qty **When** Date/Time of Receipt **Where** NLIS database **Why** Identification of Processing Facility **Information shared to traceability platform:** • **Processor establishment number/PIC** • **PIC of consignment** • **NLIS device number or RFID of animal**
	Slaughter	
MP CTE4.1	Record movement of livestock (individual animal or mob/lot) entering slaughter floor	• NLIS tag number/mob/lot number • Date and time
MP CTE4.2	Record identity of animal slaughtered on kill sheet and remove animal identification device from ear/bolus.	**Kill sheet data** • Animal/mob/lot NLIS Identifier • Processor ID • Producer ID (from NVD) • Kill date • Body ID • RFID device number removed • Visual tag number

Event code	CTE	Key data elements
MP CTE4.3	Attach EAN barcoded tag/ticket to carcase to link carcase ID with livestock ID	**Carcase ID** • Barcode • Readable data – Processor name – Establishment number – Body number – Lot number • Kill date **Information shared to traceability platform:** • **Kill sheet record to NLIS database**
	Processing (chilling, boning)	
MP CTE5	Record batches associated with carcase ID	• Carcase ID processed through boning room • Carcase ID on primal cuts (use of trays to maintain correlation) • Batch ID for other outputs (trim etc)
	Affix carcase/batch ID to primal cuts	**Livestock Processing** **Who**: Processor **What**: Carcase ID, new product (Prime cut) id, Qty used, Qty produced, Batch, Processing date **When**: Date/Time of Processing **Where**: Processing site **Why**: Processing (de-aggregration) **Information shared to traceability platform:** • **Carcase ID** • **time and date processed** • **Batch ID** • **time and date processed**
	Labelling and packing	
MP CTE6.1	**Affix carcase/batch ID to primal cuts before packaging and labelling the carton** Label carton with batch/carcase ID	Carcase ID (primal cuts) on individual meat cut vacuum pack Carton label • Processor ID (readable name address and establishment number) • Product ID/cut • Slaughter date • Date packed • Use-by date
		• Country of Origin • Weight • Number of pieces • Brand • Inspection stamp • Carton ID • MSA grade code (if MSA graded)
MP CTE6.2	**Record packaging materials**	• Packaging materials product ID • Purchase Order number • Date of receipt • Batch/Lot number • Source ID **Packing** **Who**: Processor **What**: Product ID, Qty, Batch, pack date **When**: Date/Time of Receipt **Where**: Packing location **Why**: Product packing **Information shared to traceability platform:** • **Carton IDs for consignment to storage** • **Cartons to pallet ID for off-site storage and packers** • **Packaging batch number, supplier and receival date**
	Meat storage	
MP CTE7.1	**Receival at meat storage** • Record carton/ carcase ID scanned at receipt • Record pallet number and associated cartons • Record slaughter/ processing date and best- before dates	**Scan in at receival (WMS)** • Carton barcode • Carcase tag • Slaughter date • Best before date **Palletised cartons (WMS)** • Pallet ID • Cartons associated with pallet

Event code	CTE	Key data elements
MP CTE7.2	**Retail ready packing** • If retail packing on-site, re-label packs recording carcase/batch/lots in the barcode	**Meat packing retail labels** • Product name • Supplier name and address • Date of slaughter/processing • Best before date • Country of origin • Batch number • Individual item/pack ID
		Receipt into Storage **Who** Processor **What** Product ID, Qty, Batch, pack date **When** Date/Time of Receipt into Store **Where** Processing location storage **Why** Product location tracking
		Information shared to traceability platform: • **Carton ID** • **Carcase ID** • **Pallet ID** • **Pack ID – retail packed meat**
	Order preparation and outbound product dispatch	
MP CTE8.1	**Receive and confirm Purchase Order**	**Purchase Order** • Date • PO number • Meat name • Quantity (carcase half/quarter; kg; cartons; retail packs) • Customer ID (name; address; GLN) • Deliver to address • Date of delivery • Price • Supplier ID (Export Establishment number; MSA number; GLN)
	Create Customer Order and Picking List	**Customer Order** • Customer ID • Order number • Product • Quantity/Units • Batch number/s • Carton number/s • Date of pick • Location of pick • Advance Shipping Notice number

Event code	CTE	Key data elements
		Order Picking **Who** Processor **What** Product ID, Qty, Batch, pack date, order number **When** Date/Time of Picking **Where** Processing location **Why** Order preparation, readiness for delivery
MP CTE8.2	Complete transport booking, create Consignment Note/Sea or Air Waybill/Delivery Order, complete additional shipment documentation e.g. Meat Transfer Certificate if required	**Transport/shipping documentation** • Purchase Order number • Customer Order number • Advance Shipping Notice number • Consignment Note number • Pallet number • Transport Delivery Order number • Sea/Air Waybill number (export) • Meat Transfer Certificate number (export) • Container number/ECN (export) • Container seal number (export) • RFP/AFP number
	Palletise/ pack container for outbound consignment	**Product palletisation and load build** **Who** Processor **What** Product ID, Qty, Batch, pack date, ord number, vehicle identification, SSCC number, ASN **When** Date/Time of creation **Where** Processing loading dock **Why** Logistics unit identification
MP CTE8.3	**Record outbound inventory, time and date of dispatch.**	**Inventory management** • Pallet ID • Carton ID • Time and date of dispatch • Purchase Order number • Customer Order number
		Product despatch **Who** Processor Transport provider **What** Product ID, Qty, Batch, pack date, or number, vehicle identification, SSCC number, ASN, vehicle ID, transport provider id **When** Date/Time of despatch **Where** Processing loading dock **Why** Product Despatch

Event code	CTE	Key data elements
		Information shared to traceability platform: • **Purchase Order Number** • **Customer Order number** • **ASN number** • **Consignment Note number** • **Delivery Order/Waybill number** • **Logistics Label number (SSCC)** • **Vehicle ID** • **Transport provider**

Application of GS1 global data standards

GS1 Global Data standards that apply to key data elements and shared information are identified in this section. It is recognised that in addition to GS1 Standards, other industry adopted standards exist and work in parallel to GS1 Standards e.g. Property Identification Codes, NLIS tags for livestock.

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Locations	Manufacturing Plant, Finished Goods Location, Dispatch Dock	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure use, creation can be found here: www.gs1.org
Date/Time	Production Date and/or time, Use By date, Best Before Date, Pack Date	Year -Month-Date/Time/ Time zone	**YYMMDD**	Whilst human readable date formats can vary e.g., 21 December 2020, December 21, 2020, the structure of the date format to be encoded in systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD
Product Identifiers	Input materials such as raw ingredients and packaging, Outputs such as finished goods, packaged or processed goods	Global Trade Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org Information on how to allocate a GTIN to a variable weight or variable measure trade item: www.gs1au.org (for VM non-retail items) an www.gs1au.org (for VM retail POS items)
Traceability Attributes	Batch/Lot code (AI 10), Serial Number (AI 21), Pack date (AI 13), Production date (AI 11), Best Before Date (AI 15), Expiry Date (AI 17)	Each Traceability attribute has its own data format requirements. Please refer to the detailed information found via the link provided.	**AN20**	Traceability Attributes, such as Batch or Lot Number or Serial Number etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format. List of Application Identifiers: www.gs1au.org

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Logistics Units	Pallet of Finished Goods, Crate or Box of finished Goods	Serial Shipping Container Code (SSCC)	**N18**	Logistic unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. Logistic units take many forms, a single box containing a limited number of products, a pallet of multiple products, or an intermodal container containing multiple pallets. www.gs1au.org
Weights & Measures	Variable count of items. Count of items on a logistics unit. Total weight of pallet in NET Kilos. Total Length of goods delivered in Metres. Total volume of goods delivered in Cubic Metres	Must be accompanied with a GTIN	**Varying**	Variable measure trade items use GS1 Application Identifier data fields that contains the quantity or dimension of a variable measure trade item. It also denotes the unit of measure. These element strings are used to complete the identification of a variable measure trade item. They contain information such as the weight, size, volume, or dimension of a variable measure trade item. www.gs1.org
Assets	Returnable assets (GRAI): e.g. IBC or Individual assets (GIAI): e.g. A crate	Global Returnable Asset Identifier (GRAI) Global Individual Asset Identifier (GIAI)	**N13**	Can be identified as an asset type only or an optional serial number can be added to distinguish individual assets www.gs1au.org

Useful links

AUSMEAT standards

www.ausmeat.com.au

Meat processing plant registration and licensing Approved Arrangement

DAWE (2019) Guidelines Approved Arrangement - Meat www.agriculture.gov.a

VIC

www.primesafe.vic.gov.au

ACT

health.act.gov.au

NSW

www.foodauthority.nsw.gov.au

NT

www.health.nt.gov.au

QLD

www.health.qld.gov.au

SA

www.health.sa.gov.au

VIC

www.health.vic.gov.au

WA

ww2.health.wa.gov.au

TAS

www.dhhs.tas.gov.au

Traceability standard in meat processing

Standard AS4696 (2007)
www.primesafe.vic.gov.au

NLIS Cattle Traceability Standard (2016)
www.nlis.com.au

Animal Welfare

Animal Welfare Incident Report
www.agriculture.gov.au

Product labelling

Shelf Life and Labelling, product description standards

AUSMEAT

Beef www.ausmeat.com.au

Lamb www.ausmeat.com.au

NMI Weights and Measures business.gov.au

ACCC Country of Origin Food Labelling
www.accc.gov.au

Food Standards Code labelling
www.foodstandards.gov.au Carton labelling requirements are regulated by Industry, Innovation and Science Australia.
www.industry.gov.au.

Country of Import requirements

www.agriculture.gov.au

Meat Messaging Portal

Meat Messaging Export Establishment Implementation Guide
www.meatmessaging.info

Glossary

Abattoir

An abattoir is a facility that slaughters consumable animals for human consumption.

Advance Shipping Notice

An advance ship notice or advance shipping notice (**ASN**) is a notification of pending deliveries, similar to a packing list. It is usually sent in an electronic format and is a common EDI document.

Approved Arrangement (Meat)

The Export Control (Meat and Meat Product) Rules 2021 require that the occupier of an establishment engaged in the preparation of meat and meat products for export has an Approved Arrangement. The purpose of the Approved Arrangement is to clearly describe those processes and practices which, when correctly applied by the occupier, underpin certification of meat and meat products for export.

www.agriculture.gov.au

Consignment Note

The consignment note is a key document used in transporting freight within domestic supply and in the landside logistics of import and export.

The goods are deemed to be "on consignment" until they reach the consignee.

The document is prepared by the consignor and countersigned by the transport carrier as a proof of receipt of the consignment for delivery at the destination.

Delivery Order

A document from the Consignor of the freight which orders the release of the cargo to another party. This permits the delivery direct to a warehouse or depot, as organised with the Consignee. This enables the Consignor to order pick up of product from a 3PL warehouse in order to deliver to the party named in the Delivery Order.

Lot

A lot is an amount of a food that the manufacturer or producer identifies as having been prepared, or from which foods have been packaged or otherwise separated for sale, under essentially the same conditions, for example:

A. From a particular preparation or packing unit; and

B. during a particular time ordinarily not exceeding 24 hours.

The lot identification (which could be a number or other information) is used to track a product in the event of a recall and needs to be able to identify where the food was packed or prepared.

Meat Transfer Certificate (MTC/eMTC)

A meat transfer certificate is required to move meat for export from one establishment to another e.g. from processor to storage, from processor to port. The MTC is now in the form of an electronic GS1- compliant message.
Insert link:

Meat Standards Australia (MSA)

Meat Standards Australia (MSA) was developed by the Australian red meat industry to improve the eating quality consistency of beef and sheep meat. The system is based on almost 1.2million consumer taste tests by more than 171,000 consumers from 11 countries and takes into account all factors that affect eating quality from the paddock to plate.

MSA grading of meat is undertaken post-slaughter at meat processors by MSA-authorised assessors. Producers are then provided with feedback based on the MSA scores.

National Vendor Declaration (NVD)

The National Vendor Declaration is a legal document which must be completed by the livestock owner or person responsible for the livestock husbandry prior to livestock movements. It details the food safety and health status of the animals. It informs the Livestock Transporter and the buyer.

National Livestock Identification System (NLIS)

Performance standards for livestock traceability are set by Animal Health Australia. The National Livestock Identification System (NLIS) has been developed to meet those standards. The NLIS is the means by which lifetime traceability of livestock is achieved in Australia.

For cattle, sheep and goats, NLIS has three crucial elements to create traceability –

- identification of the animal,
- associating the identity with the animal's location (PIC), and
- lodgement of records of consignment of stock.

PIC

A Property Identification Code (PIC) is the eight-character alphanumeric code allocated by the department (or the equivalent authority in other states and territories) to a property used for agricultural purposes.

Victorian PICs begin with the numeral 3, followed by four letters and three more numerals, for example, 3ABCD123. The first two letters identify the municipality of the property.

A single PIC can be allocated to a property consisting of more than one block of land, provided the blocks are part of the one enterprise and are within the same locality or in adjacent localities.[2]

Purchase Order (PO)

A commercial document issued by a buyer to a supplier. This is a legally binding offer to buy product in return for payment. The terms and conditions for delivery and payment are detailed in this document, which also details the product quantity, price, terms and conditions, product quality specifications.

Sea/Air Waybills

An Air Waybill (AWB) is a document that controls the routing of an exporter's cargo while it is in the hands of the air carrier or a consolidator. It is a contract for carriage; however, it cannot be negotiated.

Bill of Lading (BL/BOL)

A bill of lading is a document issued by a carrier to acknowledge receipt of cargo for shipment. Although the term historically related only to carriage by sea, a bill of lading may today be used for any type of carriage of goods.

The bill of lading is a legally binding document that provides the carrier and shipper with all of the necessary details to accurately process a shipment. It has three main functions. First, it is a document of title to the goods described in the bill of lading. Secondly, it is a receipt for the shipped products. Finally, the bill of lading represents the agreed terms and conditions for the transportation of the goods.

Warehouse Management System (WMS)

A warehouse management system is a software solution to manage and optimise inventory and supply chain operations in a distribution centre. Typical functions of a WMS include -

- Receiving products
- Tracking stock
- Efficient storage and cold chain management
- Picking and packing product for delivery
- Dispatch of goods
- Returns management
- Messaging between suppliers and customers.

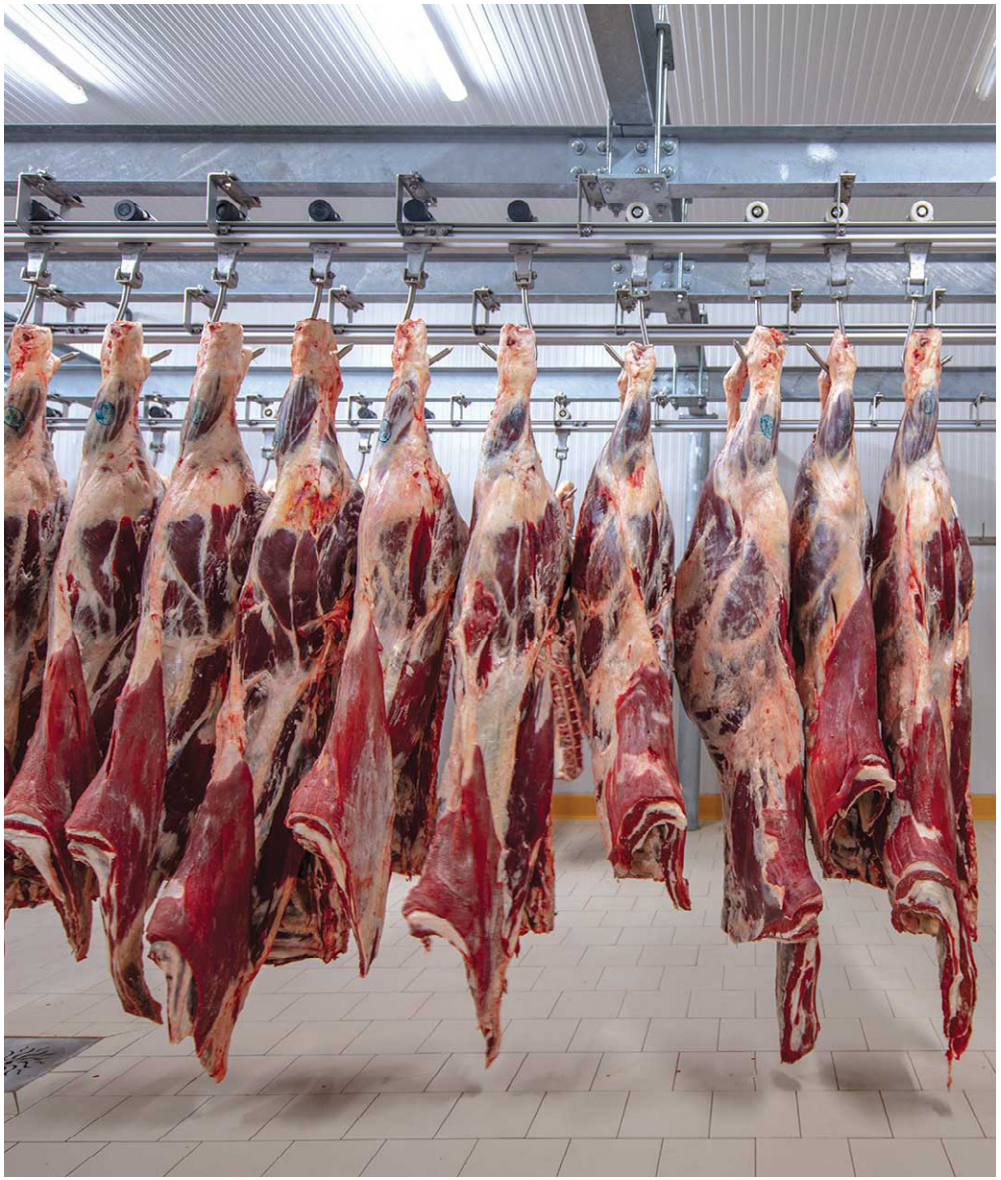
[2] Agriculture Victoria agriculture.vic.gov.au

Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Meat Storage & Distribution

Images: Meat & livestock Australia (MLA)



Meat Storage and Distribution

This section covers activities that generally take place along the Australian red meat supply chain in storage and distribution, including

- Establishment
- Receival and putaway
- Inventory management and condition monitoring in meat storage
- Meat distribution
- Meat delivery.

Establishment

Distribution of meat may take place direct from the processing plant; via a further processing or meat packing plant on or off-site that prepares store-ready packs; or held and distributed from a specialised 3PL cold storage provider. Meat storage and distribution may be for chilled or frozen product for domestic or export markets.

Businesses that handle, process, pack or store red meat require a licence issued by the food safety authority in each state or territory. In order to become licensed, storage operators are required to have a *Food Safety Plan*, *food recall procedures* and *product traceability* in place. If the facility stores or distributes meat for export, importing countries may require additional accreditation, as is the case for all establishments providing meat to the European Union.[1]

An *Export Registered Establishment* registration is required to ensure that: the facilities available are fit for the purpose of preparing, handling, storing and/or inspecting product for export; appropriate hygiene and the necessary measures to produce the goods according to trade description and other requirements applicable to a given commodity are maintained; and the goods comply with importing country requirements.

Under the Meat Export Program, cold storage facilities may be registered under an Approved Arrangement (AA). This means the facility will need to cover traceability as follows –

- The occupier has a documented procedure for trace back of incoming product
- The establishment has a documented procedure for tracing product forward for withdrawal or recall
- Carcases, meat and meat products are identified at each stage of production
- The procedure addresses corrective/preventive action
- The procedure addresses the frequency of the tasks including verification
- The procedure identifies the individuals responsible for the tasks including verification
- Records of these procedures, including monitoring and verification, and corrective/preventive action taken are maintained.[2]

Cold storage facilities may also apply under the *Biosecurity Act 2015* to register an Approved Arrangement for holding, storing and inspection of imported meat products. The traceability requirement associated with this status is documented in the Approved Arrangements: 2.5– Temperature controlled storage.

Additionally, for meat distribution using own transport, a *Meat Transport Licence* will be required.

As a trading partner or subsidiary of a meat processor or exporter, meat storage and distribution facilities are a node in both domestic and international supply chains, so application for a global location number (GLN) will support the accurate and speedy identification of the business at the whole-of-supply chain level. Allocating a GLN to the facility is part of the creation of master data, which is used frequently in supply chain transactions.

Tasks related to traceability

- License and registration with state and territory food safety bodies
- Export establishment license with Department of Agriculture, Water and the Environment as required
- Approved Arrangement registration and listing (Export and Import)
- Application for a Global Location Number for the storage facility
- Registration of vehicles used for distribution as *Meat Transport Vehicles* (MTV).

Participants

- Storage operator
- State and territory food safety regulators
- Department of Agriculture, Water and the Environment (DAWE)
- GLN issuing agency.

Receival and putaway

Delivery Orders, *Consignment Notes* or *Advance Shipping Notices* supplied with inbound meat product e.g. carcasses or boxed meat, detail the units of product, product name, weight, supplier etc. where delivery of the product is located off-site from the processing plant and delivery is via road transport. A *Meat Transfer Certificate* may also be required for the receipt of the consignment in the case of export product storage.

At the receival area, the delivery is inspected to ensure the consignment reconciles with the documentation issued from the supplier, the product use-by dates are within specified timeframes, and any damage to cartons or carcasses is recorded. A Pro*of of Delivery* (POD) is then signed to record the time and date of handover from the transport company.

Product is then scanned/recorded in the *Warehouse Management System* (WMS) or enterprise system, where each unit is allocated a slot in the storage racking or bays. At this point it is critical to record both the temperature of the inbound product and the best-before/use-by dates recorded on the carton/carcase before putaway.

Reconciliation of received product at storage with supplier delivery documentation is necessary to identify and message suppliers regarding missing product, damaged product and under/over supply.

Tasks related to traceability

- Inspect inbound product for missing units, use-by dates, temperature and damage
- Scan inbound product carton/carcase/pallet barcodes at unloading in receival area
- Sign POD
- Enter received product into WMS and allocate storage slot
- Reconcile received goods with supplier/s and message variances.

Participants

- Receival dock staff
- Accounts (reconciliation of inbound supply)
- Warehouse management
- Inspection staff
- Transport company
- Driver.

Inventory management and condition monitoring in meat storage

Food product *warehouse management systems* manage multiple needs, such as

- Inventory management – including First-In:First-Out (FIFO) or First Expiry:First Out (FEFO), rotation of product
- Visibility of stock down to bay/rack location
- Stock counts
- Provide visibility of stock levels for customers and sales agents – including across multiple storage sites
- Order fulfilment – packing for customer requirements
- Labelling and re-labeling of stock
- Shipment tracking of in-transit goods
- Returns monitoring
- Security and food safety
- Temperature, humidity requirements

Different methods and technologies are used for tracking product in storage, including

- Barcode scanning and scanning of associated storage locations
- Voicepick systems to manage order fulfilment
- Active RFID tags to track product movement within the storage facility
- Spreadsheets.

The Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption (AS 4696) requires that a suitably qualified meat safety inspector performs post-mortem inspection and makes decisions on each carcase and its carcase parts (any tissue or structure removed from a carcase and includes, for example, the head, viscera offal and blood).

[1] www.agriculture.gov.au

[2] Dept Agriculture Water and the Environment 2019 Guidelines Approved Arrangement – Meat www.agriculture.gov.au

For meat export, an inspector is qualified and approved under Australian Export Meat Inspection Scheme (AEMIS). Meat inspectors are tasked with ensuring that required standards of hygiene are observed at storage, processing and packing facilities and in transport vehicles. The inspector may be appointed through the Australian Government or be a qualified staff member.[3]

Products are checked throughout the warehouse racking, goods in and returned stock phases. Storage staff will conduct cycle counts to locate misplaced stock. Availability of stock is made visible for customers' *Order Management Systems* through integration with the Warehouse Management System.

A key requirement in meat storage is maintaining temperature. Storage facilities generally have ongoing monitoring of temperature and humidity through automated systems, with emergency systems in place to maintain correct temperatures for frozen and chilled product. According to the AFGC Cold Chain Guide "Continuous data logging from calibrated sensors is the preferred approach for cold storage. In less critical, short term or smaller business operations, monitoring must be sufficiently frequent to detect trends, and in particular malfunctions, in temperature control. At a minimum, temperature readings must be at least twice daily. Records of cold store temperatures must be retained for later reference according to operator procedures."[4]

Tasks related to traceability

- Location of stock by carcase, batch, carton and pallet
- Visibility of stock levels to customers and suppliers
- Meat inspection
- Recording of stock shrinkage in storage
- Returns monitoring
- Food safety compliance
- Monitoring of storage conditions e.g. temperature, humidity.

Participants

- Warehouse operational staff
- Suppliers
- Customers
- Meat inspectors and auditors
- Customer auditors.

Meat distribution

Product sales and subsequent distribution commence with a *Customer Purchase Order*, or *Customer Account Orders* for replenishment of stock levels at meat retail or export. This activates the *Order Acknowledgement* and *Order Confirmation* detailing the specified goods to be delivered and terms of the sale. An Order Confirmation is dependent on the storage and distribution operator ensuring the stock is available, highlighting the value of visibility of stock levels and locations.

The internal *Customer Order* is initiated and a *packing (or picking) list* is created to ensure the right products and quantities are picked and assembled for packing for outbound delivery. As products are picked they are scanned/recorded according to the packing list. Some products are required to be packed into store-ready displays or require additional labelling for sales promotion. They may need to be re-packed into cartons with specific labelling required by the market destination. This is completed and product is re-packaged prior to palletising.

In the packing area the product is scanned as it is loaded to a transport asset load unit such as a pallet. At this stage the product identification is now associated with this load unit. The pallet is shrink wrapped and a transport label affixed, which now associates each item or carton to the load unit and *transport management system* (vehicle registration, transport booking reference, delivery order and consignment note).

An *Advance Shipping Notice* is prepared for the customer and issued. This allows the customer to prepare for the inbound stock. For export loading, a Bill of lading or Air Waybill is prepared by the Meat Exporter and the Waybill/Bill of Lading

The product is now ready for delivery and a *Delivery Order/Inland Bill of Lading* and *Consignment Note* are prepared for the Transport Company and Receiver (Retailer, Foodservice, Cargo Terminal Operator (CTO) and Shipping Line), detailing the consignment instructions. This is critical where the meat storage facility is operated by a third party. It allows the Meat Exporter or Meat Processor, who own the product, to instruct the storage operator to release the consignment so it can be transferred to the receiver or port of loading. See *Meat Export* module for further detail on shipping documentation for export.

An *Invoice* is then issued to the Customer requesting payment for the goods. Account credits are made for damaged, missing or returned stock. In some cases, the invoice is raised once the goods have been received by the customer and a delivery confirmation (Receipt Advice) is sent back.

[3] www.agriculture.gov.au

[4] AFGC 2017 *Australian Food Cold Chain Guidelines* www.afgc.org.au

Tasks related to traceability

- Receipt of Purchase Order from customer
- Order confirmed and Customer Order created
- Product picked and packed and linked to a logistics load unit e.g. pallet on Transport Management System (TMS)
- Consignment Note (for Customer) and Delivery Order (for Transport Company) prepared
- Advance Shipping Notice issued to Customer
- Transport Management System booking reference assigned. For exports Meat Transfer Certificate prepared
- Consignment Note/Waybill prepared and signed by Transport Company
- Product scanned before loading on refrigerated transport (container seal recorded if export container)
- Customer Invoice issued.

Participants

- Sales representatives and agents
- Warehouse operational staff
- Customers
- Transport suppliers
- Meat Inspection officers.

Delivery to food operators

For meat distributors, the *Proof of Delivery* message indicates the delivery has been received by the Customer.

The Customer will communicate any under or over delivered, damaged or missing stock against their Purchase Order and notify the distributor within a specified timeframe so the under/over stock can be included in the next order.

Arrangements for return of damaged or rejected stock are made as per sale terms and conditions. Returned stock will either be disposed of or re-enter the inventory once its disposition is determined, usually by a Meat Inspector. Recording this stock and its re-entry or disposal will be required for traceability audit.

Tasks related to traceability

- Proof of Delivery received
- Stock returns management

Participants

- Transport Company
- Customer
- Warehouse operations staff
- Meat Inspector.

Critical Tracking Events (CTEs) and Key Data Elements (KDEs)

Critical Tracking Events (CTEs) are events that relate to the identity, movement and transformation of the food product.

Livestock transport activity	CTE code	Critical Tracking Events (CTEs)
Establishment	**MSD CTE1**	License and registration with state and territory food safety bodies
		Export establishment license with Department of Agriculture, Water and the Environment as required
		Approved Arrangement registration under the Export Meat Program
		Register an Approved Arrangement under the Biosecurity Act 2015 for imported meat products
		Application for a Global Location Number for the storage facility
		Registration of vehicles used for distribution as *Meat Transport Vehicles* (MTV)
Receival	**MSD CTE2**	Inspect inbound product for missing units, use-by dates, temperature and damage
		Scan inbound product carton/carcase/pallet barcodes at unloading in receival area
		Sign Proof of Delivery
Putaway of product	**MSD CTE3**	Enter received product into WMS and allocate storage location
		Reconcile received goods with supplier/s and message variances
Inventory management		Location of stock by carcase, batch, carton and pallet
		Visibility of stock levels to customers and suppliers
	MSD CTE4.1	Recording of stock shrinkage in storage
	MSD CTE4.2	Returns monitoring and recording

Livestock transport activity	CTE code	Critical Tracking Events (CTEs)
Meat inspection and condition monitoring in storage	**MSD CTE5**	Meat inspection and food safety compliance Monitoring of storage conditions
Meat Distribution	**MSD CTE6**	Product Picking
		Receipt of Purchase Order from customer
		Order confirmed and Customer Order created
		Product picked and packed and linked to a logistics load unit e.g. pallet on Transport Management System (TMS)
		Consignment Note (for Customer) and Delivery Order (for Transport Company) prepared
		Advance Shipping Notice issued to Customer
		Transport Management System booking reference assigned
		Air Waybill/Bill of Lading/Meat Transfer Certificate prepared (Export)
	MSDCTE7	Product load consolidation
	MSD CTE8	Product loaded into transport vehicle (or container)
		Product scanned before loading on refrigerated transport (container seal recorded if export container)
	MSDCTE9	Vehicle Departs (Dispatch)
Meat delivery	**MSD CTE10**	Product Received
		Proof of Delivery signed

Key data elements

Key data elements provide information related to the who, when, what, where and why of a critical tracking event. Some relate to specific regulatory or mandated data for compliance.

Event code	CTE	Key data elements
MSD CTE1	Establishment	• GLN of storage facility • Export establishment license number • Approved Arrangement number (AA) • Meat Transport Vehicle licensed vehicle registration numbers **For AA establishments –** • declaration/entry number • Import Permit number • Air Waybill or Bill of Lading number • date of receipt • processing (including inspection, treatment, testing) details • release from Biosecurity Control • disposal details • storage location • accredited person responsible for the items.
		Request for GLN
		Who: Importer Issuing Agency
		What: Importer, location, business entity
		When: Date/Time of Issuance
		Where: Issuing Agency
		Why: Requirement for Global location numbers, establishment
		Information shared to traceability platform: • **Export Registered Establishment number** • **Approved Arrangement number** • **Global Location Number (GLN)** • **Meat Transport Vehicle registration numbers**
MSD CTE2	Receival	**Barcode scan on carton, carcase, pallet and readable information** • Supplier name, address and GLN • Name of product • Quantity (units may be individual carcase/carton/pallet) • Weight • Use-by date • Slaughter/processing date • Batch number • Lot number (further processed or retail pack) • Carcase number • Country of Origin (export)
		• Specific stamp/marks e.g. Malaysia Halal, Grain Fed • Logistics/Pallet ID • Code for rejection – under/over; missing; damaged; QA fail **Signed Proof of Delivery** • Booking Reference/Tracking number • Date and time delivered • Job number • Invoice number • Freight paid by • Collected from location • Delivered to location • Number of load units/pallets/cartons • Contact name • Contact number • Acceptance of terms and conditions • Signature
		Product Receipt
		Who: Supplier Transport provider Storage/Distribution organisation
		What: Importer, location, business entity, Order reference, quantity, batch/lot
		When: Date/Time of receipt
		Where: Receipt location
		Why: Product receipt
		Information shared to traceability platform: • **Consignment Note number** • **GLN number** • **POD number** • **Product ID, Qty, batch, date of receipt** • **Location of consignee/receiver**
MSD CTE3	Putaway	• Barcode scan • Product name • Carton/carcase/pallet unique ID (GTIN, SSCC) • Use-by date • Supplier ID • Weight

Event code	CTE	Key data elements
		• Batch number • Date of slaughter/processing • Storage location
		Product Putaway
		Who Storage/Distribution organisation
		What Product, quantity, batch/lot
		When Date/Time of putaway
		Where Putaway location
		Why Product storage, putaway
		Information shared to traceability platform: • **Unique ID of product in WMS** • **Stock Received Report message to supplier for received/rejected/missing/ damaged goods** • **Product, qty, batch, putaway location**
	Inventory Management	
MSD CTE4.1	**Stock Shrinkage**	**Record stock shrinkage** • Batch and item level ID (GTIN, SSCC, Lot/batch number) • Quantity • Supplier ID • Date recorded • Accounted value
MSD CTE4.2	**Returns monitoring and recording**	**Returns monitoring and recording** • Returned product ID • Batch number • Quantity returned • Date of Return • Use-by date • Reason for return • Logistics unit identifier • Disposition of returned stock (disposal/re-labelling and re- sale)
		Product Stocktake/Recording of shrinkage
		Who Storage/Distribution organisation
		What Product, Qty, batch
		When Date/Time of stock write-off
		Where Storage location
		Why Stocktake/Shrinkage
		Information shared to traceability platform: • **Stock Reports** • **Determination of disposition by Meat Inspector (if requested)**

Event code	CTE	Key data elements
		• **Product Recall and Traceability procedures in Food Safety Program** • **Product, Quantity written off, batch, date of write off**
MSD CTE5	**Meat inspection and food safety compliance**	• Time and date of meat inspection • Meat Inspector ID • Temperature on carcase/logger in cartons (minimum 2 per day) • Food Safety Program audit date
		Product Inspection/Monitoring
		Who Storage/Distribution organisation Inspector
		What Product, Quantity, batch, location
		When Date/Time of inspection/monitoring
		Where Product location
		Why Product inspection/monitoring
		Information shared to traceability platform: • **Meat Inspection date** • **Food Safety Audit date** • **Temperature Log Record** • **Product inspected, batch, qty, location**
	Meat Distribution	
MSD CTE6	**Picking**	**Inbound Purchase Order –** • Customer name and location • Seller name and location • Product quantity • Product price • Terms and conditions of sale • Product quality specifications • Delivery terms and conditions • Payment terms and conditions **Customer Order/picking list –** • Product unique ID • Batch number • Use by/Best before dates • Quantity picked • Storage location • Date of pick Consignment Note number • Consignor name and address • Consignee name and address • Description of goods • Quantity, weight, dimensions of product • Declaration by consignor

Event code	CTE	Key data elements
		• Signed by transport company • ASN number • Air Waybill/Bill of Lading number **Meat Transfer Certificate** • Establishment number • Slaughter date • Product description • Number of cartons/units • Marks required under country of destination (MICoR) • Processing date • Processor ID • Packing date • Customer and Establishment Number • Departure and travel time estimate • Container seal number • Name of person signing the MTC • EU/AA listing number • Vehicle and trailer registration/ID • Transport Company GLN • MTC docket number
		Order Picking **Who**: Storage/Distribution organisation **What**: Customer Order Reference, pick list reference, product, quantity, batch, location **When**: Date/Time of pick **Where**: Pick location **Why**: Customer Order processing • Pallet/ULD unique ID x ID of associated cartons
MSD CTE7	**Load consolidation**	**Product Palletisation** **Who**: Storage/Distribution organisation **What**: Customer Order Reference, pick list reference, product, quantity, batch, location **When**: Date/Time of palletisation **Where**: Dispatch area **Why**: Product palletisation, completion of order pick
MSD CTE8	**Load to transport**	**Transport loading** • Time and date of loading • Pallet/Load Unit ID • Container ECN

Event code	CTE	Key data elements
		• Transport booking reference number • Consignment Note number • Meat Transfer Certificate **Loading on Truck** **Who**: Storage/Distribution organisation **What**: Customer Order Reference, pick list reference, product, quantity, batch, location, Pallet ID **When**: Date/Time of load **Where**: Dispatch area **Why**: Loading of truck, Generation of ASN
MSD CTE9	**Load departs/ dispatch**	**Load Departs** **Who**: Storage/Distribution organisation **What**: Customer Order Reference, Consignment Note, ASN, product, qty, batch **When**: Date/Time of dispatch **Where**: Dispatch area **Why**: Load departs facility **Information shared to traceability platform:** • **Purchase Order number** • **Customer Order number/picking list number** • **Transport booking reference number** • **Consignment Note number** • **ASN number** • **Air Waybill, Bill of Lading number** • **Load unit number; Container seal number (export)** • **Meat Transfer Certificate docket number**
		Meat Delivery
MSD CTE10	**Proof of Delivery received**	**Proof of Delivery** • Date and time stamp • Vehicle registration • Driver ID • Job number (transport company) • Invoice number (credit) • Freight paid by • Collected from location • Delivered to location • Number of load units or items • Contact name and number of consignor • Terms & Conditions acceptance • Signature of consignee

Event code	CTE	Key data elements	
		Stock Receipt	
		Who	Customer Location
		What	Customer Order Reference, product, quantity, batch, pallet id
		When	Date/Time of receipt
		Where	Customer Receipt location
		Why	Customer Receipt, proof of delivery
		Information shared to traceability platform:	
		• **Signed POD number**	

Application of GS1 global data standards

Data standards that apply to key data elements and shared information are identified in this section.

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Locations	Distribution centre, warehouse location	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: www.gs1.org
Date/Time	Date of Receipt, Date of despatch	Year -Month-Date/Time/ Time zone	**YYMMDD**	Whilst human readable date formats can vary e.g., 21 December 2020, December 21, 2020, the structure of the date format to be encoded into systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD
Product Identifiers	Input materials such as raw ingredients and packaging, Outputs such as finished goods, packaged or processed goods	Global Trace Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org Information on how to allocate a GTIN to a variable weight or variable measure trade item: www.gs1au.org (for VM non-retail items) and www.gs1au.org (for VM retail POS items)
Traceability Attributes	Batch/Lot code (AI 10), Serial Number (AI 21), Pack date, Production date, Etc. Best Before Date, Expiry Date	Each Traceability attribute has its own data format requirements. Please refer to the detailed information found via the link provided.	**AN20**	Traceability Attributes, such as Batch or Lot Number or Serial Number etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format. List of Application Identifiers: www.gs1au.org
Logistics Units	Pallet of Finished Goods, Crate or Box of finished Goods	Serial Shipping Container Code (SSCC)	**N18**	Logistic unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. Logistic units take many forms, a single box containing a limited number of products, a pallet of multiple products, or an intermodal container containing multiple pallets. www.gs1au.org
Assets	Returnable assets (GRAI): e.g. IBC or Individual assets (GIAI): e.g. A crate		**N13**	Can be identified as an asset type only or an optional serial number can be added to distinguish individual assets www.gs1au.org

Useful links

Licensing and guidance on food safety for cold storage

New South Wales

NSW Department of Primary Industries (NSW DPI)
NSW Food Authority

Northern Territory

Department of Primary Industries and Resources (DPIR) NT Department of Health

Queensland

Department of Agriculture and Fisheries (DAF)
Queensland Health

South Australia

Primary Industries and Regions South Australia (PIRSA) SA Health

Tasmania

Department of Primary Industries, Parks, Water and Environment, Tasmania (PIPWE)

Tasmanian Department of Health

Victoria

Agriculture Victoria Primesafe

Western Australia

Department of Primary Industries and Regional Development (DPIRD) WA Health

Safe Meat www.safemeat.com.au AS 4696 – Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption

Export Establishment Licensing
www.agriculture.gov.au

Glossary

Advance Shipping Notification (ASN) An advance ship notice or advance shipping notice (ASN) is a notification of pending deliveries, similar to a packing list. It is usually sent in an electronic format and is a common EDI document.

Air Waybill

Bill of Lading (BOL)

The Bill of Lading is used for international shipments and for coastal shipping processes. The BOL contains all the pertinent details required to ship the product and then invoice the transaction correctly once the transaction is completed. It acknowledges the receipt of cargo, provides evidence of contract of carriage and documents title of the goods.

Consignment Note

The consignment note is a key document used in transporting freight within domestic supply and in the landside logistics of import and export. The goods are deemed to be "on consignment" until they reach the consignee. The document is prepared by the consignor and countersigned by the transport carrier as a proof of receipt of the consignment for delivery at the destination.

Delivery Order

A document from the Consignor of the freight which orders the release of the cargo to another party. This permits the delivery direct to a warehouse or depot, as organised with the Consignee. This enables the Consignor to order pick up of product from a 3PL warehouse in order to deliver to the party named in the Delivery Order.

Export Container Number (ECN) Container numbers are assigned by The Bureau International des Containers, which was founded in 1933 as a neutral, non-profit, international organisation whose mission is to promote the safe, secure and sustainable expansion of containerization and intermodal transportation. BIC (The Bureau International des Containers) uses the ISO 6346 standard when assigning reference numbers to the shipping containers. Container Identification Number consists of the BIC Code (Owner prefix) + Equipment Identifier + Serial Number + Check Digit.

Further processing

Further Processing operations means a process (such as curing, heat treatment, drying, canning, fermenting or rendering) applied to meat or meat products to form essentially a new product with different characteristics and flavour.

Under the *Australian Meat and Live-Stock Industry Act 1997* all Further Processors must hold AUS- MEAT Accreditation. All Further Processors requiring an Export Meat Licence must be AUS-MEAT Accredited.

Load Unit The Principle of Unit Load states that, "it is quicker and economical to move a lot of items at a time rather to move each one of them individually". In other words, this principle suggested that the larger the load handled, the lower the cost per unit handled. Packages loaded on a pallet, in a crate or any other way that enables them to be handled at one time as a unit is described as a load unit.

Load units may be pallets, tubs, barrels, shipping or intermodal containers, tanks, cages or unit load devices (airfreight).

Order Confirmation

A legally binding commitment to deliver specified good on specified terms. This enables the buyer to plan for receipt of these goods and if unconfirmed, to look to alternative suppliers.

Proof of Delivery (POD)

A commercial document used by the Consignee or their Logistics Service Provider to notify the Consignor of the receipt and acceptance of a delivery. A signed POD enables the Transport Company to raise an invoice.

Purchase Order

A commercial document issued by a buyer to a supplier. This is a legally binding offer to buy product in return for payment. The terms and conditions for delivery and payment are detailed in this document, which also details the product quantity, price, terms and conditions, product quality specifications.

Meat Transfer Certificate (MTC)

A Meat Transfer Certificate is required for moving meat products between Meat Export Establishments. An electronic version of the MTC has been developed using GS1 global data standards. See Insert link.

Meat Transport Vehicle

Each state and territory have licensing requirements for vehicles carrying meat. Vehicles must comply with the *Australian Standard for the Hygienic Production and Transportation of Meat and Meat Products for Human Consumption AS4696:2007* (Section 25) and be renewed annuallyLoad units may be pallets, tubs, barrels,

Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Meat Retail

Meat Retail

This module covers key activities that generally take place along a retail business supply chain where food (fresh and/or processed) is sold to customers and usually to be consumed elsewhere. Retail businesses may include- supermarkets; grocers, butchers, bakers, delicatessens, convenience stores, service stations, food takeaways, market stalls.

In this module, processes/activities are associated with retail businesses:

- Establishment
- Sourcing of product suppliers
- Auditing suppliers for traceability and food safety
- Inventory management in 3rd Party Logistics warehousing and Retail Distribution Centres
- Receipt of food product
- Storage of inbound product
- Ensuring food integrity, quality and safety
- Point of Sale data capture
- Product returns and store salvage.

Establishment

Regulatory agencies mandate establishment activities for food retail businesses. This is required for local, state or national government responsibilities, such as ensuring the entity can be located in the circumstance of a food safety or health risk-related disease outbreak or food recall.

For example, the NSW Food Authority defines retail meat licensing requirements as follows-

A retail meat premises license is required by -

- butchers that process and sell meat for retail sale: processing includes boning, slicing,cutting and packing.
- supermarkets and independent meat and poultry retailers.

Businesses that process ready to eat (RTE) or uncooked comminuted fermented (UCFM), eg salami products, also have additional requirements outlined for RTE & UCFM products.

If large amounts of meat (more than 1 tonne in any week of a calendar year) are sold wholesale, these businesses are defined as meat processors. If businesses only sell pre-packaged meat, and do not process product, they instead need to comply with the requirements for general retail food outlets.

All food retail businesses need to apply for a licence and registration with their local Council. This licence is annual.

In addition to having a food business licence number or meat retail premises licence number, creating a unique identification and location reference for the retail business will enable food logistics and traceability of inbound shipments to be undertaken efficiently. This is effective for food retailers with multiple outlets, enabling each to have a unique identifier for use in distribution.

Traceability can be created through establishing the identity of items supplied, suppliers and businesses handling inbound product. Assets used to store and move product can also be identified and correlated with the product and locations.

Key tasks related to traceability

- Establish a Food Safety Program (including traceability) to be licensed under state and local government food business regulations
- Allocate a Global Location Number (GLN) (entity and location) to each retailer distribution centre, warehouse and retail outlet
- Ensure Logistics Service Providers such as 3PL (third party logistics) storage are identified
- Request a global location number (GLN) identifier of suppliers
- Create identification of own transport assets such as store-ready pallets, trays and tubs.

Participants

- Retailer
- Food Safety and local government regulators
- Logistics service provider/3PL
- Suppliers to retail (wholesalers, meat processors, retail distribution centres).

Mandatory requirements related to the Australian Food Safety Code and the Australian Standard for Hygienic Production and Transportation of meat and Meat products for Human Consumption apply to retail settings:

- Standard 3.1.1 (Interpretation and Application)
- Standard 3.2.1 (Food Safety Programs)
- Standard 3.2.2 (Food Safety Practices and General Requirements)
- Standard 3.2.3 (Food Premises and Equipment)
- Standard 4.2.3 (Production and Processing Standard for Meat)
- AS 4696:2007 (Australian Standard for Hygienic Production and Transportation of Meat and Meat Products for Human Consumption)Sourcing of red meat products

Identifying, contracting and managing product suppliers is a major activity for food retail businesses. Sourcing involves:

- Establishing the requirements for products
- Defining the sourcing strategy to follow
- Sourcing potential suppliers from local and overseas markets
- Identifying desired suppliers based on requirements
- Evaluating possible suppliers
- Negotiating contract specifications
- Reviewing contracts to ensure compliance with standards and policies
- Signing the contract based on supplier/vendor agreements
- Managing the supplier agreements.

Meat Standards Australia (MSA) provides an assurance program for retailers to identify consistent quality in meat supply. In sourcing meat product into retail food businesses, identification and verification of supplier entities and the origin of the produce may be mandated by the retailer in supplier contracts. It assists to tell the story of the product to consumers and supports product recall.

For food retail businesses, traceability should extend to being able to identify the source of all raw red meat product, processed meat products e.g. sausages, patties; and other inputs such as packaging material.

A food retail business may select an intermediary such as a wholesaler or further processor to supply product from several meat processors, wholesalers or packers. Verifying the origin of the animal is becoming increasingly challenging.

Product suppliers must be able to provide verification of provenance of supplied raw produce and the components of the processed animal (including additives, other ingredients and packaging material). This may take place as part of the due diligence process in sourcing and procurement practices. Product suppliers with traceability systems will be able to provide data that can be established and automatically shared with the retailer.

Auditing meat suppliers for traceability and food safety

Retailers undertake periodic auditing of suppliers. A traceability system may be audited at a frequency of 12 monthly across the groups of meat products handled. Where multiple product groups exist, the traceability audit might cover one group annually on a rolling basis.

Once a traceability exercise is completed, records of the audit showing all steps should be maintained and corrective actions applied as required.

The key requirement in traceability audit is for the red meat supplier and retailer to be able to track a product forward and trace the product backward (minimum one up, one down). In many audit standards, the supplier will perform a traceability exercise. This generally places the burden of demonstrating an established traceability system on the supplier.

In an onsite traceability exercise, the auditor will select a finished product, and the retailer and suppliers will need to produce records of the disposition of the product, the source of the product and packaging used for the product and complete the exercise within a specified time.

Typically, two years minimum retention of records is required by auditors and for the purpose of being able to rely on a due diligence defence with food safety regulators domestically (and internationally in case of exports).

The documentation for a traceability test should include the following:

- Product lot identification including quantities
- Packaging used and unique identifier
- Quantities of waste products for disposal as waste
- Location and quantities of product within the food retailer's control and quantities sold/shipped to individual consumers including on-line consumers.

Tasks related to traceability

- Create establishment master data for the meat supplier
- Verify product (and any relevant other input/ingredient) origin and integrity
- Conduct process mapping of the product flow from point of origin to consumer
- Retailer undertakes regular supplier audits.

Participants

- Meat retailer
- Supplier (processor, further processor, wholesaler, meat packer)
- 3PL Operator (if applicable)
- Retail Distribution Centre (if applicable)
- Auditor.

Inventory management in 3PL warehousing and retail distribution centres

Retailers are increasingly outsourcing the management of their inventory to integrated logistics suppliers offering 3rd Party Logistics (3PL) warehouse and distribution solutions. 3PL warehouses and distribution centres receive, store and distribute goods from suppliers. They de/consolidate loads of product into consignments for the retailer. In the supply of meat products, 3PL cold storage providers may hold and distribute to retail.

Best practice inventory management enables total stock visibility and precise ordering. It reduces wastage, out-of-stock situations and delivers cost savings and improved food safety.

3PL and Distribution Centres rely on a suite of IT systems such as Warehouse Management System, Inventory Management System, Transport Management System, to trace products as they are received, stored, value-added and dispatched to retail businesses.

Scanning the barcode from the carcase, carton or pallet as inventory is received, located in cold storage, and eventually dispatched, enables key data to be captured electronically and exchanged without manual intervention into the retail store order management systems.

Tasks related to traceability

- Inventory visibility for the retailer
- Retailer Purchase Order
- Storage operator/supplier scans product before loading onto refrigerated transport
- Notification of impending shipment.

Participants

- Supplier
- 3PL warehouse of distribution centre operator
- Transport company
- Retailer.

Receipt of meat products

Buying product for retail is initiated by the Retailer submitting a Purchase Order. The Purchase Order becomes a fundamental traceability tool alongside the Customer Invoice for Retailers and their suppliers to reconcile what products were received. Order Acknowledgement and Order Confirmation by the supplier then allows the Retailer to plan for receival of stock. An Advance Shipping Notice and Delivery Order or Transfer message (if stock is from the Retailers' own storage) provide the Retailer with details of the goods, delivery date and the number of load units being shipped. This enables retailer loading dock/receival staff to prepare for the goods, cold storage space to be arranged and retail display shelf space planning to be undertaken for the inbound product.

Suppliers of chilled and frozen meat to major supermarkets will need to meet mandatory packaging and barcoding requirements defined in retailer supplier guides. Failure to do so can cause major handling issues, processing and delivery delays and may result in orders being rejected. There can be significant variation in requirements from retailer to retailer. As an example, some retailers require a very high percentage of product received to be in shelf-ready packaging.

The meat supplier and their 3PL cold store will create a Customer Order once product, quantity, variety, delivery terms and price have been agreed with the Meat Retail business. Often the supplier will have a term contract to supply.

The chain of custody passes to the meat retailer on receipt of the product or in the case of backhaul /customer pick up at the time the truck is finished loading at the supplier's distribution facility.

Store receipt can be line by line (carton by carton) or 'Receipt In Full'. Upon receipt, the store system receives against the purchase order (PO) or Transfer for the articles and quantities and this is then recorded in the Store inventory.

Food Safety Australia New Zealand-FSANZ (see FSANZ Chapter 3, Food Standards Code) provides the following advice in relation to receival of food.

"If an enforcement officer asks you to do so, you must be able to provide the officer with information on the suppliers of any food on your premises and what that food is. You need this information in case food on your premises is found to be unsafe or contaminated in some way and has to be returned to the supplier or destroyed.

Although most, if not all of the food you buy will be labelled with the name of the product and the name and address of the manufacturer, importer or packager of the food, you may also have unpackaged or unlabelled food on your premises and will need other ways of proving what this food is and where it came from. You might do so using your supplier invoices, or you might keep some other record of your suppliers and what you buy from them and the food you have on your premises.

You must not accept food unless you can identify it and trace it back to its supplier."

This means that the Supplier will need to maintain a system of traceability with the ability to trace meat products whether they are fresh meat products, finished or processed products, or packaging material.

Inventory records for vehicles that transport products allow those products to be tracked from loading to delivery and include tracking the movement of trailers/vehicles. In the case of meat transport, all red meat deliveries must be made in a vehicle registered as a meat transport vehicle. A Returns Policy and Procedures agreed between the Retailer, Supplier, 3PL, Distribution Centre and Transport Company will outline all procedures to ensure traceability of damaged packs and of any products returned to stock or for disposal.

Tasks related to traceability

- Advance Shipping Notice received by food retailer (identifies product shipped and traceability attributes)
- Product is delivered with Delivery Order correlated to the ASN (advance shipping notice). The Delivery Order lists what is actually on the vehicle.
- Product is unloaded from transport at receival dock.
- Product is inspected (contamination; identification; temperature) and accepted/rejected/returned to suppliers with reason recorded.
- Inbound product is matched to the original purchase order and over/under/missing stock notified to supplier.
- The Proof of Delivery is signed by the receiver/consignee/retailer.
- Received product is scanned/entered into the retailer's own Enterprise Resource Planning (ERP) or inventory system.
- The Supplier Invoice is reconciled with Purchase Order/ASN/and transport documentation, such as Delivery Order and Proof of Delivery, based on identification of received carcasses, pallets, cartons.

Participants

- Supplier of meat product
- Food retailer – goods receival staff and accounts
- Transport company and driver
- Food safety inspector
- Retailer Quality Assurance inspector.

Storage of inbound meat product

The meat product may be transferred to the food retailer's own storage assets for refrigerated storage. The product may be individual carcasses, cartons or palletised, depending on the order size or product type. Recording where each unit of meat product is located in the cold storage area assists in locating product and managing FIFO systems.

Some retailers have their own stock identifiers such as Stock Keeping Units (SKUs) to identify product and associate it with their internal record keeping, order management system and stock location in store. They may use a SKU reference or the assigned GTIN to order product from their regular suppliers.

Retailers may also "portion pack" foods bought on a wholesale basis or in larger lots or in cases where the smaller stores require less than case quantities of generally slower moving inventory. For traceability, retailers rely on labelling each pack with information linking the sold product to supplied product information, including product identity, supplier identity, lot code, date received and consumer information such as use-by date, storage conditions, allergens etc.

Tasks related to traceability

- Position in storage identified and allocated
- Product transferred to internal storage asset e.g. pallet or tub
- Product put away in cold storage ready to be called forward to the retail sales floor
- Product best before, expiry dates recorded for stock management.

Participants

- Supplier of product
- Food retailer – goods receival staff and accounts
- Transport company and driver
- Food safety inspector
- Retailer Quality Assurance inspector.

Ensuring food integrity, quality and safety

Ensuring food safety is a key obligation of all food businesses including retailers. This ensures that the food is safe and suitable to consume. Food safety standards also contain health and hygiene obligations for food handlers, aimed at lowering the incidence of food-borne illness.

Traceability is a key means to manage the integrity of food product stored on-site and on floor display, by understanding the status of the product in the in-store inventory system, through:

- Recording inspections of storage conditions, particularly the effectiveness of refrigeration equipment
- Recording batch and lot number and expiry date at receival and adding this to the retail inventory management system for each SKU/GTIN/lot or batch
- Using colour markers/labels on items to indicate expiry time/date of products at item or lot/batch level
- Implementing a First-In – First Out (FIFO) stock movement plan/system. This may be as basic as a whiteboard recording batches and their expiry dates
- Undertaking regular stock counts to identify older stock.

Tasks related to traceability

- Record Quality Assurance inspections of storage conditions and stock in inventory system
- Record Lot/Batch and expiry date at receival.

Participants

- Food retailer
- QA and food safety inspectors
- QA Auditors
- State level food retail regulators and health authorities.

Point of Sale data capture

Point of Sale (POS) is generally defined as a location where a product can be purchased by a consumer. This can be referred to as a retail checkout where barcode symbols are normally scanned via a POS scanning device.

A key ingredient for food traceability is relevant data associated with a physical product. That is one that is uniquely identified and can be linked to supporting business process. In this context the Global Trade Item Number (GTIN) is the most commonly implemented GS1 data standard identifier.

It is encoded in the universal product code (UPC) barcode for point-of-sale scanning and checkout systems.

Point of sale is a dynamic environment in which a product may be withdrawn from the inventory system or reduced for sale. Active barcodes can adapt quickly to these variations to align with POS variations. In the case of most modern retailers, it is the aggregation of inventory that is sold at retail at all stores (through POS capture) that may trigger automatic replenishment from a supplier to the retailer's warehouse. Recording GTINs at point of sale provides identity of the product.

Consumers should have a minimum of information attached to the product, identifying the product. Product may have an identifier affixed as a barcoded label or sticker or it may have a carcase tag attached. Ensuring all product has labelling, display and consumer-available information regarding use-by or best before dates for the item/pack can be critical to the speed and accuracy of product recall. This enables a lot, batch or expiry date to guide removal of product, rather than an entire display being removed.

Source: PrimeSafe www.primesafe.vic.gov.auFood Standards in Australia require the retailer to ensure that where meat is packed in cartons and containers for resale, such cartons and containers must display the following information:

- the name and street address of the premises in which the meat was packed
- the animal species from which the meat or meat product is derived
- the trade name or the description of the meat or meat products contained in the package
- a nutrition information panel if marinades or other ingredients are used, the weight, one or more of the following:
  - date of packaging and a statement of the shelf life of the packaged food, or
  - use-by date, or
  - best-before date.

Where meat is packed on the premises for retail sale, such packages must be labelled in accordance with the requirements of the Food Standards Code.

Tasks related to traceability

- Record the product identity via the POS system
- Ensure meat labelling is compliant with Food Standards Code (pre-packaged or pack on- premises)

Participants

- Food retailing company – store staff
- Food safety regulators
- End consumers.

Product returns and store salvage

Clause 11 of Standard 3.2.2 – Food Safety Practices and General Requirements specifies:

A food business must ensure that food for disposal is held and kept separate until it is:

a. Destroyed or otherwise used or disposed of so that it cannot be used for human consumption

b. Returned to its supplier

c. Further processed in a way that ensures its safety and suitability or

d. Ascertained to be safe and suitable.

A food business must clearly identify any food that is held and kept separate as returned food, recalled food, or food that is or may not be safe or suitable, as the case may be.

This means that recalled food must be held, separated and identified from other food until it is either destroyed, used for purposes other than human consumption, returned to its supplier, or further processed or otherwise determined to be safe and suitable.[1]

Product returns result from overstock product supplied, damaged stock unloaded at the receival dock or stock that does not have the required shelf life prior to expiry as specified by the retailer (although in each case the approval for returns is based on negotiated agreements between suppliers and retailer). Product returns are a subset of a broader discipline within supply chains entitled reverse logistics.

Traceability of this rejected stock can be achieved through a Returns Policy with suppliers and a Standard Operating Procedure (SOP) which staff can enact. Some retailers have Returns Centres or a 3PL dedicated to managing returns. On-line retailing can present a challenge as it entails high rates of returned items.

Store salvage is the merchandise that retailers are unable to sell in their own stores. For example, food items are may be "reduced to clear" or removed from shelves if they are approaching their best-before or expiration dates or because they are no longer at their peak quality, and hence retailers consider them unfit for sale.

In order to dispose of these items, retailers are likely to take several steps:

- Retail the products at a reduced sell price in order to clear product rather than waste/ dump product.
- Depending on the condition of the product, the retailer may return the product to the supplier or DC
- Depending on the quality of the product, retailers may participate in food donation programs
- Supply for organic composting and recycling initiatives
- Dispose of the product through processes agreed to between the supplier and retailer in manner that meets the guidelines of regulatory bodies.

Tasks related to traceability

- identification of products returned to the retailer by consumers
- identification of products returned by the retailer to supplier or DC/Returns Centre

Participants

- Retailer
- Consumer
- Product supplier
- Distribution Centre (DC), Returns Centre, 3PL Returns warehouse.

[1] www.foodstandards.gov.au

Critical Tracking Events

For each of the identified meat retail activities, critical tracking events (CTEs) which establish identity and enable traceability and compliance with traceability-related regulation are summarised in the following table. It should be noted that while regulators often identify standard CTEs, in many cases, supply chain actors may choose to track additional events occurring within their supply chain to create a more robust picture of their supply chain.

Critical Tracking Events (CTEs) are events that relate to the identity, movement and transformation of the meat product. Some are mandated by regulators, others support traceability.

Meat Retail activity	CTE code	Critical Tracking Events (CTEs)
Establishment **Establish master data identification of meat retailer**	**MR CTE1.1**	Global Location Number allocated Meat retailer licence issued Food Retailer licence issued
Establish master data for suppliers	**MR CTE1.2**	Creating identity master data for meat suppliers
Create unique identifiers for retailer assets	**MR CTE1.3**	Apply unique IDs to retailer pallets, tubs, trays that hold meat product
Allocate unique identifiers to product units	**MR CTE1.4**	Apply product master data
Sourcing of meat product	**MR CTE2**	Verify product (and any relevant other input/ingredient) origin Conduct process mapping of the product flow from point of origin to consumer Undertake regular supplier traceability audit
Inventory management and dispatch - 3PL warehousing and retail distribution centres	**MR CTE3**	Inventory visibility for the retailer **Retailer sends Purchase Order/Stock Transfer order** Storage operator/supplier creates Customer Order, picks, packs product
	MR CTE4	**Warehouse/DC staff scan outbound product before loading onto refrigerated transport**
	MR CTE5	**Truck leaves storage/dispatch**
	MR CTE6	**Retailer notified of impending shipment**
Receipt of meat product at retail outlet	**MR CTE7**	**Delivery** Product is delivered with Delivery Order correlated to the ASN (advance shipping notice). The Delivery Order lists what is actually on the vehicle.
	MR CTE8	**Product Inspection at Store Receipt** • Product is unloaded from transport at receival dock. • Product is inspected (contamination; identification; temperature) and accepted/rejected/returned to suppliers with reason recorded. • The Proof of Delivery is signed by the receiver/consignee/retailer.
	MR CTE9	**Entry into store inventory** • Received product is scanned/entered into the retailer's own Enterprise Resource Planning (ERP) or inventory system. • The Supplier Invoice is reconciled with Purchase Order/ASN/and transport documentation, such as Delivery Order and Proof of Delivery, based on identification of received carcasses, pallets, cartons. • Record and notify variations to supplier
Storage of inbound product prior to display	**MR CTE10**	Position in storage identified and allocated Product transferred to internal storage asset e.g. pallet or bin Best-before date recorded for each SKU/GTIN/Lot/Batch **Location and storage asset ID for inbound product recorded**
Ensuring food integrity, quality and safety	**MR CTE11**	**Record Quality Assurance inspections of storage conditions and stock in inventory system** Implement a FI-FO stock movement system Undertake regular stock counts
Point of sale (POS) data capture	**MR CTE12**	**Ensure meat labelling is compliant with Food Standards Code (pre- packaged or pack on-premises)**
	MR CTE13	**Record the product identity via the POS system**
Product returns and store salvage	**MR CTE 14**	**Record the identity of products returned to the retailer by consumers**
	MR CTE15	**Record the identity of products returned by the retailer to supplier or DC**

Key Data Elements

Key Data Elements (KDE) ensure that captured and recorded data can be interpreted and used as relevant and required by all supply chain partners. Key Data Elements define Who, What, When, Where and Why for each Critical Tracking Event identified above.

Event code	CTE	Key data elements
	Establishment	
MR CTE1.1	**Establish master data identification of meat retailer**	**Global Location Number** The Global Location Number (GLN) is used to identify locations and legal entities. This unique identifier is comprised of a GS1 Company Prefix, Location Reference, and Check Digit. GLNs are used to identify parties to business transactions; functional groups within a company; or real, physical "places" that might ship, receive, process, or hold the product.
		Request for GLN
		Who Retailer Agency
		What Retailers, location, business entity
		When Date/Time of issuance
		Where Issuing Agency
		Why Requirement for Global location numbers, establishment
		Meat Retailer Premises Licence This licence is issued by state and territory food authorities
		Request for Meat Retailer Premises License
		Who Retailer Issuing Agency
		What Retailers, location, business entity
		When Date/Time of issuance
		Where Issuing Agency
		Why Requirements for Meat Retailer Premises License
		Food Licence Number This licence number is issued by local government
		Request for Food Licence
		Who Retailer Issuing Agency
		What Retailers, location, business entity
		When Date/Time of issuance
		Where Issuing Agency
		Why Requirements for Food License
MR CTE1.2	**Establish master data of suppliers**	Supplier GLN

Event code	CTE	Key data elements
MR CTE1.3	**Apply unique ID to retailer pallets, tubs, trays that hold meat product for internal traceability**	Asset ID
MR CTE1.4	**Allocate unique identifier to products**	Product ID **Information shared to traceability platform:** • **Global Location Number (GLN)** • **Supplier GLN** • **Meat Retail License number (meat further processing on-site e.g. butcher)** • **Food business registration number (pre-packed meat on-site)** • **Asset ID** • **Product item ID**
	Sourcing meat products	
		Process map product supply chain • Storage and distribution data – time and date of dispatch and receival prior to retail receipt – Name and address of sites in chain of custody e.g.NLIS records – Product ID (GTIN, SKU)
MR CTE2	**Verifying the product (and any relevant other input/ ingredient) origin and integrity and ability to track product**	**Verify origin** • Origin of product (PIC,GLN) • Source of any ingredients used • Temperature records • Use by/Best before • Batch/Lot number of product • Relevant manufacturer declarations and test certificates **Supplier Traceability Audit** • Ingredient source record keeping • Trial traceability exercise result • Date of audit • Auditor ID

Event code	CTE	Key data elements
		Supplier Establishment
		Who Retailer Supplier
		What Product, proof of origin, location
		When Date/Time of Proof supplied
		Where Retail site
		Why Supplier Establishment
		Information shared to traceability platform: • **Source of product and producer brand** • **Supplier Traceability audit date** • **Supplier Meat Licence number**
	Inventory management in 3PL warehousing and Retail Distribution Centres	
MR CTE3	**Retailer sends Purchase Order**	**Purchase Order traceability data** • Retailer name and location • Supplier name and location • Product ID • Product quantity
MR CTE4	**Scan of product at loading**	**Unit scan** • Carcase, carton, pallet ID (SSCC) • Vehicle registration number • Time and date loaded
		Load Vehicle
		Who Retail or 3PL DC Transport provider
		What Product, quantity, batch, location, store order reference, vehicle ID
		When Date/Time of load
		Where Retail DC or 3PL
		Why Loading vehicle
MR CTE5	**"Gate Out" time and date**	Loaded vehicle departs Retail DC or 3PL
		Vehicle Departs
		Who Retail or 3PL DC Transport provider
		What Product, quantity, batch, location, store order reference, ASN
		When Date/Time of vehicle departure
		Where Retail DC or 3PL
		Why Vehicle departs
MR CTE6	**Retailer receives Advance Shipping Notice/Transfer Advice**	**Advance Shipping Notice traceability data** • Shipment date and time • Packing slip number • Purchase Order number • Configuration of the goods e.g. number of pallets

Event code	CTE	Key data elements
		Information shared to traceability platform: • **Consignor ID** • **Vehicle ID** • **Transfer Order/Store Order number** • **Advance Shipping Notice** • **Date/Time of vehicle departure**
	Receipt of meat product at retail outlet	
MT CTE7	**Product is delivered**	All food must be traceable from the approved supplier through your supply chain (wholesaler to your shop). Minimum data required • name and street address of the premises in which the meat was packed • animal species from which the meat or meat product is derived • trade name or the description of the meat or meat • products contained in the package • nutrition information panel if marinades or other ingredients are used • weight • best-before, use-by or expiry date **Un-packaged meat in a display cabinet** • country of origin • product description e.g. MSA grade and description Carcase meat must be stamped or rolled with appropriate identifiable features (e.g. processor stamps, inspection stamps, processor tickets) and be traceable to the supplier with sufficient evidence (e.g. supplier tax invoice). **Delivery Note (own transport) issued by meat supplier** • Name and address of supplier and retailer (consignor and consignee) • Description of product • Quantity of product • Date of dispatch • Method of delivery • Retailer signature (proof of delivery) **Consignment Note (hired transport) issued by Transport Company** • Description of goods • Quantities • Markings, carton ID and carton numbers • Freight charges • Delivery date • Terms and conditions of carriage (insurance, liability) • Signature of Consignee/Retailer (Proof of Delivery)

Event code	CTE	Key data elements
MR CTE8	**Product Inspection at receival**	**Proof of Delivery traceability data** • Time and date of delivery • Name of signatory • Consignor ID • Consignee ID • Consignment Note/Delivery Note number **Temperature at receival, recorded on Delivery Note, Supplier Tax Invoice, or Deliveries Book** • Data logger temperature %C at receipt • Meat temperature probe reading at receipt %C
MR CTE9	**Product entered into store inventory system**	**Retailer Store Inventory System data** • SKU/GTIN of product • Quantity x unit (e.g. carton, carcase) • Best-before/Use-by date • Date received • Consignment/Delivery Note number • Purchase Order number • missing/over/rejected stock SKU/GTIN
		Receipt at Store
		Who: Retail Store; Transport provider/vehicle ID
		What: Product, quantity, batch, location, store order reference, ASN, Order Number, temperature
		When: Date/Time of receipt
		Where: Retail store
		Why: Product receipt
		Information shared to traceability platform: • **Supplier name and location** • **Delivery/Consignment Note number** • **Purchase Order number** • **Date received (POD number)** • **Temperature of received meat product** • **Lot, batch, carcase ID** • **Country of origin**
	Storage at retail outlet	
MR CTE10	**Storage prior to display**	**Chiller or freezer storage** • Date received • Pallet/bin/tray/container ID • Carcase or carton ID • Lot or Batch number

Event code	CTE	Key data elements
		• GTIN/SKU number of unpacked items • Best-before date • Storage slot e.g. freezer or meat cool room ID
		Product Putaway/storage
		Who: Retail store
		What: Product, quantity, batch, location, pallet ID (SSCC)
		When: Date/Time of putaway
		Where: Retail store
		Why: Product putaway
		Information shared to traceability platform: • **Retailer name and location** • **Logistics Pallet ID (SSCC)** • **Product ID – SKU/GTIN** • **Batch/Lot number** • **Quantity** • **Putaway location**
	Ensuring food integrity, quality and safety	
MR CTE11	**QA inspection**	Food must be stored so it does not become contaminated by biological, chemical, or physical hazards • Stock removed from inventory SKU/GTIN numbers • Temperature record (minimum 2 readings per day) • Date and time of inspection
	FI:FO stock rotation	• Product SKU/GTIN • Batch/Lot number • Best-before, Use-by, Expiry date
	Stock counts	• Product SKU/GTIN • Description • Quantity • Location
		Product Inspection
		Who: Retail QA inspector
		What: Product, quantity, batch, location
		When: Date/Time of inspection
		Where: Retail Store location
		Why: Product inspection
		Information shared to traceability platform: • **QA inspection records on request** • **Stock removed from inventory (expiry, damage, contamination, recall)**

Event code	CTE	Key data elements
	Point of sale (POS)	
MR CTE12	**Compliant labelling**	**Labelling** • Unique identifier indicating batch and lot affixed with compliant product information • Name of the food • Manufactured date and use by date • Product lot identification • Description of the ingredient or ingredient listing • Description of allergens • Instructions for storage and preparation • Country of origin information • Warning and advisory statements • Relevant nutritional information • Information about weights and measures (volume and quantity) • Name and address of the food processor or manufacturer.
MR CTE13	**Record the product identity via the POS system** **Notify nominated supply chain partners of product sale status**	**Record in POS system** • Time and Date of sale • Item SKU/GTIN • Quantity sold **Reorder/replenishment** • Retailer ID • Outlet ID • Product ID • Quantity sold • Date

Product Sale

Who	Retail store
What	Product ID, Quantity, Batch, Best before
When	Date/Time of Sale
Where	Retail Store
Why	Product Sale

Information shared to traceability platform:

- **Retailer ID**
- **Store/Outlet ID**
- **Product ID (SKU,GTIN)**
- **Quantity Sold**
- **Batch/Lot number (if captured at POS)**
- **Use by/best before (if captured at POS)**

Event code	CTE	Key data elements
	Product returns and store salvage	
MR CTE14	**Identification of products returned to the retailer by consumers**	**Customer returns** • Product unique identifier (GTIN, SKU code, item or article number) • Sales Receipt number • Disposition – return to supplier, destruction, salvage
MR CTE15	**Identification of products returned by the retailer to supplier, DC or Returns Centre**	**Retailer returns** • Record/scan of product prior to loading on pallet/tub for return to DC, returns centre or direct to supplier • Record Consignment Note/Transfer number

Product Returns

Who	Retail Store
What	Product ID, Batch, date information, Logistics unit/pallet ID, Quantity
When	Date/Time of Return
Where	Store Location
Why	Product return/reason for return

Information to be shared to a traceability platform

- Product ID
- Quantity Returned
- Batch/Lot number
- Store ID
- Reason for return
- Date of dispatch

Application of GS1 Data Standards

Adoption of global data standards enables data sharing between businesses through using common formats. These formats allow a business to identify participants, locations, products, processes and events in the supply chain.

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Location	Retail outlet, store Distribution centre	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: www.gs1.org
Date/Time	Receipt Date	Year -Month-Date	**YYMMDD**	Whilst human readable date formats can vary e.g. 21 December 2020, December 21 2020, the structure of the date format to be encoded into systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD
Product Identifiers	Packaged Meats (Fixed Weight) Packaged Meats (Variable weight)	Global Trade Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org Information on how to allocate a GTIN to a variable weight or variable measure trade item: www.gs1au.org (for VM non-retail items) and www.gs1au.org (for VM retail POS items)
Traceability Attributes	Batch/Lot code (AI 10), Serial Number (AI 21), Pack date (AI 13), Production date (AI 11), Best Before Date (AI 15), Expiry Date (AI 17)	Each Traceability attribute has its own data format requirements. Please refer to the detailed information found via the link provided.	**Varying depending on Traceability attribute**	Traceability Attributes, such as Batch or Lot Number or Serial Number etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format. List of Application Identifiers: www.gs1au.org

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Logistics Units	Pallet of Finished Goods, Crate or Box of finished Goods	Serial Shipping Container Code (SSCC	**N18**	Logistic unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. Logistic units take many forms, a single box containing a limited number of products, a pallet of multiple products, or an intermodal container containing multiple pallets. www.gs1au.org
Assets	Returnable assets Ie: IBC or individual assets Ie: A crate	Global Returnable Asset Identifier (GRAI) Global Individual Asset Identifier (GIAI)	**N13**	Can be identified as an asset type only or an optional serial number can be added to distinguish individual assets www.gs1au.org
Shipment	Grouping of logistics units	Global Shipment Identification Number (GSIN)	**N17**	The Global Shipment Identification Number (GSIN) is a number assigned by a seller and shipper of goods to identify a shipment comprised of one or more logistic units that are intended to be delivered together. www.gs1.org

Useful links

Food Safety

FSANZ www.foodstandards.gov.au

Australian Institute of Food Safety
www.foodsafety.com.au

MLA Safe Meat Retailing
www.mla.com.au

AFGC

Meat and Food Retail Food business licensing
www.foodstandards.gov.au

VIC
www.primesafe.vic.gov.au

NSW
www.foodauthority.nsw.gov.au

ablis.business.gov.au

QLD
www.safefood.qld.gov.au

SA www.pir.sa.gov.au

Food business classifications

Each state and territory in Australia have different classifications for food businesses. The classification of a food business relates to the licenses required. To determine the classification of a food business, see the following links -

NSW www.foodauthority.nsw.gov.au

ACT health.act.gov.au

VIC www.health.vic.gov.au

QLD www.health.qld.gov.au

SA www.health.sa.gov.au

WA www.public.health.wa.gov.au

NT www.health.nt.gov.au

TAS www.dhhs.tas.gov.au

Retailer Supplier Standards

Meat Standards Australia www.mla.com.au

Coles www.supplierportal.coles.com.au

Metcash metconnect.metcash.com

Woolworths partnerhub.woolworthsgroup.com.au

ALDI corporate.aldi.com.au

Glossary

Advance Shipping Notice (ASN)

An advance ship notice or advance shipping notice (ASN) is a notification of pending deliveries, similar to a packing list. It is usually sent in an electronic format and is a common EDI document.

Batch

A batch number is first assigned to a meat product at the processor, in order to link the outputs generated from an individual carcase or number of carcasses processed in a time period (e.g. one hour/one shift). A new batch number may be assigned when the meat product is transformed further and additional ingredients blended with the meat e.g. meat patties. Recording of batch numbers supports the accuracy of food recalls.

Consignment Note

The consignment note is a key document used in transporting freight within domestic supply and in the landside logistics of import and export.

The goods are deemed to be "on consignment" until they reach the consignee.

The document is prepared by the consignor and countersigned by the transport carrier as a proof of receipt of the consignment for delivery at the destination.

First in: First out (FI-FO)

FO-FO is a stock rotation mechanism based on recording the best-before/use-by/expiry date of food product received into a warehouse or retailer inventory management system, to ensure food product is not overlooked and wasted due to expiry of these dates.

Inventory Management

Inventory is goods in raw form, bulk or packaged ready for sale. Management of inventory in retail involves tracking and controlling stock, generally in its finished product condition, ready for sale.

Lot

A lot is an amount of a food that the producer or processor identifies as having been sold, processed and from which foods have been manufactured, packaged or otherwise separated for sale, under essentially the same conditions, for example:

- A Lot of sheep or goats (mob-based identification)
- A Lot of processed product from the one set of ingredients

The lot identification (which could be a number or other information) is used to track a product in the event of a recall and needs to be able to identify where the food was packed or prepared.

Order Acknowledgment

An Order Acknowledgment is a commercial document/electronic message issued by the Meat supplier acknowledging receipt of the Purchase Order.

Order Confirmation

A legally binding commitment to deliver specified good on specified terms. This enables the retailer to plan for receipt of these goods and if unconfirmed, to look to alternative suppliers.

Order Management System

An order management system (OMS) is a tool that records all the sales and purchase order details of a business on a single platform.

Proof of Delivery (POD)

A commercial document used by the Consignee or their Logistics Service Provider to notify the Consignor of the receipt and acceptance of a delivery. A signed POD enables the Transport Company to raise an invoice.

Purchase Order (PO)

A commercial document issued by a buyer to a supplier. This is a legally binding offer to buy product in return for payment. The terms and conditions for delivery and payment are detailed in this document, which also details the product quantity, price, terms and conditions, product quality specifications.

Quality Assurance (QA)

In the context of food distribution and storage, QA involves compliance with regulatory requirements (based on Food Safety standards) and the specifications of industry and customer standards e.g. MSA.

Stock Keeping Unit (SKU)

Retailers use SKUs to identify products placed on sale to consumers. They are distinct to each retailer and designed for internal purposes.

In connected Point of Sale and Inventory Management Systems, retailers may choose to track product based on their SKUs. Use of SKU number in traceability is limited at a supply chain level in comparison to a Universal Product Code (UPC) barcode symbol.

Transport Management System (TMS)

A TMS enables a wholesaler or distributor to coordinate movement of product from one location to another, including procurement of transport services, planning of inbound and outbound delivery route, transport mode and timelines, product tracking in transport processes and transport invoice control.

Warehouse Management System (WMS)

A warehouse management system is a software solution to manage and optimise inventory and supply chain operations in a distribution centre. Typical functions of a WMS include

- Receiving products
- Tracking stock
- Efficient storage
- Picking and packing product for delivery
- Dispatch of goods
- Returns management
- Messaging between suppliers and customers.

Australian Guide to Implementing Food Traceability (AGIFT):

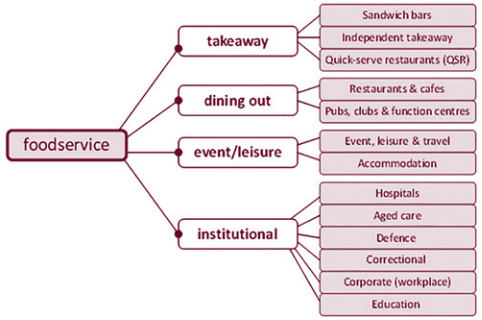
Red Meat & Livestock

Foodservice

Meat in Foodservice

This module covers key activities that generally take place in a foodservice setting. From a foodservice perspective, traceability means the ability of foodservice partners to quickly verify the history, location, and usage of product, resulting from coordinated efforts of trading partners to collect and maintain product information that supports batch/lot or serial number visibility of the product's movement through the distribution channel.

The foodservice industry encompasses all of the activities, services, and business functions involved in preparing and serving food to people eating away from home. This includes all types of restaurants from fine dining to fast food. It also includes institutional food operations at locations such as schools and hospitals, as well as other specialty vendors such as food truck operators and catering businesses.



In this module, processes/activities are associated with foodservice operations:

- Establishment
- Ordering food supplies
- Receival of product
- On-site storage
- Maintaining traceability once bulk packs are opened
- Ensuring food integrity, quality and safety.

Establishment

Local councils and state authorities administering food safety regulations are involved in licensing food premises and allocating a current licence number to each foodservice business.

In addition to obtaining this registration and licence, creating a unique identification and location reference for the foodservice business will enable food logistics and traceability of inbound and outbound shipments to be undertaken efficiently. This is effective for foodservices with multiple outlets, enabling each to have a unique identifier for use in distribution.

Traceability can be created through establishing the identity of items supplied, as well as suppliers and businesses handling inbound product. Assets used to store and move product can also be identified and correlated with the product and locations.

Tasks related to traceability

- Allocate a Global Location Number (GLN) (entity and location) to each warehouse and foodservice outlet
- Ensure Logistics Service Providers such as 3PL (third party logistics) storage are identified
- Request GLN of suppliers
- Create identification of own transport assets such as pallets, trays, tubs
- Ensure unique identification of each item sold.

Participants

- Foodservice operator
- Logistics service provider/3PL
- Suppliers to foodservice.

Sourcing of product suppliers

Identifying, contracting and managing meat product suppliers is a major activity for food retail businesses. Sourcing involves:

- Establishing the requirements for products
- Defining the sourcing strategy to follow
- Sourcing potential suppliers from local and overseas markets
- Identifying desired suppliers based on requirements
- Evaluating possible suppliers
- Negotiating contract specifications
- Reviewing contracts to ensure compliance with standards and policies
- Conduct appropriate Know Your Customer (KYC) validations and checks such as Politically Exposed Persons (PEP); Sanctions Screening; Tax ID; International Bank Account Number (IBAN) Verification[1]
- Develop and agree to appropriate service agreements and performance metrics
- Signing the contract
- Managing the supplier.

In sourcing meat into Foodservice businesses, identification and verification of supplier entities and the origin of the produce in terms of source locations may be mandated by the supplier contract.

This also supports the Foodservice Operator to tell the story of the product to consumers and in product recall.

For Foodservice Operators, traceability should extend to being able to identify the source of all food products including fresh meat, processed meat products and other inputs such as packaging material.

Foodservice businesses may source the same category of product from multiple producers or locations. For example, a Foodservice Operator may select an intermediary such as a wholesaler to supply product from several farms of origin. Once the animal is processed and further ingredients are added to a finished meat product e.g. sausages, verifying the origin of the product supplied becomes increasingly challenging.

Product suppliers, meat processors or meat product manufacturers, should be able to provide verification of provenance of supplied raw meat and the components of the finished product (including additives, other ingredients and packaging material). This may take place as part of the due diligence process in sourcing and procurement practices. Product suppliers with traceability systems will be able to provide data that can be automatically shared and can be established during this process.

Auditing suppliers for traceability and food safety

The key requirement in a traceability audit is for the Foodservice Operator to be able to link the unique identifiers of the food products to the origin / provenance of the product.

Relevant record keeping is an essential part of the mandatory food safety plan requirements for food businesses throughout Australia. Failure to keep proper records to demonstrate adherence to a food safety plan can be a criminal offence.

Typically, two years minimum retention is required by auditors and for the purpose of being able to rely on a due diligence defence with food safety regulators.

The documentation for a traceability test (and food safety) should include the following:

- Products lot identification including quantities
- Packaging used and unique identifier
- Quantities of waste products for disposal as waste
  Location and quantities of product within the Foodservice Operator's control and quantities sold/shipped to individual consumers including on-line consumers.
- Proper records and logs with the times and temperatures to which goods have been subjected in order to make appropriate decisions regarding food safety.

Tasks related to traceability

- Create master data for suppliers – food, cleaning products, packaging
- Verify the product (and any relevant other input/ingredient) origin and integrity
- Complete supplier audit

Participants

- Producer
- Meat/meat product Supplier
- Food authorities
- Foodservice Operator.

[1] www.austrac.gov.au; iban.com.au; www.austrac.gov.au

Inventory management in foodservice 3PL warehouses and distribution centres

Caterers and restaurant chains may operate their own distribution operations. Increasingly, larger scale operators are outsourcing the management of their inventory to integrated logistics suppliers offering 3rd Party Logistics (3PL) warehouse and distribution solutions.

3PL warehouses and distribution centres receive, store and distribute goods from suppliers. They de/consolidate loads of product into consignments for the foodservice operator, delivering in regular consignments as required.

A key aspect of these processes is inventory management. Best practice inventory management enables total stock visibility and precise ordering. It reduces wastage, out-of-stock situations and delivers cost savings and improved food safety.

3PL and Distribution Centres rely on a suite of IT systems such as Warehouse Management System, Inventory Management System, Transport Management System, to trace products as they are received, stored, value-added and dispatched to foodservice businesses. All finished product available in the warehouse/DC inventory is able to be made visible to the foodservice operator ordering stock.

Tasks related to traceability

- Inventory management
- Purchase Oder processing
- Dispatch
- Delivery

Participants

- Supplier
- 3PL warehouse of distribution centre operator
- Transport company
- Foodservice Operator.

Receipt of food products from supplier/3PL warehouse

Buying product for foodservice is initiated by the Foodservice Operator submitting a Purchase Order. The Purchase Order becomes a fundamental traceability tool alongside the Customer Invoice for Foodservice Operators and their suppliers to reconcile what products were received. Order Acknowledgement and Order Confirmation by the supplier then allows the Foodservice Operator to plan for receival of stock. An Advance Shipping Notice and Delivery Order provides the Foodservice Operator with details of the goods, delivery date and the number of load units being shipped. This enables loading dock/receival staff to prepare for the goods, storage space to be arranged and shelf space planning for the inbound product.

The supplier will create a Customer Order once product, quantity, variety, delivery terms and price have been agreed with the Foodservice Operator.

FSANZ (see FSANZ Chapter 3, Food Standards Code) provides the following advice in relation to receival of food:

"If an enforcement officer asks you to do so, you must be able to provide the officer with information on the suppliers of any food on your premises and what that food is. You need this information in case food on your premises is found to be unsafe or contaminated in some way and has to be returned to the supplier or destroyed.

Although most, if not all of the food you buy will be labelled with the name of the product and the name and address of the manufacturer, importer or packager of the food, you may also have unpackaged or unlabelled food on your premises and will need other ways of proving what this food is and where it came from. You might do so using your supplier invoices, or you might keep some other record of your suppliers and what you buy from them and the food you have on your premises.

You must not accept food unless you can identify it and trace it back to its supplier."

This requires that the Supplier maintains a system of traceability with the ability to trace products whether they are fresh food products, finished or processed products, or packaging material.

The Transport Company making food deliveries will record the transport booking reference and the Consignment Note related to the delivery and attach the Delivery Order for the Foodservice Operator receiving the goods.

A Returns Policy and Procedures agreed between the Foodservice Operator and Suppliers outlines all procedures for returned stock to enable traceability of damaged packs and of any products returned to stock or for disposal.

Tasks related to traceability

- Advance Shipping Notice received by foodservice operator
- Product is delivered with Delivery Order correlated to the ASN (advance shipping notice)
- Product is unloaded from transport at receival dock
- Product is inspected (contamination; identification; temperature) and accepted/rejected/returned to suppliers with reason recorded (as per returns policy and procedures)
- Inbound product is matched to purchase/customer order and over/under/missing stock notified to supplier
- Proof of Delivery signed
- Received product is scanned/recorded in the Foodservice Operator Enterprise Resource Planning (ERP) or inventory system
- Supplier Invoice is reconciled with Purchase/Customer Order/ASN/and transport documentation, such as Delivery Order and Proof of Delivery.

Participants

- Supplier of product
- Foodservice Operator – receival staff and Accounts
- Transport company and driver
- Food safety inspector.

On-site storage of inbound product

Fresh food product and/or processed food products may be transferred to the Foodservice Operator's own storage pallets/tubs/containers. The product, which may be in bulk bags, loose in tubs or crates or enclosed in cartons is recorded with a storage location.

Tasks related to traceability

- Position in storage identified and allocated
- Product transferred to internal storage asset e.g. pallet, bin, tub
- Product put away ready to be called forward to food preparation area
- Product identifiers, supplier and best before, expiry dates recorded.

Participants

- Foodservice Operator – goods receival staff and accounts
- Transport company and driver
- Food safety/QA inspector.

Maintaining traceability once bulk packs are opened

Tracking by lot and batch numbers is the most effective means to undertake a recall in food preparation. This means being able to record the lot or batch number of a product supplied and in turn, of foods prepared. Records of the supplier, the lot/batch number and the use-by date related to the bulk/caterer's pack and on portions used for food preparation, allows recall to be limited to that specific batch or lot prepared within a fixed timespan. An enterprise system enabled to scan this data allows association of the food served with the product supplied. Scanning/recording the batch/lot number and ID of supplier on portions before placing in cool rooms and refrigerators can link food served with the bulk/caterer packs as supplied.

As a recipe is being prepared, record the ingredient batch/lot number, the name of the ingredient, the brand name, the date received, and the quantity used in the recipe. Once the production of the recipe is completed, create and record new batch codes for the end consumer reference. This batch code and a use-by date becomes a reference for consumers of catering at an event or restaurant

diners. If more than one bulk pack is used in a foodservice production, both batch numbers need to be recorded and labelled on the serve.

Tasks related to traceability

- Record lot/batch number and use-by date from supplier on portions before food preparation
- Record ingredient batch/lot number, the name of the ingredient, the brand name, the date received, and the quantity used in the recipe
- Place batch number and use-by date on each serve for end-consumer reference
- Record which location/event/outlet the batch is delivered to (own transport or see Freight Transport module).

Participants

- Foodservice Operator food preparation and production staff.

Ensuring food integrity, quality and safety

Ensuring food safety is a key obligation of all food businesses. This ensures that the food is safe and suitable to consume. Food safety standards also contain health and hygiene obligations for food handlers, aimed at lowering the incidence of food-borne illness.

Traceability is a key means to manage the integrity of food product stored on-site and on floor display, by understanding the status of the product, through -

- Recording inspections of storage conditions, particularly temperature and light levels and effectiveness of refrigeration equipment
- Recording batch and lot number and expiry date at receival and adding this to the inventory management system for each SKU/GTIN/lot or batch
- Using colour markers on portions/items to indicate expiry time/date of products at item/lot/batch level once supplier packaging is removed
- Implementing a First-In – First Out (FIFO) stock movement plan/system. This may be as basic as a whiteboard recording batches and their use-by/expiry dates
- Undertaking regular stock counts to identify older stock.

Tasks related to traceability

- Record inspections of storage conditions and stock in inventory system
- Record Supplier, Lot/Batch and use-by/expiry date at receival
- Implement a FIFO stock movement system
- Undertake regular stock counts.

Participants

- Foodservice Operator
- Appointed food safety inspector
- State level regulators.

Critical Tracking Events

For each of the identified foodservice activities, critical tracking events (CTEs) that establish identity and enable traceability and compliance with traceability-related regulation are as follows:

Foodservice (FS) activity	CTE code	Critical Tracking Events (CTEs)
Establishment - Establish master data for the foodservice business, including assets and packed food portions	**FS CTE1**	Apply for Global Location Number Food operator licence issued Unique ID for assets e.g. tubs, vehicles ID for outbound food portions
Establish master data for suppliers	**FS CTE2**	Create master data for suppliers of food, cleaning products, packaging
Auditing suppliers for traceability and provenance	**FS CTE3**	Verify the product (and any relevant other input/ ingredient) origin and integrity and supplier's ability to track product from origin
Storage Provders	**FS CTE4**	Provide Inventory Reports to Foodservice Operator for visibility of inventory in storage
Customer Order processing	**FS CTE5**	Foodservice Operator lodges order
Order Dispatch	**FS CTE6**	Order Dispatched Foodservice Operator receives Advance Shipping Notice
Receipt of food products at Foodservice Operator	**FS CTE7**	Product Received and recorded into inventory management systems Proof of Delivery signed Record and notify variations to supplier Received product is scanned/entered into the Foodservice Enterprise Resource Planning (ERP) or inventory system
On-site storage of inbound product	**FS CTE8**	Stock put away into storage Product internal storage unit ID and location recorded
Ensuring food integrity, quality and safety Implement a FIFO stock movement system **Undertake regular stock counts**	**FS CTE9**	Record food safety/QA inspections of storage
Maintaining traceability once bulk packs are opened	**FS CTE10**	Record supplier, lot and use-by date on portions from bulk packs
New product creation	**FS CTE11**	Record ingredients used in recipes and allocate ID to new product created
End consumer traceability **Consumer serve/portion labelling**	**FS CTE12**	Place batch number and use-by date on each serve for end-consumer reference
Foodservice/event location	**FS CTE13**	Record delivery date and location against portion ID

Key data elements

Key Data Elements (KDE) ensure that captured and recorded data can be interpreted and used as relevant and required by all supply chain partners. Key Data Elements define Who, What, When, Where and Why for each Critical Tracking Event identified above.

Event code	CTE	Key data elements
FS CTE1	**Apply for Global Location Number**	**Key Data Element examples/guidance** The Global Location Number (GLN) is used to identify locations and legal entities. This unique identifier is comprised of a GS1 Company Prefix, Location Reference, and Check Digit. GLNs are used to identify parties to business transactions; functional groups within a company; or real, physical "places" that might ship, receive, process, or hold the product. **Request for GLN** **Who** Foodservice Operator Issuing Agency **What** Foodservice organisiation **When** Date/Time of issuance **Where** Issuing Agency **Why** Requirement for GLN **Food Licence Number** This licence number is issued by local government **Food License Number** **Who** Foodservice operator **What** Foodservice organisiation **When** Date/Time of issuance **Where** Issuing Agency **Why** Food business registration **Information to be shared to a traceability platform** • Global Location Number (GLN) • Food business registration number and currency
FS CTE2	**Establish master data of suppliers**	• Supplier GLN • Supplier Food Licence Number • Grower Property Identification Code (PIC) for direct-from-farm deliveries **Supplier Master Data** **Who** Foodservice operator, Food supplier **What** Supplier Products, Locations **When** New product or new supplier engagement **Where** Foodservice operator **Why** Master Data Set-up

Event code	CTE	Key data elements
FS CTE3	Verify the product (and any relevant other input/ ingredient) origin and integrity and ability to track product	**Supplier Traceability Audit** • Ingredient source record keeping • Date of audit • Auditor ID • Relevant manufacturer declarations and test certificates verifying product source and integrity
		Traceability Audit **Who** Traceability Auditor Supplier **What** Supplier Traceability and food safety management systems **When** Date/Time of Audit **Where** Supplier **Why** Food Safety Audit
		Information to be shared to a traceability platform • Date of audit • Auditor ID • Test Certificate/Manufacturer Declaration number and date
	Storage Providers	
FS CTE4	Provide inventory reports to Foodservice Operator for visibility of inventory in storage Order Receipt and Picking	**Quantity** • Current stock on hand by GTIN, SKU, SSCC • Stock shrinkage • Date • Stock reference (SKU, GTIN) • Description • Location • Quantity • Reorder level
		Inventory Update **Who** Foodservice Operator Customer **What** Product ID, Inventory Levels, Quantity, Batch, Date Information **When** Date/Time of pick **Where** Foodservice warehouse **Why** Inventory update
FS CTE5	Foodservice Operator lodges Customer Order	**Customer Order** • Date • Foodservice Operator ID and location (GLN) • Product GTIN/SKU/SSCC identifier • Quantity and unit (carton, drum etc) • Date required • Delivery instructions e.g. opening hours, dock location)

Event code	CTE	Key data elements
		Information shared to traceability platform: • **Inventory report (dated)** • **Customer order number** • **Date of Pick** • **Product picked** • **Batch number** • **Use By/Best Before dates** • **Logistics unit number (SSCC)**
FS CTE6	Order Dispatch	• Customer Order Number • Product • Qty • Batch • Use By/Best Before dates • Date of dispatch **Information shared to traceability platform:** • **Customer order number** • **Logistics Unit numbers (SSCC)**
	Receipt of food products at Foodservice Operator	
FS CTE7	Sign Proof of Delivery Record and notify variations to warehouse/ DC or supplier Received product entered into store inventory system	**Proof of Delivery** • Delivery date • Number of units – pallets, cartons, drums • Delivery ID • Name and signature of receiver **EDI message for rejected/missing stock** • Record variations x SKU/GTIN, lot number and supplier ID • Product ID (SKU + GTIN) • Lot/batch number • Use-by/expiry date for each lot
		Receipt **Who** Foodservice operator **What** Order Number, ASN, Logistics unit ID, Product ID, Quantity, Batch, Use By/Best before Date information **When** Date/Time of Receipt **Where** Receipt location **Why** Receipting
		Information to be shared to a traceability platform • POD number • Receipt ID • Product ID • Actual quantity receipted

Event code	CTE	Key data elements
		• Batch • Use by/Best before date • Date/Time of receipt
	Storage of inbound product	
FS CTE8	**Product internal storage unit ID and allocated stock recorded**	• Storage unit ID • Location in storage
		Put Away
		Who Foodservice operatpr
		What Product ID, Quantity, Batch, Date Information, logistics unit id
		When Date/Time of put away
		Where Put away location
		Why Stock put away
FS CTE9	**Inspection and monitoring of food storage**	• Inspection date • Inspection record code
		Food Safety Inspection
		Who Food Safety Auditor Foodservice operator
		What Product ID, Quantity, Batch, Date Information, Ingredients (products id's batch numbers, quantities)
		When Date/Time of inspection
		Where Inspection location
		Why Product inspection
		Information shared to traceability platform: • **Inspection date** • **Inspection record code** • **Inspected product ID, batch number**
	Opened bulk packs – Product Repack	
FS CTE10	**Record supplier, lot and use- by on portions of product from bulk packs**	• Supplier • Lot number • Use-by date
		Product Re-pack
		Who Foservice operator
		What Inital Product ID, Quantity, Batch, Date Information, re-packaged product ID, quantity, batch number
		When Date/Time of re-pacl
		Where Repacking location
		Why Re-pack

Event code	CTE	Key data elements
		Information shared to traceability platform: • **Lot numbers used in food preparation** • **Supplier of each lot** • **Batch number of outbound meals** • **Bulk Product ID** • **Re-packaged product ID** • **Quantity re-packed** • **Date of re-pack**
	New product creation	
FS CTE11	**Record lot details and quantity used in recipe/ production**	• Product ID (brand and supplier) • Lot number • Quantity used • Date
		Product Usage
		Who Foodservice operator
		What Product ID, Quantity used, Batch, Date Information
		When Date/Time of usage
		Where Usage location
		Why Usage
		Information shared to traceability platform: • **Product ID** • **Lot numbers used in food preparation** • **Quantity** • **Date of usage**
	End consumer traceability	
FS CTE12	**Label serves of newly produced meal portions for end consumer reference**	• Batch code • Use-by date • Product ID
		Product Creation
		Who Foodservice operator
		What Product ID, Quantity used, Batch, Date Information, Ingredients (product id's batch numbers, quantities)
		When Date/Time of creation
		Where Creation location
		Why Product Creation (transformation)

Event code	CTE	Key data elements
		Information shared to traceability platform: • **New Product ID** • **Quantity produced (portions)** • **Batch number** • **Best Before/Use by dates** • **Date of creation**
FS CTE13	**Record delivery location for each batch number**	• Delivery location ID • Batch number • Quantity delivered • Delivery date
		Product Delivery
		Who Foodservice operator
		What Product ID, Quantity used, Batch, Date Information, Ingredients (product id's batch numbers, quantities)
		When Date/Time of delivery
		Where Delivery Location
		Why Delivery
		Information shared to traceability platform: • **Product Delivered ID** • **Delivery location** • **Quantity delivered** • **Batch number** • **Date of delivery**

Application of GS1 Data Standards

Data standards that apply to key data elements and shared information are identified in this section.

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Location	Distributor Receiving Dock	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: www.gs1.org
Date/Time	Date of stock receipt, date of despatch	Year -Month-Date	**YYMMDD**	Whilst human readable date formats can vary e.g., 21 December 2020, December 21, 2020, the structure of the date format to be encoded into systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD
Product Identifiers	Packaged Product (Fixed weight) Packaged Product (Variable measure)	Global Trace Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org/ Information on how to allocate a GTIN to a variable weight or variable measure trade item:www.gs1au.org (for VM retail POS items)
Location	Distributor Receiving Dock	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: www.gs1.org
Date/Time	Date of stock receipt, date of despatch	Year -Month-Date	**YYMMDD**	Whilst human readable date formats can vary e.g., 21 December 2020, December 21, 2020, the structure of the date format to be encoded into systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Product Identifiers	Packaged Product (Fixed weight) Packaged Product (Variable measure)	Global Trace Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org Information on how to allocate a GTIN to a variable weight or variable measure trade item: www.gs1au.org (for VM retail POS items)
Traceability Attributes	Batch/Lot code (AI 10), Serial Number (AI 21), Pack date (AI 13), Production date (AI 11), Best Before Date (AI 15), Expiry Date (AI 17)	Each Traceability attribute has its own data format requirements. Please refer to the detailed information found via the link provided.	**Varying depending on Traceability attribute**	Traceability Attributes, such as Batch or Lot Number, Serial Number, Production Date etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format. For a full list of Application Identifiers applicable to the Meat industry, please refer to the GS1 Standards Module. List of all Application Identifiers: www.gs1au.org
Logistics Units	Pallet of packaged product	Serial Shipping Container Code (SSCC)	**N18**	Logistic unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. Logistic units take many forms, a single box containing a limited number of products, a pallet of multiple products, or an intermodal container containing multiple pallets. www.gs1au.org
Returnable Asset	CHEP pallet	Global Returnable Asset Identifier (GRAI)	**N29**	The Returnable Asset Identifier is especially suitable for the management of reusable transport items, transport equipment, and tools. It can identify these returnable assets by type and if needed also individually for tracking and sorting purposes www.gs1.org

Useful links

Food Safety

FSANZ www.foodstandards.gov.au Australian Institute of Food Safety www.foodsafety.com.au

Food business licensing

www.foodstandards.gov.au

Each state and territory in Australia have different classifications for food businesses.

NSW – www.foodauthority.nsw.gov.au

ACT – health.act.gov.au

VIC – www.health.vic.gov.au

QLD – www.health.qld.gov.au

SA – www.health.sa.gov.au

WA – www.public.health.wa.gov.au

NT – www.health.nt.gov.au

TAS – www.dhhs.tas.gov.au

Glossary

Advance Shipping Notice (ASN)

An advance ship notice or advance shipping notice (ASN) is a notification of pending deliveries, similar to a packing list. It is usually sent in an electronic format and is a common EDI document.

B2B/E2E

Business -to-Business and Exchange-to-Exchange describes the IT system and business transactions between trading partners in a supply chain. In E2E transactions of data it is presumed these are automated processes.

Delivery Order (DO)

A document from the Consignor of the freight which orders the release of the cargo to another party. This permits the delivery direct to a warehouse or depot, as organised with the Consignee. This enables the Consignor to order pick up of product from a 3PL warehouse in order to deliver to the party named in the Delivery Order.

First in: First out (FIFO)

FOFO is a stock rotation mechanism based on recording the best-before/use-by/expiry date of food product received into a warehouse management system, to ensure food product is not overlooked and wasted due to expiry of these dates.

Lot

A lot is an amount of a food that the manufacturer or producer identifies as having been prepared, or from which foods have been packaged or otherwise separated for sale, under essentially the same conditions, for example:

- from a particular preparation or packing unit; and
- during a particular time ordinarily not exceeding 24 hours.

The lot identification (which could be a number or other information) is used to track a product in the event of a recall and needs to be able to identify where the food was packed or prepared.

Order Acknowledgment

An Order Acknowledgment is a commercial document/electronic message issued by the Wholesaler or Distribution Centre acknowledging receipt of the Purchase Order.

Order Confirmation

A legally binding commitment to deliver specified good on specified terms. This enables the buyer to plan for receipt of these goods and if unconfirmed, to look to alternative suppliers.

Proof of Delivery (POD)

A commercial document used by the Consignee or their Logistics Service Provider to notify the Consignor of the receipt and acceptance of a delivery. A signed POD enables the Transport Company to raise an invoice.

Purchase Order (PO)

A commercial document issued by a buyer to a supplier. This is a legally binding offer to buy product in return for payment. The terms and conditions for delivery and payment are detailed in this document, which also details the product quantity, price, terms and conditions, product quality specifications.

3rd /Third Party Logistics (3PL)

Outsourcing of distribution, warehousing or fulfilment. In food logistics, a 3PL may operate storage for multiple food suppliers or retailers, often specialising in cold chain management, a specific product, or distribution at a national, metropolitan or regional level. 3PL warehouses may assemble products for promotions, prepare in-store product displays. Through their warehouse management system, they monitor inventory and interact with customers to manage inventory, assembling orders and preparing for dispatch. A proportion of 3PL suppliers also offer distribution and delivery services.

Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Consumer Information

Meat Consumer Information

The Global Center for Food Integrity defines transparency as "... the rational offering of honest information that has the emotional appeal of inviting confidence and authentic connection".[1] Using this definition, transparency can be viewed as more of an individual company's choice rather than a supply chain-wide decision to reveal information. Some components of traceability may be incorporated into a transparency commitment by a company, such as disclosing suppliers. Conversely, a product can be robustly and digitally traceable without the company providing that information to their customers.[2]

This module covers key activities related to the sale of the meat product to the end consumer, often from supermarkets, markets and convenience stores. The consumer makes a decision to purchase the meat product based on a range of information from price, product appearance, claims, certifications, content/ingredients, labelling design and nutritional value. Where the product cannot be clearly viewed, the label and packaging become critical to consumer information.

Australian consumers benefit from high standards in food production and labelling of food products. Additionally, Australian consumers may seek information on the circumstances of the meat production and whether the product conforms to their values, ethical choices and specific personal nutritional needs.

It is important to note that having traceability does not equate with provenance. Provenance is the ability to verify that the product is as stated and from an origin as claimed. The traceability data framework should be able to share provenance verification with supply chain partners and potentially consumers, however it does not create provenance verification.

In this module, processes/activities were identified to support consumer information and link with traceability:

- Identification of the product at origin
- Verification of provenance
- Smart Labelling and product information
- Feedback from consumers.

[1] www.foodintegrity.org
[2] www.ift.org
[3] www.deloitte.com

Source: Deloitte The Future of Food 2020[3]

Identification of the product at origin

Providing a unique identifier for the origin of the animal can be achieved using a global location number or GLN. This can be encoded in the product label. Similarly, processors and manufacturers can record this origin code from their supplier and link this with the inputs or ingredients for the product they create. In the case of livestock, the GLN and the state-issued Property Identification Code (PIC) has been used as a basis of identifying the producer entity and the property location. At a supply chain level, particularly when the end consumer may be located outside Australia, a GLN is likely to have greater functionality. While brand stamps may be used, these have been shown to be prone to counterfeiting in export markets.

A GLN combined with the mandated NLIS identification of the animal is the basis for locating the source of the animal, the animals processed, the meat processor and the outputs from processing. Sharing NLIS data and provenance information with further processors and meat retailers can enable consumers to have access to information that may underpin a premium price.

There are multiple technologies available to capture data on the product origin and conditions of production, including Blockchain, Internet of Things (IoT), Radio Frequency Identification (RFID), Quick Response (QR) codes and Barcodes. In addition, there are software-based technologies that are able to capture the varied digital signals created when a critical tracking event (CTE) occurs in a device-agnostic manner, and from this create a holistic picture of the journey of the product. In the case of serialization, this can be done at a very granular (sell unit) level.

Combining suitable technologies and symbologies with the critical tracking events and key data elements and using global data standards, the entire supply chain can be made transparent, expanding the potential for consumer information.

Key tasks related to traceability

- Use GLN and PIC codes to identify the entity and location of origin of the product or ingredient
- To identify the source of bulk product, use lot level identification combined with grower GLN/PIC

Participants

- Primary producers
- NLIS platform
- GLN issuing organisation
- Meat Processors
- Further processors/meat packing plants
- Meat product manufacturers
- Retailers
- Consumers.

Verification of provenance

There are a range of technologies available to verify the provenance and integrity of a product. Food analysis laboratories conduct a range of tests. Some are able to link the product to the unique soil mineral or water "signature" of a region, or to test claims associated with organic, grass or grain-fed production.

A certificate from an accredited laboratory can provide product claim and provenance verification. Creation of a unique identifier for these verification certificates, providing them to supply chain partners in a cyber-secure, encrypted and authenticated message, enables provenance verification to accompany the product. This information then becomes a product attribute that may be shared with end consumers.

Producers, processors and manufacturers often rely on vendor or supplier assurance programs to underpin product claims. However, these assurance symbols may be replicated on counterfeit product. In order to prevent this, a document code contained as a product attribute in a digital code can verify the accreditation is true and current.

Recording data from the critical tracking events (CTEs) in this Guide will enable detailed information to be gathered, as identified in the On-farm Production module and the transformation of raw materials in the Meat Processing module.

This data is used for E2E or B2B transactions, to track the product's journey, to facilitate handovers of custody, to comply with regulatory regimes or buyer specifications. In recognition of the interest of growers in marketing the story of their product, AgriFutures has prepared a toolkit to assist primary producers in this task – Provenance Storytelling for Success.[4]

Key tasks related to traceability

- Embed test certificate codes related to provenance and integrity as an attribute of the product ID

Participants

- Primary producers
- Accredited analytic laboratories
- Product assurance bodies e.g. MLA's Livestock Production Assurance, Australian Certified Organic
- Processors
- Manufacturers
- Retailers.

Smart labelling and product information

Requirements for food labelling are described by FSANZ and cover a variety of foods and circumstances, such as product labelling for E2E sales versus B2C sales. The Australian Government also has requirements for country of origin labelling, weights and measures and Australian product content.[5]

Despite large amounts of information being encoded on product packaging and item labels, there are opportunities for brand owners to provide additional product information for consumers through use of smart labels. These labels use QR codes, sensors, microchips to enable information to be generated from the brand owner of the product to the consumer.

[4] www.agrifutures.com.au

Smart labels have a dual purpose in providing consumer information and in traceability of the product. They can indicate deterioration of the product, as they change colour or blister, detecting oxygen and bacteria levels. This helps to notify consumers and avert food waste. For high value items such as premium meat cuts, smart labels containing an IoT sensor using Near Field Communication/5G can enable anti-tampering and tracking in transit. These embedded devices can detect changes in temperature and humidity via packaging and labels, while the product is in transit or storage. They will also indicate any tampering with the item.

Consumers can use a specific Application (App), scan a QR code or digital barcode on the product to access product information held by the brand owner/manufacturer or grower; to search via the Web; or conduct a product search on a registry of brands and products to gain additional information via smart phone, tablet or desktop.

Key tasks related to traceability

- Ensure compliant labelling on packaging and product item
- Determine the business case for smart label application to the product as a dual consumer information and traceability tool

Participants

- Primary producer
- Manufacturer
- Solution provider
- Retailer.

Feedback from consumers

Traceability is focused on monitoring the flow of the product to the consumer and the requirement to conduct product recall from the consumer back to the source of the threat in the circumstance of a food safety incident. Food safety must be the first priority, however, as consumers seek to engage with the upstream food supply chain beyond the food retailer or foodservice operator, the opportunity for feedback from consumers has expanded.

Point of Sale (POS) devices are able to capture large volumes of consumer data regarding preferences, sales volumes and consumer ratings of products. The use of QR codes also supports the opportunity for brand owners to gain valuable feedback. Customer loyalty schemes are also a tool to gather feedback on products. This capability is in addition to the use of social media as a feedback tool and is able to use the system interoperability created through use of product identification, business entity identification and the event history of the product created through the traceability data model, to transmit consumer feedback to upstream partners.

Many small and medium enterprises (SMEs) who are producers and manufacturers find consumer insights cost-prohibitive to purchase and therefore miss out on valuable feedback. Use of the traceability data model can enable the receipt of consumer insights via system interoperability.

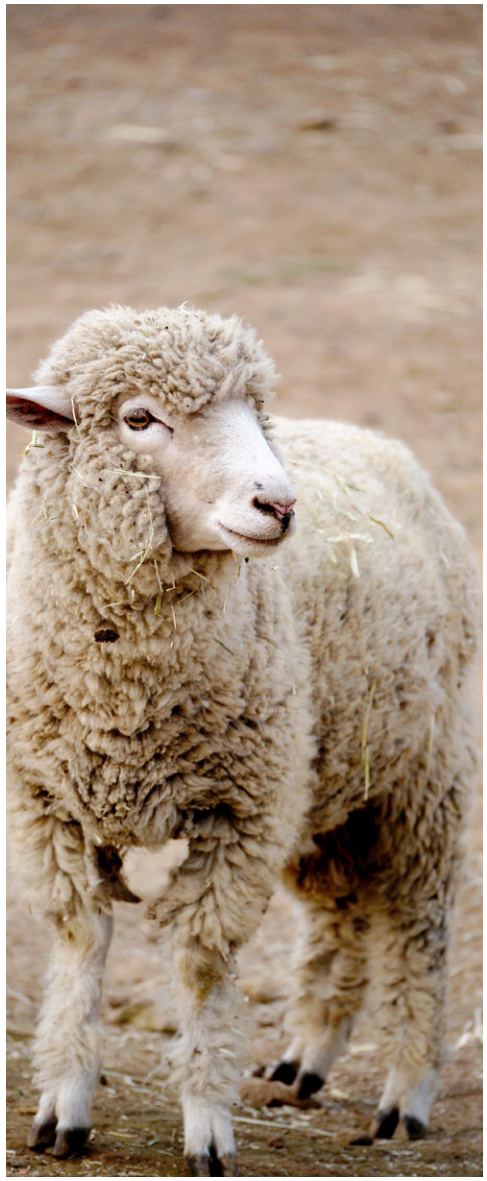
Key tasks related to traceability

- Determine with consumer-facing partners what consumer insights can be integrated in the traceability data model for the product

Participants

- Food retailers
- Foodservice Operators
- Primary producers
- Solution Providers
- Meat processors and manufacturers
- Consumers.

[5] www.business.gov.au



Critical Tracking Events (CTEs)

For each of the identified consumer information activities, **Critical Tracking Events (CTEs)** establish identity and enable traceability and compliance with traceability-related regulation. CTEs in this module relate to the transparency of the food product supply chain and supply of consumer information and consumer feedback.

Consumer Information Activity	CTE code	Critical Tracking Events (CTEs)
Identification of the product origin	**CI CTE1**	Identify the entity and location of origin of the product or meat ingredient
Verification of provenance	**CI CTE2**	Link provenance verification e.g. test certificates reference to product identifier
Smart Labelling and product information	**CI CTE3**	Ensure compliant labelling on packaging and product item Determine the business case for smart label application to the product as a dual consumer information and traceability tool
Feedback from consumers	**CI CTE4**	Determine with consumer-facing partners what consumer information can be integrated in the traceability data model for the product

Key Data Elements (KDEs)

Key Data Elements (KDEs) ensure that captured and recorded data can be interpreted and used as relevant and required by all supply chain partners. KDEs define Who, What, When, Where and Why for each CTE identified above.

CTE Code	CTE	Key Data Elements
CI CTE1	**Product source**	• Global Location Number of source supplier • Property Identification Code of Australian grower • Country of Origin **Product Source** **Who** Processor, Producer, Retailer, Foodservice operator **What** Product ID (NLIS), Batch, Date, Origin of product, GLN or PIC of origin **When** Date/Time of processing or transformation **Where** Processing, repacking **Why** Identify product origin
CI CTE2	**Provenance verification**	**Test Certificate Links** **Who** Processor, Producer, Retailer, Foodservice operator **What** Product ID, Batch, Test Certificate number, Quantity **When** Date/Time of Testing **Where** Location of testing **Why** Linking Test Certificate to product/batch
CI CTE3	**Ensure compliant labelling on packaging and product item**	**Product Labelling** • Use by Date/ Best Before Date • Lot Identification • Batch Identification • Name of Processor • Storage Instructions • Cooking Instructions • Contact Details • Country of Origin • Food Description • List of Ingredients • Percentage of Ingredients • List of Allergens • Product Labelling

CTE Code	CTE	Key Data Elements
CI CTE3	**Ensure compliant labelling on packaging and product item**	**Product Labelling** • Use by Date/ Best Before Date • Lot Identification • Batch Identification • Name of Processor • Storage Instructions • Cooking Instructions • Contact Details • Country of Origin • Food Description • List of Ingredients • Percentage of Ingredients • List of Allergens • Product Labelling
		Product Labelling
		Who Processor, Producer, Retailer, Foodservice operator
		What Product ID, Batch, Date Information, Quantity
		When Date/Time of labelling
		Where Labelling location
		Why Product labelling
CI CTE2	**Consumer information** Determine with consumer-facing partners what consumer insights can be integrated in the traceability data model for the product	• Consumer information as agreed for specific product supply chain

Application of GS1 global data standards

Adoption of global data standards and data driven collaboration enables data sharing between businesses through using common formats. These formats allow a business to identify participants, locations, products, processes and events in the supply chain.

Data Element	Examples	Valid Values	Data/Type Format	Further Information
Location	Manufacturing Plant, Finished Goods Location, Farm location, Retail location	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: www.gs1.org
Date/Time	Production Date and/ or time, Use By date, Best Before Date, Pack Date	Year -Month-Date	**YYMMDD**	Whilst human readable date formats can vary e.g. 21 December 2020, December 21 2020, the structure of the date format to be encoded into systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD
Product Identifiers	Input materials such as raw ingredients and packaging, Outputs such as finished goods, packaged or processed goods	Global Trade Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN www.gs1.org
Traceability Attributes	Batch/Lot code (AI 10), Serial Number (AI 21), Pack date (AI 13), Production date (AI 11), Best Before Date (AI 15), Expiry Date (AI 17)	Each Traceability attribute has its own data format requirements. Please refer to the detailed information found via the link provided.	**Varying depending on Traceability attribute**	Traceability Attributes, such as Batch or Lot Number or Serial Number etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format. List of Application Identifiers: www.gs1au.org

Useful Links

Food testing laboratories

www.nata.com.au

Provenance and story telling

AgriFutures toolkit

www.agrifutures.com.au

Food labelling

NMI Weights and Measures

business.gov.au

ACCC Country of Origin Food Labelling

www.accc.gov.au

Food Standards Code labelling

www.foodstandards.gov.au

www.legislation.gov.au

Meat labelling

www.primesafe.vic.gov.au

Meat Standards Australia

www.mla.com.au

Red Meat Consumer information

www.goodmeat.com.au

www.mla.com.au

Rare Medium Foodservice Program

raremediummag.com

rmac.com.au

Glossary

B2B

Business to Business transactions

B2C

Business to Consumer transactions

E2E

Exchange to Exchange transactions

IoT

Internet of Things. A description for a range of devices that can connect with each other and the Internet without human intervention.

Point of Sale (POS)

POS devices are evolved from cash registers and cover a range of cloud-connected or stand-alone enterprise systems for recording sales, managing inventory and enhanced customer engagement

e.g. loyalty programs/customer preferences.

QR code

A Quick Response code is a machine-readable code consisting of an array of black and white squares, typically used for storing URLs or other information for reading by the camera on a smartphone. It can store 7,000 characters.

Small and medium enterprise (SME)

The Australian Bureau of Statistics (ABS) uses the number of persons employed:

a micro-business employs between 0-4 persons

a small business, between 5-19 persons

a medium business, between 20 and 199 persons; and

a large business employing 200 or more persons

Various Commonwealth agencies define SMEs differently, however it is recognised that SMEs make up around 98 percent of Australian businesses.

Smart labels

Smart labels include QR codes, Electronic Article Surveillance (EAS) tags and specially configured RFID tags. Smart labels are created by combining three technologies: plain text, radio code and

optical character recognition. Smart labels are divided into chip labels, printable labels and electronic labels.

Smart labels such as data-embedded barcodes (GS1-128), QR codes, RFID tags, enable a much larger amount of information to be provided to consumers.

www.clearmark.uk

SmartLabel: Consumer Brands Association and Food & Consumer Products of Canada

www.smartlabel.org

Australian Guide to Implementing Food Traceability (AGIFT):

Red Meat & Livestock

Cyber Security, Data Sharing, Privacy

Cyber Security, Data Sharing, Privacy

Global supply chains are becoming increasingly dependent upon digital technologies. Understanding, evaluating, and mitigating the cyber risks impacting supply chain critical business activities and trading data is thus of increasing importance. This module puts forward a comprehensive list of security concerns, threats, and mitigation strategies for constituents of a supply chain (e.g., trade companies, service providers, etc.) to discuss and analyse when developing their overall security posture. In that pursuit, we present a generic architecture of traceability that is divided into four main layers, namely data carrier, data capture, data sharing, and application layers (see Section 2 for details). We present a description of core elements (or technologies) of each layer and outline threats and mitigation strategies based on the STRIDE threat model (see Section 4 - 7). STRIDE is widely used for analysing systems for different vulnerabilities and their potential countermeasures. Finally, we present a description of best practices for managing cyber-risks in supply chains (see Section 8) and for ensuring privacy of data shared amongst the trade partners (see Section 9).

Disclaimer: This is not a risk assessment report. Hence mitigation strategies and threats described herein are neither ranked nor sorted in terms of their impact, severity or risk to a given organisation. This module is intended to be used as a generic guide for business owners to determine the best security controls available to their organisations.

Introduction

Digital technologies are being increasingly adopted in modern supply chains. This brings many benefits such as ease of data sharing amongst the trade partners, access of product related data whenever needed and end-to-end traceability of products. It also helps end-users to have product specific data and make more informed decision when purchasing a product. However, the interconnection of trade partners using digital technologies brings cyber threats to the spotlight, with the potential to leak business data, disrupt business operations, and provoke financial, intellectual and reputation losses. Understanding and analysing those threats is the goal of this report. To accomplish this, we present a generic data flow architecture for supply chains that is comprised of four layers (see Figure 1), and then identify the assets associated with each layer. For ease of exposition and analysis, we adopt the STRIDE threat model to present potential mitigation strategies against common threats, such as spoofing, tampering, repudiation, information disclosure, denial of service, and elevation of privileges.

Figure 1 shows a four layered food traceability data flow architecture, which comprises the data carrier layer, data capture layer, data sharing and application layer. The data carrier layer is comprised of means (e.g., barcodes, RFID (Radio Frequency Identification) tags, IoT (Internet of Things) devices) used to carry information (e.g., identification keys) related to products and other entities within the supply chain. The data capture layer records the identification data from the various physical identification techniques attached to the products moving in the supply chain. The data sharing layer contains a central repository of master data recorded for the products as well as a distributed repository that can be accessed by various participants of the supply chain. The application layer comprises software systems that access traceability data to provide services.

The mitigation strategies presented in this report are based on the Microsoft's STRIDE threat model. Although other threat models exist, such as Open Web Application Security Project (OSWAP), Process for Attack simulation and Threat modelling (PASTA), and Operationally Critical Threat, Asset and Vulnerability Evaluation (OCTAVE), the STRIDE model was chosen due to its simplicity and the broad categories of threats it covers. The six major threats considered in STRIDE are the following.

- Spoofing - aims to subvert the authentication mechanism of the system by using fake or cloned credentials.
- Tampering - targets the various components of the system where the ICT components and data stored in them are tampered with.
- Repudiation - targets the system's vulnerability in logging and tracing activities to prevent detection and identification of malicious activities.
- Information Disclosure - aims to access unauthorised information from the system and disclose it to unauthorised parties.
- Denial of Service - disrupts system operation and service availability.
- Elevation of Privileges - allows users to increase their level of access to the system resources without authorisation.

The next four sections in this document are dedicated to an analysis of aforementioned threats within each of the layers comprising the food traceability data flow architecture. The analysis identifies the assets an organisation may want to protect, main threats to those assets, and potential mitigation strategies.

Figure 1: Food traceability data flow architecture

1.1 Data Carrier Layer

This layer focuses on the identification and description of various assets that carry the product data and are physically attached to the assets to track and monitor the product locations and conditions. Table 1 shows the three main assets in the data capture layer that contain product information and/or monitor products in the food supply chain.

Assets	Descriptions
Barcodes	Barcodes capture various product related information such as Global Location Number (GLN) and Global Trade Item Number (GTIN).
RFID tags	Hardware RFID tags used to store the EPC
IoT devices	Hardware sensor devices used to monitor and track products and packages

1.2 Security Requirements and Threat Mitigation Techniques for the Data Carrier Layer

1.2.1 Barcodes

Threat	Threat Description	Potential Mitigation
Spoofing	Copying/printing legitimate barcodes to spoof the product identities and insert fake goods or legitimize fake products in supply chains	Use of anti-copying and unclonable barcodes such as 2D barcodes versus the 1D barcodes to prevent copying or cloning of barcodes. Use of special printing material, physical unclonable functions, digital water marking and high-density black and white blocks for preventing illegal copying of barcodes [1,2].
Tampering	Preventing access to traceability information by manipulating barcodes. Embedding harmful commands within barcodes to be executed by barcode readers. Attaching counterfeit barcodes to products with the purpose of manipulating prices and traceability information.	Use of tamper-resistant and durable materials for making the barcode labels with additional security of voiding tampered labels is suggested to prevent tampering attacks. Similarly, tamper detection for barcodes (i.e., QR codes) can be implemented to integrate the digital signature of a barcode content in the error correcting area by leveraging stenographic techniques[3].
Reputation	Preventing unauthorised operations from being traced and attributed to the malicious user.	Repudiation attacks are difficult to defend as barcodes are non-electronic and any logging of actions (e.g., modifications) is not possible.
Information Disclosure	Perform unauthorised scanning and read barcodes and fetch information stored in them (e.g., unprinted information in case of QR codes).	Use of security enhanced barcodes such as Secret-function-equipped QR codes (SQRC) that carry an additional confidential information that may be accessible through a purpose-built scanner with the correct cryptographic key[4].
Denial of Service	Damaging barcodes to make them unreadable (e.g., damaging checksum bits). Disable or hijack host device through malicious embedded codes leading to buffer overflow.	• Use of tamper-proof materials for printing barcodes to prevent any damage to barcodes which may lead to DoS (Denial of Service) attacks. • Use of limit on the data that is being read to block any potential buffer-overflow attack.
Elevation of privileges	Performing unprivileged actions by embedding malicious commands in barcodes (e.g., targeting database systems by embedding SQL statement)[5]	Incorporate security features in scanners or host device to block the execution of malicious commands or loading of malicious URL – e.g., incorporation of threat signature library as indicated in [6].

1.2.2 RFID Tags

Threat	Threat Description	Potential Mitigation
Spoofing	• Detaching tags from products and attaching to fake products (Tag Snatching). • Creating replica of tags through reverse engineering (Tag counterfeiting). • Reading data from cheap items and uploading it to some other tags and attaching to expensive items.	• Use tamper evident and tamper alarm RFID tags that alerts if tags are detached from an expensive item and are unusable after their removal[7]. • Use of anti-counterfeiting techniques such as physical unclonable functions, chip-less RFID tags[8], and distance bounding protocol that utilize broadcast and collisions to find the cloned tags[9]. • Allow only authorized physical access to the RFID tags.
Tampering	Inserting malicious information to cause harm to tag readers and systems connected to it (e.g., Virus [10]). Physical tampering to damage tag data.	• Use RFID authentication protocol and lock all memory banks (that may be unlocked with correct access password) to protect against any illicit manipulation of data. • A middleware that can detect the presence of any malicious data being read from a tag may be helpful against insertion of harmful viruses. • Allow only authorized physical access to the RFID tags.
Repudiation	Tampering tag data without logging the manipulation performed.	• Allocate sufficient memory to log/track all manipulations on tag data.
Information Disclosure	Revealing tag data related to traceability that are not protected by encryption and authentication mechanism.	• Use mutual Reader/Tag authentication and encryption to protect against the unauthorized access to the stored information. • Use shielded enclosures to protect against any unauthorized access to tag data outside the legitimate access area.
Denial of Service	• Killing of tags to make them unusable. • Manipulation of tag data to some arbitrary values unrecognizable to backend system.	• Enable Reader/tag authentication so that kill command may not be issued by a malicious reader or it may not manipulate data such that it leads to DoS attacks. • Allocate sufficient memory to kill passwords so that they are hard to brute force. • Use strict access control mechanisms to manipulate the tag data.
Elevation of privileges	Installing malware on RFID tags to steal information or gain unauthorized access to the system.	Security features in reader/middleware to detect the presence of any malicious viruses and malware in tag memory, such as memory attestation.

1.2.3 IoT Devices

Threat	Threat Description	Potential Mitigation
Spoofing	Impersonating the device credentials to connect to supply chain IoT Network. Use cloned IoT devices to bypass authentication mechanism and access the important data or feed incorrect data.	• Use authentication mechanisms that rely on unclonable information – e.g., device-characteristics-based mutual authentication between the communicating devices. • Use multi-factor authentication to counter any potential compromise of credentials. • Use of strong credentials and regular updates of device's access passwords.
Tampering	• Tampering traceability data stored in IoT devices such as GPS coordinates to manipulate traceability data. • Installing malwares on IoT devices to access traceability data. • Tampering IoT firmware.	• Encrypt and digitally sign the firmware binaries to preserve their confidentiality and integrity [11]. • Enforce a secure boot process to prevent from modifying/replacing back doored firmware [12]. • Mutually authenticate the device firmware and cloud update pool using PKI [13]. • Do not hardcode encryption key in firmware as reverse engineering may reveal it, and an attacker may use it to tamper the memory content [14] as per his needs. For example, it may allow an attacker to modify passwords, replace certificates, and download back doored versions of the firmware [15]. • Protect IoT devices from an unauthorized physical access that may allow the installation of malicious software [16]. • Only allow the administrator to manipulate critical information, such as geo-coordinates (after verifying the multi-factors of authentication). • Regular security patching of IoT firmware to prevent vulnerabilities.
Repudiation	Denying of unauthorised actions by erasing IoT device logs and memory contents.	• Use cloud locations to store critical event logs on IoT devices to trace actions on it. • Enforce strong authentication mechanisms prior to deleting logs or IoT traceability data.
Information Disclosure	Revealing sensitive information stored on the IoT devices such as credentials, digital certificates, product details and traceability data.	• Encrypt all stored data on IoT devices, and do not hardcode keys in firmware. • Use light weight encryption techniques that do not exhaust device battery and do not require complex CPU cycles to encrypt data on IoT devices.

Threat	Threat Description	Potential Mitigation
Denial of Service	Denial of traceability service by physically damaging or disabling the IoT device used for traceability. • Sending unnecessary communication requests to battery operated devices to drain their batteries and disable device [17].	• Protect against the unauthorized physical access to IoT devices to avoid any damage to these devices that may lead to DoS attacks. • Detect and prevent anomalous communication with the IoT device.
Elevation of privileges	Gaining unauthorized access to the IoT firmware and executing unauthorized commands to impact the traceability.	• Protect against the unauthorized access to firmware by encrypting the binaries [18]. • Detect and disable malicious or compromised IoT devices. • Disable unnecessary services running on IoT devices.

[1] www.arxiv-vanity.com
[2] arxiv.org
[3] patents.google.com
[4] delivr.com
[5] link.springer.com
[6] patentimages.storage.googleapis.com
[7] www.atlasrfidstore.com
[8] minerva-access.unimelb.edu.au
[9] www.sciencedirect.com
[10] cdn.intechopen.com
[11] www.infosys.com
[12] www.infosys.com
[13] www.infosys.com
[14] blog.securityinnovation.com
[15] www.infosys.com
[16] www.trendmicro.com
[17] ieeexplore.ieee.org
[18] www.infosys.com

1.3 Data Capture Layer

Data capture layer focuses on assets and interfaces that facilitates the capturing of product data encoded in carriers attached to the product, and its subsequent conversion to a format that is suitable for different applications and storage in repositories. Following are the assets related to data capture layer:

Assets	Descriptions
Barcode printers and Scanners	Devices used for printing several types of barcodes, and scanners used to read the data encoded in a barcode attached to a product.
Barcode Reader Application (Host system)	Barcode host system application used to decode and act on the data read from barcodes
Tag writers/Readers	Devices used for writing data into tag memory, and readers used for reading data from the tags.
RFID Air Interfaces	The air interfaces provide a common Radio Frequency (RF) operating range and a standard communication protocol to facilitate the tag and reader to communicate. The readers identify the tags and access the stored data using the air interfaces. Two air interface standards are discussed below: UHF Gen2 Air Interface - The latest UHF Gen2 standard proposed by GS1 is the Gen2 V2.0 which defines an operating range of 860 – 960 MHz UHF range. HF Air Interface - A protocol operating at 13.56 MHz frequency defining the requirements of a RFID Tag and reader specifying the passive-backscatter, Interrogator-talks-first (ITF) for RFID communication.
RFID Software Interfaces	These interfaces form the middleware between the RFID tags and the applications that access RFID data and help in transforming the RFID stored data into format required by the upper layer applications. These interfaces include: Low level Reader protocol (LLRP) - Defines the control and delivery of raw tag reads from Readers to the Filtering & Collection role. Application-Level Event (ALE) - Defines the control and delivery of filtered and collected tag read data from Filtering & Collection role to the EPCIS Capturing Application role. This is one of the critical components of the RFID system as it sits between the RFID readers and the ERP (Enterprise Resource Planning) tools.

1.4 Security Requirements and Threat Mitigation Techniques for Data Capture Layer

1.4.1 Barcode Scanner / Writer/ Reader Application

Threat	Threat Description	Potential Mitigation
Spoofing	Impersonating authorised scanners to scan barcode data	Authentication must be enabled between the barcode scanners and the host computer system so that unauthorised scanners cannot be attached to the host system
Tampering	• Tampering Software / Firmware of barcode scanners • Remotely controlling the host computer using backdoors in reader applications.	• Access to firmware should be restricted to authorised individuals using strong authentication techniques • The firmware updates need to be digitally signed and encrypted to prevent tampering of scanner software[19] • Wi-Fi connected handheld barcode scanners need to be physically secured from unauthorised usage and prevent tampering.
Repudiation	Denying malicious actions by clearing logs of scanner events and reader software application	Logging needs to be enabled and secured at all the scanner devices and reader applications to enable tracking of events in the supply chain.
Information Disclosure	• Compromising scanners/host applications and reveal traceability information. • Eavesdropping on Wi-Fi connected handheld scanners to disclose scanning data.	• Communication between the scanners and host applications need to be secured. Access to data stored on the host system needs to be protected with strong authentication mechanisms. • Especially handheld barcode scanners need to encrypt the communication between scanner application and the backend systems.
Denial of Service	• Disabling scanners using malicious barcodes to cause DoS. • Exploiting Wi-Fi enabled scanner OS/Firmware vulnerabilities to cause DoS20.	• The scanner firmware, reader applications need to be regularly patched to remove open vulnerabilities. • Data scanned from barcodes need to be verified for malicious content to prevent damaging the scanners or the reader application [21 22]. • Communication mechanisms used by wireless handheld barcode scanners need to be secured and patched to prevent DoS attacks[23].
Elevation of privileges	• Launching attacks on connected components of the supply chain system.	Host systems should contain access control levels to prevent reader applications from having privileged access to other parts of the system and isolate compromised host systems from affecting other parts of the supply chain.

1.4.2 RFID Reader/Writer/Air Interface

Threat	Threat Description	Potential Mitigation
Spoofing	• Extracting or modifying product information using unauthorized readers/writer to read/write RFID tags. • Feeding incorrect traceability data using previously recorded communication between reader and tag.	• Use reader/writer authentication before allowing them read data from a tag or write data to a tag's memory. • Use timestamps, counters, and challenge response cryptography to protect against the replay attack[24].
Tampering	• Modifying traceability data by tampering or reverse engineer the readers/writer firmware • Tampering tag data using unauthorized RFID tag writers	• Encrypt and digitally sign the firmware updates to protect against the unauthorized firmware update[25]. • Enable writer/tag authentication so that malicious writer cannot tamper the tag data.
Repudiation	Causing repudiation by exploiting the limited memory and logging capability on tags	Enable a secure logging at all readers/writer for tracking all actions conducted with these devices.
Information Disclosure	• Eavesdropping to listen to unencrypted communications between the reader and the tag. • Launching Side channel at tacks to analyse the memory access and power fluctuations to extract authentication keys or steal information. • Launching MiTM (Man in the Middle) attacks that divert communications to malicious devices and steal information.	• Encrypt the communication between tag and reader to protect against the eavesdropping. • Use the RFID authentication protocol that are resistant to MiTM attacks [26]. • Filter the power signal or delay the computation randomly to make power analysis difficult [27].
Denial of Service	• Killing tags using malicious writers causing DoS. • Launching Jamming attacks blocking the communication between tag and reader.	• Use mutual authentication such that attacker cannot launch desynchronization[28] attacks and kill command attacks. • Use external noise/radio shielded enclosure to protect against the RF jamming attack [29].
Elevation of privileges	Performing unprivileged actions using compromised readers/writer on connected applications.	• Built security features in reader so that malicious data stored in the tags that can potentially compromise the reader be detected (e.g., check for buffer overflow if appropriate). • Reader/Writer firmware be protected against the unauthorized update.

1.4.3 RFID Middleware

Threat	Threat Description	Potential Mitigation
Spoofing	• Connecting to RFID middleware applications as LLRP lacks authentication mechanism using spoofed RFID reader identities. • Replaying previously captured communication from the reader device and gain unauthorized access to middleware application.	• Mutual authentication between readers and ALE middleware. • Use sequence numbers and timestamps to protect against the replay attacks [30] between reader and client.
Tampering	• Inserting unauthorized code into middleware applications. • Tampering traceability data by exploiting vulnerabilities of the LLRP protocol used in middleware • applications.	• Build security feature in middleware that can check for insertion of any malicious data such viruses. • Enable strong authentication before allowing a change in LLRP parameters.
Repudiation	Denying unauthorised access by deleting logs and associated traces.	Enable activity logs in middleware and ensure that deleting logs is not possible.
Information Disclosure	Eavesdropping and listening to unencrypted LLRP communications to reveal traceability information.	• Use of encryption to protect against the eavesdropping between a reader and filtering and collection role. • Use authentication such that MiTM attacks are blocked.
Denial of Service	• Disabling middleware applications by inserting malicious values in the reader protocol causing buffer overflow attacks. • Corrupting the ALE interface with malicious reader values.	• Use programming languages that offer bound checking to protect against the buffer overflow [31]. • Allow only authenticated reader's data in proper format to flow through ALE interface. • Use load-balanced ALE middleware to prevent availability issues due to flooding attacks.
Elevation of privileges	• Gain unauthorized access to the backend traceability applications or supply chain system using a compromised ALE interface. • Exploiting the weakness in input data validation mechanism to launch SQL injection attacks using malicious characters or values stored on RFID tags. • Gaining unauthorised access to the system to reveal traceability information using stolen accounts and credentials to bypass the RBAC access control policies.	• Build a security features in readers and middleware that accepts data only in pre-defined format to protect against the code injections. • Protect against the buffer overflow that may lead to elevated privileges [32]. • Incorporate a layer on top of middleware component that helps controlling the collection done by clients (i.e., capture application)[33].

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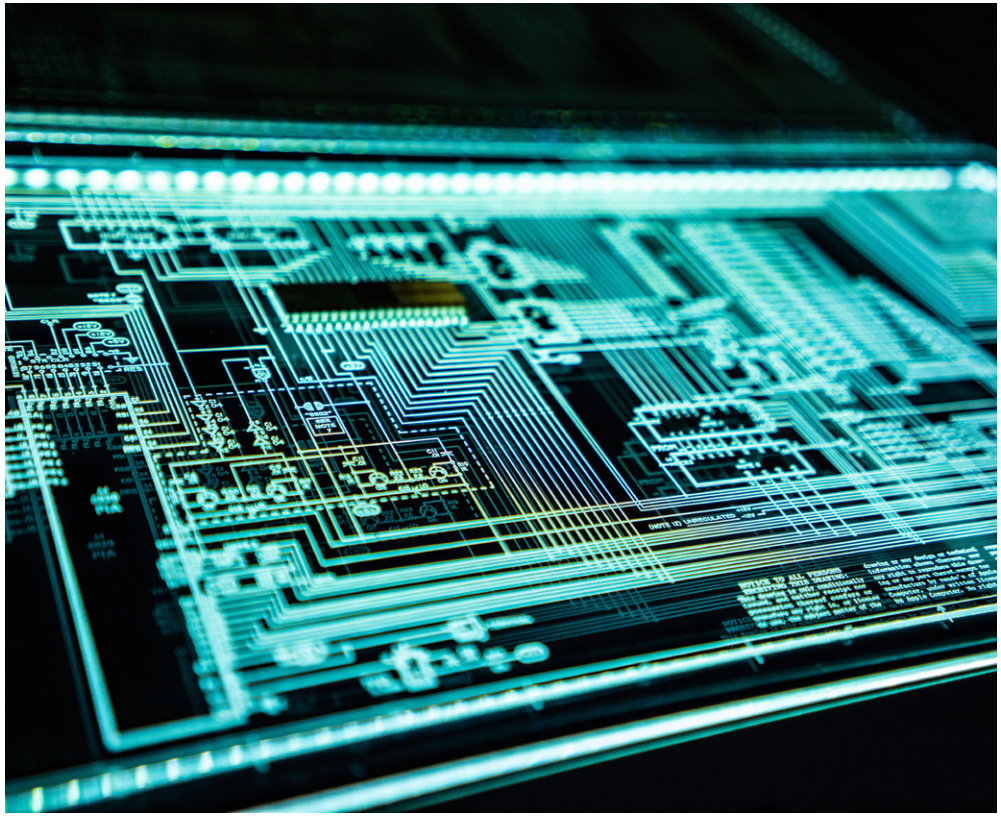

1.5 Data Sharing Layer

To support traceability of products, GS1 provides global traceability standards which support the identification, capturing and sharing of traceability data such as the master data, transactional data and the event data related to the products. GS1 defines three different standards for data exchange amongst the trading partners within the supply chain. These include Global Data Synchronization Network (GDSN – used for sharing Master Data), Electronic Product Code Information Services (EPCIS – used for sharing Visible-Event Data), and Electronic Data Interchange (EDI – used for sharing Transactional Data) as highlighted in Figure 2.

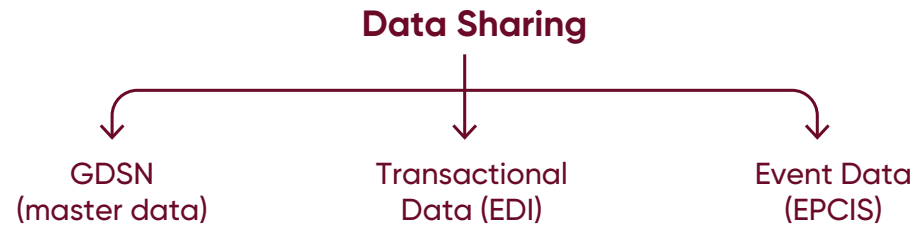

Figure 2: GS1 traceability data sharing standards

Master Data - refers to data that is shared by one trading partner with many others and contains the description of attributes of real-world entities identified by GS1 ID keys. Examples include trade items and physical locations.

Transactional Data - refers to execution of a business process function such as a supply contract, custom processing, order placement, and final settlement using the GS1 identification keys.

Visibility-Event Data - refers to details of physical activity of products (or other assets) identified by keys within the supply chain, detailing where and why products are at a time within and across the organizations.

Assets in this layer include:

Assets	Descriptions
GDSN Data Pools	The data pools contain the product information (product catalog and product prices) which is shared among the trading partners. The data pools can be either maintained by a third-party or can be deployed internally by the trading partner.
GDSN Registry	The GS1 global registry is a directory of registered parties and products which also federates between data pools. It also serves as the pointer for data pools with respect to the master data of products and parties.
EPCIS Capture Interface	With this interface, visibility event data in accordance with EPCIS data model is delivered from capturing applications to a receiver (e.g., persistent repository of EPCIS data).
EPCIS Repository	A persistent store of visibility event data, comprising all EPCIS events generated internally within the organization and received from other trading partners, and makes them available to be used by the EPCIS Accessing Application
EPCIS Query Interface	With this interface, EPCIS event data may be requested by and delivered to a business application or a trading partner
AS2	Communication protocol used for GDSN synchronization and sharing EPCIS event data with trade partners.
Object Naming Service (ONS)	ONS is DNS based discovery service used to discover data and services related to the GS1 identification key.

1.6 Security Requirement and Threat Mitigation Techniques for Data Sharing Layer

Potential mitigation steps that can help on protecting the various assets at data sharing layer are described next.

1.6.1 GDSN Data Pools/ EPCIS Repositories

Threat	Threat Description	Potential Mitigation
Spoofing	Accessing sensitive product data in GDSN data pools or GS1 global registry using stolen or spoofed credentials.	Enable strong authentication (e.g., multifactor authentication) prior to giving access to critical data stored in GDSN data pools.
Tampering	• Pushing tampered event data to EPCIS repositories of all trade parties by compromising a single weak trading partner. • Tampering the GDSN data related to the products such as the GTIN, GLN or product descriptions causing errors in traceability data.	Allow only authorized individuals to make changes to product related information after verifying their identity.
Repudiation	Denying unauthorised actions either due to Improper logging or logs being removed by adversaries.	Enable secure logging both on GDSN data pools and EPCIS repositories.
Information Disclosure	Leaking sensitive traceability data from EPCIS repositories using SQL injection attacks or by transacting with malware infected repositories.	• Ensure that correct data is being shared only with authorized partners. • Enable protection against virus and malware. • Accept data only in pre-defined format to protect against any malicious data fed to EPCIS repositories.
Denial of Service	• Denying service to legitimate users by using malicious XML files, or oversized XML documents.	• Protect against several types of XML attacks as mentioned in [34].
Elevation of privileges	• Gaining unprivileged access to registries and data pool services. • Gaining unprivileged access to EPCIS event data stored in EPCIS repositories (e.g., stolen access token). • Enabling unauthorized access to EPCIS repositories using malicious payload in AS2 (e.g., malware) or data from RFID tags.	• Ensure that access tokens for EPCIS event data is shared with correct partners. • Allow data pool access only to authorized partners. • Protect against malicious XML payloads that may lead to unauthorized data retrieval as indicated in [35].

1.6.2 EPCIS Capture/Query Interface

Threat	Threat Description	Potential Mitigation
Spoofing	Feeding corrupted data to EPCIS repositories using spoofed middleware credentials or due to lack of mutual authentication between a middleware and repository.	• Enable mutual authentication between capture application, accessing application, repositories, and repository and trade partners.
Tampering	Tampering data in EPCIS repositories by exploiting the vulnerabilities in EPCIS capturing application.	• Accept data only from authenticated readers/ trade partner in proper format so that capture/ query interfaces are not corrupted. • Allow only authorized individuals to makes changes to data stored in EPCIS repositories or GDSN data pools.
Repudiation	Denying malicious actions due to Improper logging or logs being removed by adversaries.	Enable activity logging.
Information Disclosure	• Gaining unauthorised access to traceability data due to lack of encryption between capture application, repositories, and trade partners. • Disclosing sensitive information by exploiting the lack of mutual authentication between capturing application and EPCIS repositories.	Encrypt the communication between middleware, accessing application, repositories, and repository and trade partners.
Denial of Service	Denying service to legitimate users by corrupting capture and query interface by sending malicious data from reader or from trade partners	Accept data only in pre-defined form from data carriers to alleviate the chances of corrupting EPCIS capture interface that can lead to DoS.
Elevation of privileges	Gaining unprivileged access to EPCIS repositories by conducting SQL injection attack.	• Enable mutual authentication between capture application and repositories so that malicious readers cannot feed data to repositories. • Accept data only in pre-defined form from data carriers and trade partner so that capture and query interfaces be corrupted leading to elevated privileges of an attacker. • An EPCIS service should be incorporated to conduct proper redaction to alleviate the unauthorized access to data (redaction refers to denying a data request or restricting the amount of data requested by a trade partner) [36].

1.6.3 AS2 Communication Servers

Threat	Threat Description	Potential Mitigation
Spoofing	Spoofing credentials of legitimate users and access trade data using stolen digital certificates and bypassing AS2 authentication.	• Keep digital certificates in secure locations such as on an encrypted device and hardware security module. • Keep the OS and antivirus up to date and avoid running any suspicious program.
Tampering	Tampering traceability data by modifying AS2 communication parameters or the AS2 payload.	• Use strong hash algorithms so that collision attacks are not possible and any attempt to tamper the sent data be detected (e.g., SHA-2 instead of SHA-1 which is recommended AS2 transport communication guidelines available on GS1 official website [37]).
Repudiation	Denying malicious actions on AS2 servers by removing traces of adversarial actions or targeting weak AS2 server software that do not log connections and activities performed	Enable secure logging of all operations.
Information Disclosure	• Disclosing sensitive data by launching attacks such as DNS cache poisoning or using stolen digital certificates to get access to the EDI data sent over AS2 protocol. • Revealing private keys or AS2 service credentials in public domain.	• Ensure that digital certificates are kept in secure locations. • Use strong public-private keys for asymmetric encryption. For example, consider using 2048 bits keys instead of 1024 bits recommended AS2 transport communication guidelines available on GS1 official website. Weak keys are likely to be compromised as demonstrated in[38]. • Protect against MiTM attacks through DNS poisoning by enabling DNSSEC[39].
Denial of Service	Denying service to legitimate users by launching Application layer DoS attacks targeting AS2 protocol such as flooding of authentication requests to the AS2 servers.	• Prevent HTTP/S flooding attacks by incorporating techniques such as traffic profiling, computational challenges, firewall, and constant monitoring of threats[40].
Elevation of privileges	Gaining unprivileged access to the AS2 servers by sending malicious AS2 payload (e.g. malware infected Excel files, or XML payloads).	• Check for malicious payloads such as XML injects attacks as mentioned in[41].

1.6.4 ONS

Threat	Threat Description	Potential Mitigation
Spoofing **Tampering**	• Spoofing identity of legitimate ONS servers to redirect clients to malicious web address. • Corrupting ONS data by poisoning the cache to point or return incorrect query response. • Tampering DNS NAPTR records to point to malicious services.	Enable authentication and signing the DNS requests using DNSSEC that can protect the integrity of DNS queries. In addition, blockchain technology such as BlockONS can be used to prevent tampering attacks[42].
Repudiation	Denying malicious actions due to lack of logging or tampering with logs.	Enable extensive logging of ONS requests to prevent repudiation attacks.
Information Disclosure	Leaking service details by reading insecure DNS queries.	Cryptographic techniques to prevent leaking of information through DNS queries can be applied[43].
Denial of Service	Flooding servers or launch DNS amplification attacks on ONS server44.	Increase the redundancy of DNS hosting servers to prevent availability issues. Also, DNS query monitoring techniques can be used to detect malicious ONS request.
Elevation of privileges	Gaining unprivileged access to ONS servers and launch attacks to modify the ONS data.	Strong authorisation mechanisms must be used on the DNS servers to prevent escalation of privileges.

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[44] link.springer.com

1.7 Application Layer

The application layer is the uppermost layer in the data flow architecture where end-user applications access traceability data to perform various tasks. Traceability data is accessed by various end-user applications such as Enterprise Resource Planning (ERP) tools, Supply Chain Management (SCM), audit applications, consumer applications, monitoring and analytics tools[45,46]. These applications accessing traceability data can be broadly categorised into business to business (B2B), business to government (B2G) and business to customer (B2C)[47]. Due to complex interrelationship between food producers, supply chains, consumers, financial institutions and government organisations, weakness, or vulnerabilities in any one domain can lead to cyber security risks to the entire food traceability system[48].

	Assets	Descriptions
B2B	**ERP, SCM**	Various ERP systems of manufactures to supply chain traders access traceability data for inventory management, order management, shipping, transportation, and financial transactions related to food products[49]. SCM systems are used to manage the flow of products from source to destination[50].
	Traceability/ Supply chain Analytics	Such applications are used in the supply chain industry to use traceability data for conducting exploratory analysis.
	Audit Applications	These applications are primarily used for ascertaining the compliance of traceability standards and regulations.
B2C	**Consumer Application**	These applications enable consumers to access the information related to the products they purchase in terms of the origins for food products.

1.8 Security Requirement and Threat Mitigation Techniques for Application Layer

1.8.1 B2B Applications

Threat	Threat Description	Potential Mitigation
Spoofing	Accessing ERP/SCM systems using compromised credentials.	• Protect ERM/SCM systems with strong authentication mechanisms such as 2FA (2 Factor Authentication) [51].
Tampering	Tampering data in ERP/SCM systems or launch an insider attacker to alter sensitive data. ERP/SCM applications can also be impacted by malwares.	• Enable anti-virus/malware protection to alleviate chances of any tampering to B2B applications. • Allow only authorized individuals to modify the traceability data.
Repudiation	Denying malicious actions by deleting logs and associated traces.	Enable secure logging of all operations.
Information Disclosure	Disclosing sensitive information by exploiting weak authentication mechanisms in ERP systems. An ERP/SCM system impacted with malware can leak sensitive product and pricing information.	• Protect all communication with encryption to alleviate chances of any unauthorized access to data. • Enable robust authentication and enable fine-grained access control. • Use privacy preserving techniques such as differential privacy for protecting personal data if any.
Denial of Service	• Disrupting ERP/SCM services by using ransomwares. • Exploiting vulnerabilities in the ERP/ SCM software to disable the software.	• Train staff on ransomware and how they impact system [52]. • Scan systems regularly with state-of-the- art anti-virus software.
Elevation of privileges	• Gaining unprivileged access to ERP/ SCM system by exploiting weak access control mechanisms in ERP/SCM systems. • Gaining unprivileged access to ERP/ SCM system by deploying viruses in ERP/SCM systems. • Exploiting known software vulnerabilities to launch different attacks.	• Enable fine grained access control. • Protect against virus/malwares. • Update software as soon as they are made available to patch any known security vulnerabilities.

1.8.2 B2C Applications

Threat	Threat Description	Potential Mitigation
Spoofing	Accessing traceability data using stolen client credentials or forged client identities.	• Enable multi-factor authentication to protect against any potential subversion of first factor of authentication.
Tampering	Tampering client and backend consumer facing applications or traceability data (e.g., Leaving a backdoor or inserting a malware)	• Allow only authorized individuals to modify traceability data. • Protect against malware.
Repudiation	Denying malicious actions due to insufficient logging capabilities or adversary's ability to delete logs on client applications and the backend servers.	• Enable secure logging of all operations.
Information Disclosure	Revealing sensitive information by targeting insecure communication channel between client applications and the backend servers.	• Encrypt communication with backend server.
Denial of Service	Denying service to legitimate clients by spamming or by sending unnecessary requests to the backend servers causing heavy resource utilisation.	• Incorporate a reliable DoS detection and mitigation solution as indicate in [53].
Elevation of privileges	Compromising client applications or backend servers to launch cyber-attacks on other connected applications and services.	• Update client application and server software regularly to fix any know security vulnerabilities. • Regularly scan system for virus/malware

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[53] phoenixnap.com

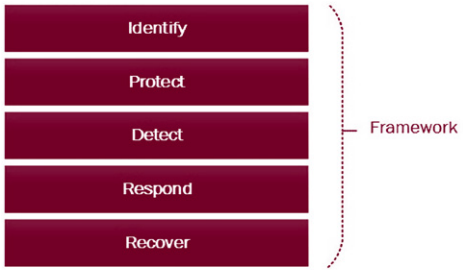
Best Practices for Managing Cyber Risks in Supply Chains

Managing cyber security risks in a supply chain system which involves various stakeholders and those that span multiple countries with different regulations is a challenging task. Nevertheless, risk can be effectively managed by following industry best practices that can be used by organizations to better plan, prepare and act during cyber security incidents. The best practices presented in this section are provided as a guide for supply chain stakeholders to plan their security strategies and aid their preparation in securing the traceability systems.

Research conducted in [54] suggests several best practices for managing cyber risks in supply chains. To pinpoint the best practices for managing cyber risks in supply chains, authors interviewed 30 senior executives who manage the complex global supply chain and several solution providers in supply chain. The suggested best practices include the following.

- **Catalogue and Map Process** – Cataloging the cyber inventory may be considered as a first step towards understanding cyber risks. Mapping of supply chain (i.e., cataloging hardware and software) nodes gives visibility into people and processes that leverage IT systems and current defense mechanisms (e.g., firewall). This knowledge can help in devising effective risk protection mechanism. Organizations should first identify all the assets or use the assets described under each traceability architecture layer that needs to be secured from cyber threats. Consequently, the mitigation steps provided for each identified threat should be considered when securing the supply chain network.
- **Clear Cyber Strategy** – An effective and clear cyber risk management strategy should be in place to counter any threats. For example, one of the possible approaches that may serve as a basis for developing comprehensive cyber strategy is the NIST Framework shown below. Identify in below figure refers to the organizational understanding of potential cyber threats to different systems, assets, data, and capabilities. Protect refers to organizational approach to defend against different perceived threats. Detect refers to organizational ability to identify the occurrence of any cyber incident. Respond refers to a set mechanism in place to act against a particular cyber incident. Recover refers to the mechanism that may help in resuming the services and capabilities impacted by a particular cyber incident.
- **Identify Critical Systems** – As a part of cyber risk management, organizations may identify the critical systems that hold important business data and place a robust mechanism to protect such systems. Aggressive cyber risk management strategy for such systems may be incorporated. For example, this may include, unplugging such system from the Internet, have qualified personnel to manage those systems, incorporate multi-factor authentication, and mandate software updates immediately when they are available.

- **End-to-End Integration** – Instead of treating cyber strategy as an isolated operation within the four walls of an organization, it must be extended to end-to-end supply chain by collaborating with trade partners (thorough strategic principles such as collaboration, integration, and synchronization).
- **State-of-the-art Defense Systems** – Organizations must adopt the latest defense mechanisms such as firewalls, endpoint security, and IDS. Ensure that software is updated regularly to patch any known vulnerability that can lead to data breaches, critical systems are installed with latest anti-virus/anti-malware and updated regularly to protect against virus/malware[55], and Incorporate IDS for detecting any potential cyber-attacks.
- **Wise Use of Contemporary Technologies** – Businesses now-a-days are heavily reliant upon artificial intelligence and machine learning for analyzing the enormous amount of data to provide insights to the business leaders. Similarly, they are often used within the cyber strategy – e.g., in intrusion detection system. However, these technologies open a whole new vector of cyber threats, that may be considered and mitigated accordingly.
- **Continuous Training and Awareness** – Often, a misconception in organizations is that the cyber incidents are the responsibilities of IT people. However, this is not the case, as effective strategy needs awareness amongst the entire workforces. Ongoing training on regular basis must be conducted to effectively prepare against the potential cyber-attacks. The trainings and awareness can also prove to be pivotal against the insider misuses. For example, not all cyber risks come from cyber attackers. Often, they are associated with personnel within the company's supply chain, with no adversarial motives. For example, an accidental sharing of sensitive business information with someone can lead to sophisticated social engineering or phishing attacks. Appropriate employee training and awareness can help mitigating such insider misuses.



- **Cybersecurity Information Sharing:** Most supply chains partners are SMEs which are often targeted due to their weaker cyber security posture, making them a weak link in the supply chain system[56]. One of the means to mitigate cyber security risks in a heterogenous supply chain IT systems is by sharing information and intelligence related to cybersecurity threats the organizations face[57]. This information sharing can be done directly between trading partners or using a trusted third-party.
- **Manage security of IoT devices and CPS systems:** As automated supply chains heavily rely on IoT devices and CPS systems; it is essential that organizations have effective strategies to manage and establish security policies to safeguard devices and the data stored in them. As traditional security tools cannot be implemented on constrained devices, it is essential to use IoT specific measures that can play a critical role in securing the access and communication to these devices, such as light-weight authentication protocols[58] and encryption schemes suited to IoT devices [59]. Physical security of all the devices used within the supply chains is also an important aspect that needs to be considered.
- **Security Compliance:** In a supply chain, trading partners should ensure that they and their peers are security compliant to established standards such as NIST, ISO27001, PCI, or HIPPA etc. This can be leveraged by organizations to create a strong security posture and increases trust among the trading partners.
- **Incident response:** An incident response plan should be developed by supply chain organizations to create an action plan in the event of cyber security breach. This allows supply chain trading partners to quickly resolve cyber security issues and restore normalcy in the supply chains.
- **Insider Threats:** Immediately terminate the system access to any employee leaving the organization under any circumstances[60] (e.g., fired). A disgruntled employee with access to company resources can pose serious threats to the business.
- **Data Back up**: Back up your data regularly as in case of a cyber-incidents erasing all the data from the systems may be needed [61].

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Best Practices for Ensuring Privacy of Shared Data

When analyzing the data sharing layer, we highlighted various threats and mitigation strategies that were worth considering. Certainly, with multi-party supply chains data is shared with many trading partners, raising data confidentiality and privacy concerns[62] with implications on the business confidentiality agreement[63]. In view of this, companies must not only emphasize on what information can be shared and with whom it can be shared, but they also need to ensure that their own confidential data and the data shared by other trade partners remains secure. To ensure this the following recommendations can be helpful:

- **Data Protection:** Always encrypt data be it in rest or in transit64. Especially the use of Secure Multi- Party Computation (MPC) is recommended for securing data between several trading partners [65]. This necessitates that all the trading partners update their security mechanisms and adopt the same security standards as their counterparts.
- **Anonymization:** Incorporate privacy-preserving publication techniques, such as k-anonymity and differential privacy, when making personal information available to stakeholders or to the public. In this case it is paramount important to test and evaluate the inherent utility vs privacy trade-off resulting from the application of these techniques.
- **Multi-party secure computation:** Consider multi-party secure computation protocols tailored to supply chain data-sharing needs, combining inputs by different entities in a privacy-preserving manner.
- **Identity Establishment Prior to Data Access:** Enable multi-factor authentication on systems that hold important data. In addition, make sure that the system access of an employee leaving the organization is terminated immediately to alleviate the data breach threats posed by the disgruntled employee[66]. Furthermore, consider using continuous authentication for enabling the periodic identity establishment beyond the entry-points.
- **Data Release:** Ensure fine-grained role-based and time-bound access control [67,68] such that unauthorized individuals cannot access important confidential data.
- **Principle of least privilege:** Enforce the principle of least privilege on traceability system models, ensuring that traceability and provenance data are accessible to authorised parties only.
- **Decentralization:** De-centralized data sharing techniques such as blockchains provide a secure network to share data with added security of immutability, resilience to cryptographic attacks and updated only with peer consensus[69]. The use of such technologies can allow supply chain partners to share data related to traceability in a transparent way.
- **Data Cleanrooms:** Sharing sensitive product information among peers for demonstrating the competitive advantage over others is a challenging task. Solutions such as data cleanrooms and digital marketplaces have been suggested as means to securely share such sensitive information[70 71]. These methods can enhance the quality of the shared data and introduce transparency among the supply chain peers which are essential for competitive intelligence. An example of digital cleanroom was setup by A.T. Kearney for a fast-food chain where the sensitive information was shared among the trading partners, allowing them to optimise their supply chains[72].
- **Audit:** Always log the requests made to access critical data and conduct regular audit on those logs.
- **Secure Data Storage:** Store critical data on secure locations with proper protections (i.e., authentication and access control). Destroy any data that is not used anymore and maintain its record.
- **Avoid Credentials Sharing:** Ensure that employees are not sharing login credentials for accessing important resources.
- **System Security Settings:** Allow only authorized individuals to change approved security settings on critical systems [73].
- **Unauthorized Data Sharing:** Ensure that data is not being shared with unauthorized persons.
- **Protection of Work Areas:** Ensure that work area in only accessible to authorized individuals.
- **Report Cyber Incidents:** Immediately report any cyber incidents to all involved trade partners so that any corrective measures can be taken to avoid any subsequent damages.

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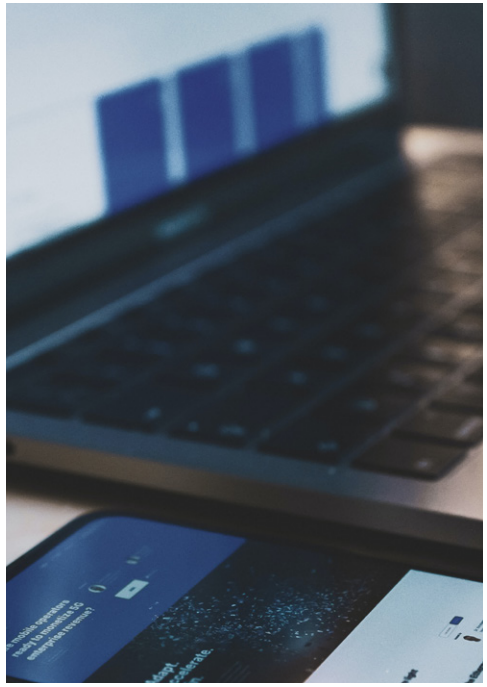
[72] www.smartdatacollective.com
[73] www.pmc.gov.au



Application of GS1 global data standards for Red Meat Traceability

The following section provides details on both the definition of the GS1 Standards referenced in each module of the Red Meat supply chain and the application and use of the standards.

Adoption of global data standards enables data sharing between businesses through using common formats. These formats allow a business to identify participants, locations, products, processes and events in the supply chain.

Foundational Elements

Location Identification

The unique identification of locations is a critical component of traceability systems and is used to identify where specific transactions and events have occurred.

The Global Location Number (GLN) is the globally unique GS1 Identification Number for locations and supply chain partners. The GLN can be linked to existing location identifiers commonly used in the Red Meat supply chain such as Property Identification Codes (PIC).

The GLN can be used to identify a functional entity (e.g. accounts receivable or a bill back department), a physical entity (e.g. a manufacturing plant, a distributor's loading dock, or a finished goods location), or a legal entity (e.g. a parent corporation or subsidiary). The attributes defined for each GLN [e.g., name, address, location type (e.g., ship to, bill to, deliver to, etc.)] help users to assure that each GLN is specific to one unique location across the world.

Product Identification

The Global Trade Identification Number (GTIN) can be used to identify trade items (loose or pre- packed), input materials, outputs, at any stage of the supply chain up to the end consumer.

Most trade items have a trading partner (processor) allocated GTIN (Global Trade Item Number). Where the trading partner has multiple processing facilities the same GTIN is often used for the same product, irrespective of the processing facility. To ensure traceability is maintained to the specific processing facilities the trading partner utilises Application Identifiers with the GTIN to maintain traceability back to the respective processing facility.

Where product is being packed for a specific third party such as a product brand owner, the product brand owner may allocate the GTIN to be used. This is likely to include utilising Application Identifiers with the GTIN to maintain traceability back to the respective processing facility. This is used to differentiate which processing facility the brand owner has used.

If a trading partner further processes and packages a product in the supply chain, such as the case with store-processed product, then that trading partner becomes the manufacturer and is responsible for assigning a GTIN or item reference and traceability attributes. This may be achieved by using a combination of human readable and scannable product information. This information should also be stored for future retrieval, if necessary.

It should be noted that governments and national trading partners may require additional business information to appear on the trade item labels and it is recommended that trading partners work closely with local regulatory authorities to ensure compliance.

A separate GTIN must be assigned to every different variation of a product. Size, style, grade, colour, quantity etc are all considered separate variations and thus require separate GTINs. Each level of packaging should be numbered (and barcoded) separately to all other levels.

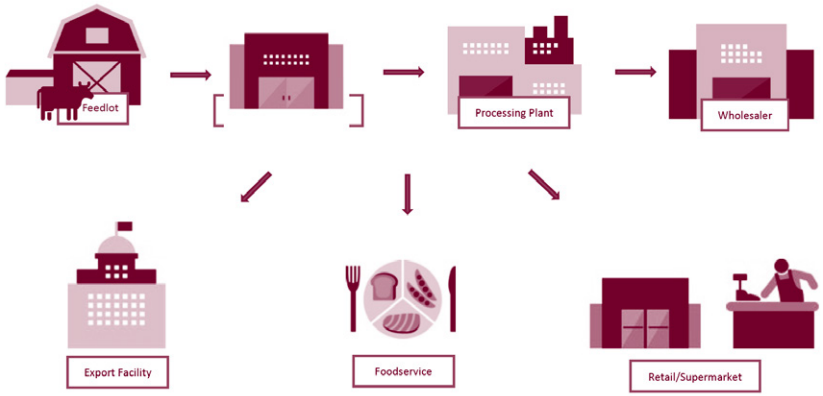


Figure 1: Examples of GLN application in the red meat supply chain

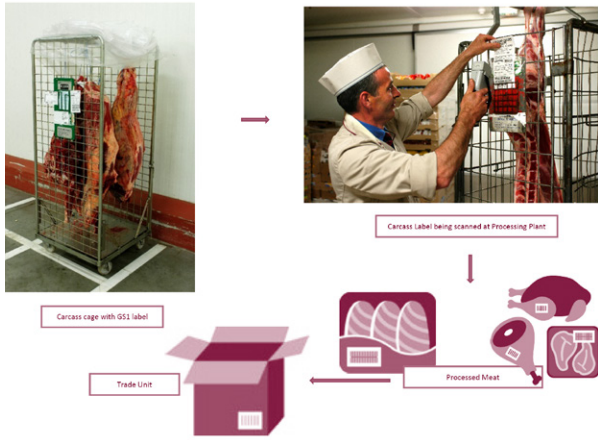


Figure 2: Examples of GTIN application

Variable Measure Trade Items Not Scanned in General Retail at Point-of-Sale (Carton/Case Labelling)

Trade items in the meat and poultry industry are often variable measure because the production process results in a wide range of weights for the same product or because the products are created to meet a special order that states a specific quantity or weight.

Domestic and importing country regulations, as well as specific market regulations, may specify certain human readable date and other information to be printed on labels. These requirements override any GS1 specified requirements detailed in this document.

The barcode symbology used in the meat industry for variable measure trade items not scanned at Point-of-sale carton/case labels is GS1-128. The GS1-128 barcode allows secondary attribute information over and above primary global trade item identification to be represented in the barcode.

The barcode symbology can also represent attribute information such as batch or lot numbers, serial numbers, expiry dates and weight in a standard format. This ensures that the attribute information encoded by one trading partner can also be scanned and interpreted by any other trading partner in the supply chain.

Additional country, market or customer requirements may be applicable in certain circumstances. Contact the applicable representatives in those markets to determine the current requirements.

Variable Measure Trade Items Scanned in General Retail at POS

Variable measure trade items that are scanned at Point-of-sale have two main GS1 applications that are available. In some instances, due to trading partners (e.g. Retailer) requirements both options may be applied to the one variable measure fresh food trade item. Before implementation of any GS1 applications for variable measure trade items that are scanned at Point-of-sale mutual agreement should be obtained between the trading partners.

The two main GS1 applications for variable measure fresh food trade items are:

- Variable Measure Fresh Food Trade Items using a GTIN and additional attributes encoded with GS1 DataBar Expanded or Expanded Stacked.
- Variable Measure Trade Items using a Restricted Circulation Number (RCN) encoded with the EAN/UPC symbology family.

Trading partners should ensure that retailer labelling requirements are known and understood when following this guideline. Where a retailer specified requirement contradicts this guideline the retailer requirement should be followed.

Attributes of Trade Items

Attribute information of trade items is any data over and above the item identifier, i.e. the GTIN.

Examples of this type of information include batch numbers, production, use by and best before dates and variable measure information such as length, weight etc.

Attribute information is represented by GS1 Application Identifiers (AIs) and these ensure that the attribute information can be interpreted unambiguously by trading partners throughout the entire supply chain.

In order to enable cost-effective adoption by food processes and manufacturers, we recommend the use of attribute data to provide traceability of product from the supplier into the manufacturing plant, providing visibility and faster and more efficient recalls and food safety.

Suppliers, at their discretion, can also apply to trade items, any of the AIs available to them under the GS1 specifications. When using GS1-128 barcodes for raw materials and ingredients to the food processing and manufacturing it is recommended that the following information should be encoded in the barcode on every level of packaging:

1. Item Identifier [Global Trade Item Number (GTIN)]
2. Date (Production, Packaging, Expiration or Best Before)
3. Production Information (Batch/Lot Number or Serial Number)

Batch/lot and serial identification

The minimum requirements for traceability rely upon a combination of the GTIN and batch/lot number and/or serial number.

Note: If both the batch/lot number and serial number are present, as sometimes happens, the batch/lot number takes precedence in case of a recall.

For more information regarding the use of AIs, please refer to the GS1 General Specifications: www.gs1.org

Note: Regarding Trade Item Attribute information:

- Attribute information cannot stand-alone; it must always be accompanied by a GTIN
- Attribute information must be encoded in a GS1-128 barcode/ EPC enabled RFID tag / GS1 2Dimensional Symbol.
- If an AI appears on the same item more than once (e.g. if two labels are applied to the same item) the AI must be followed by the same information on each label.

Logistics Units (SSCC)

The Serial Shipping Container Code can be used by companies to identify a logistic unit, which can be any combination of trade items packaged together for storage and/ or transport purposes, for example a case, pallet or parcel.

The SSCC is a crucial key for traceability as it uniquely identifies each distributed logistic unit and its content.

- The SSCC enables companies to track each logistic unit for efficient order and transport management.
- The SSCC can be encoded in a barcode or EPC/RFID tag, ensuring the logistic unit can be accurately and easily identified as it travels between trading partners, anywhere in the world.
- When SSCC data is shared electronically via EDI or EPCIS, this enables companies to share information about the status of logistic units in transit, and reliably link it to related transport information such as shipment details.
- The SSCC enables companies to link to additional information about the logistic unit. This information can be communicated via a Despatch Advice or Advanced Shipping Notice (ASN) prior to the logistic unit's arrival. Upon receipt the SSCC will be scanned, providing the required information to speed up the receipt of goods as well as the subsequent invoicing process.

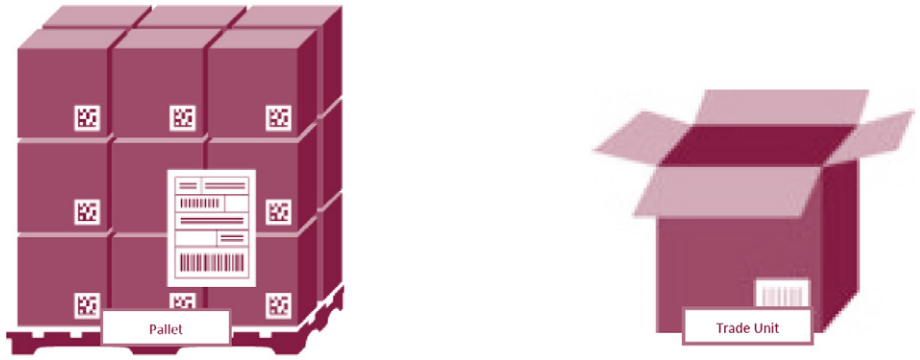


Figure 3: Example of SSCC label

Global Identification Number for Consignment (GINC)

The Global Identification Number for Consignment can be used by companies to identify a consignment comprised of one or more logistic units that are intended to be transported together

Logistic units in a particular shipment may be associated with different GINCs during various transport stages; for example, when the shipment gets consolidated with other shipments during its journey, and deconsolidated again before it reaches the consignee. The GINC allows freight forwarders and transport providers to keep track of the logistic units being transported together.

- The GINC is typically used by freight forwarders to instruct transport providers; for example, on a Master Airway Bill (MAWB) or a Master Bill of Lading (MBL).
- The GINC can be encoded in a barcode or as text on a MAWB / MBL, or in addition to the Serial Shipping Container Code (SSCC), on a logistics label.
- The GINC can be electronically used in transport instruction and transport status messages between freight forwarder and transport provider.

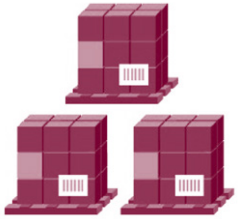


Figure 4: Example of GINC application

Global Shipment Identification Number (GSIN)

The Global Shipment Identification Number (GSIN) is a number assigned by a seller and shipper of goods to identify a shipment comprised of one or more logistic units that are intended to be delivered together.

The logistic units keep the same GSIN during all transport stages, from origin to final destination. The GSIN identifies the logical grouping of one or several logistic units, each identified with a separate Serial Shipping Container Code (SSCC).

- The GSIN can be encoded by the shipper in a barcode or as text on a House Waybill, or in addition to the SSCC, on a logistics label.
- The GSIN can be electronically used by a company in transport instruction and transport status messages between freight forwarder and transport provider, and also as a reference in the Despatch Advice.

the GSIN is fully compatible with ISO/IEC 15459 – Part 8: Grouping of transport units. the GSIN also meets the requirements for a Unique Consignment Reference (UCR) according to the world customs organisation.

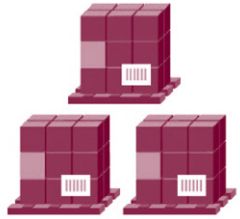


Figure 5: Example of GSIN application

Asset Numbering

The GS1 System provides a method for the identification of assets. The object of asset identification is to identify a physical entity as an inventory item.

Asset Identifiers may be used for simple applications, such as the location and use of a given fixed asset (e.g. a personal computer), or for complex applications such as recording the characteristics of a returnable asset (e.g. a Intermediate Bulk Container), its movements, its life-cycle history and any relevant data for accounting purposes.

GS1 System asset identifiers can be used to identify any fixed assets of a Company. It is left to the discretion of the issuer to determine whether the Global Returnable Asset Identifier (GRAI), AI (8003), or Global Individual Asset Identifier (GIAI), AI (8004), is more suitable for the application concerned. Asset identifiers must not be used for any other purpose and must remain unique for a period well beyond the lifetime of the relevant records.

Global Returnable Asset Identifier (GRAI) – AI (8003)

A Returnable asset is a reusable package or transport equipment of a certain value, such as a beer keg, a gas cylinder, a plastic pallet, or a crate. The GS1 System identification of a returnable asset, the Global Returnable Asset Identifier (GRAI), enables tracking as well as recording of all relevant data.

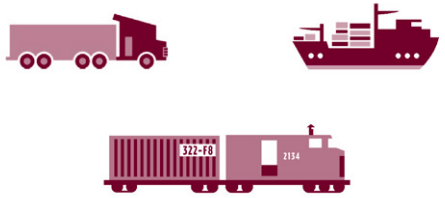
A typical application using a GRAI is in tracking returnable beer kegs. The owner of the beer keg applies a barcode carrying a GRAI to the keg using a permanent marking technique.

This barcode is scanned whenever the keg is supplied full to a customer and scanned again when it is returned. This scanning operation allows the beer keg owner to automatically capture the life-cycle history of a given keg and to operate a deposit system if desired.

Global Individual Asset Identifiers (GIAI) – AI (8004)

An individual asset is considered a physical entity made up of any characteristics. The Global Individual Asset Identifier (GIAI) identifies a physical entity as an asset. It must not be used for other purposes and must be unique for a period well beyond the lifetime of the relevant asset records.

Whether the assigned GIAI may remain with the physical item when changing hands depends on the business application. If it remains with the physical item, then it must never be re-used. This element string might, for example, be used to record the life-cycle history of a wine vat or barrel. By symbol marking the GIAI, using AI (8004), on a given vat, or barrel, wine manufacturers are able to automatically update their inventory database and track assets from acquisition until retirement.



GS1 Application Identifiers relating to meat:

(For a full list of GS1 Application Identifiers visit www.gs1.org)

All GS1 Application Identifiers indicated with (FNC1) are defined as of variable length and shall be delimited unless this Element String is the last one to be encoded in the symbol.

AI	Data Content	Format	FNC1 Required
00	SSCC (Serial Shipping Container Code	N2+N18	
01	GTIN (Global Trade Item Number)	N2+N14	
02	GTIN of the Contained Trade Items	N2+N14	
10	Batch or Lot Number	N2+X..20	(FNC1)
11 (**)	Production Date (YYMMDD)	N2+N6	
13 (**)	Packaging Date (YYMMDD)	N2+26	
15 (**)	Best Before Date (YYMMDD)	N2+N6	
17 (**)	Expiration Date (YYMMDD)	N2+N6	
21	Serial Number	N2+X..20	(FNC1)
251	Reference to Source Entity	N3+X..30	(FNC1)
254	GLN extension component	N3+X..20	(FNC1)
30	Count of items (variable measure trade items)	N2+N..8	(FNC1)
310 (***)	Net weight, kilograms (variable measure trade items)	N4+N6	
320 (***)	Net weight, pounds (variable measure trade items)	N4+N6	
330 (***)	Logistic weight, kilograms	N4+N6	
37	Count of Trade Items	N2+N..8	(FNC1)
410	Ship to – deliver to global location number	N3+N13	
411	Bill to – invoice to global location number	N3+N13	
412	Purchased from global location number	N3+N13	
413	Ship for – deliver for – forward to global location number	N3+N13	
414	Identification of a physical location – global location number	N3+N13	

Figure 6: Global individual asset identifiers

AI	Data Content	Format	FNC1 Required
415	Global location number of the invoicing party	N3+N13	
422	Country of origin of a trade item	N3+N3	(FNC1)
423	Country of initial processing	N3+N3+N..12	(FNC1)
425	Country of processing	N3+N3	(FNC1)
426	Country of disassembly	N3+N3	(FNC1)
7002	UN/ECE Meat Carcases and Cuts Classification	N4+X..30	(FNC1)
7003	Expiration Date and Time	N4+N10	(FNC1)
7006	First Freeze Date	N4+N6	(FNC1)
7007	Harvest Date (for meat this can the date of Slaughtering)	N4+N6..12	(FNC1)

(**): If only year and month are available, DD must be filled with two zeroes.

(***): The fourth digit of this GS1 Application Identifier indicates the implied decimal point position. Example:

- 3100 Net weight in kg without a decimal point
- 3102 Net weight in kg with two decimal points

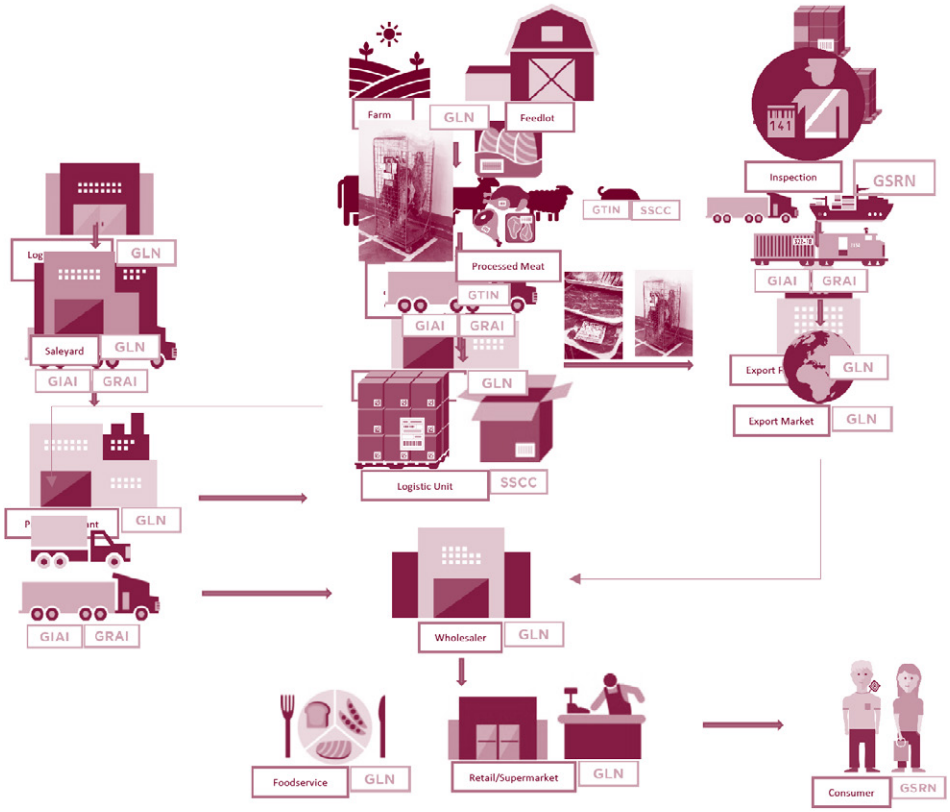


Figure 7: Traceable Objects and Parties

Summary of Data Standards Applicable in the Red Meat Supply Chain

Data standards that apply to key data elements and shared information are identified in this section.

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Location	Feedlot location Field location Location of the whole property Individual Paddocks Location Supplier Identification (Water treatment, Chemical treatment, Feed), Meat Processor Slaughterhouse identification Packaging supplier Meat Storage Facility Dispatch Dock Logistic Service Provider Identification	Global Location Number (GLN)	**N13**	Further information on Global Location Numbers (GLN), their structure, use, creation can be found here: www.gs1.org
Date/Time/ TimeZone	Date of registration Date of slaughter/processing Date/time to record livestock birth, death & disposal Water receipt/treatment date/ or time Chemical receipt and application date/ or time Use By date Best Before Date Expiry Date Pack Date	Year/Month/ Day e.g. 20210101 Date plus Time plus Timezone: 2011-11- 06T12:43+09 :00	**YYMMDD (date only)**	Whilst human readable date formats can vary e.g., 21 December 2020, December 21, 2020, the structure of the date format to be encoded into systems and barcodes requires a consistent approach. The globally adopted standard for date recording is YYMMDD

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Product Identifiers	**Input materials such as:** Chemicals Fertilisers Feed Animal stock Packaging **Outputs such as:** Animal Carcass Processed product Finished product	Global Trade Item Number (GTIN)	**N14**	Unique product identification of all traceable objects is a foundational element of any traceability system. Information on how to allocate a GTIN: www.gs1.org Information on when to change a GTIN: www.gs1.org Information on how to allocate a GTIN to a variable weight or variable measure trade item: www.gs1au.org (for VM non-retail items) and www.gs1au.org (for VM retail POS items)
Traceability Attributes	Batch/Lot code Serial Number Production Date Pack Date Freeze Date Country of processing (Refer to table below detailing full list of Application Identifiers applicable to the meat sector)		**AN20**	Traceability Attributes, such as Batch or Lot Number or Serial Number etc. can be encoded into barcodes along with the Global Trade Item number enabling capture information along the supply chain. Also referred to as Application Identifiers, each has its own unique identifier and format. List of Application Identifiers: www.gs1au.org

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Logistics Units	Pallet of Finished Goods Crate or Box of finished Goods	Serial Shipping Container Code (SSCC)	**N18**	Logistic unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. Logistic units take many forms, a single box containing a limited number of products, a pallet of multiple products, or an intermodal container containing multiple pallets. www.gs1au.org
Shipment	Grouping of logistics units	Global Shipment Identification Number (GSIN)	**N17**	The Global Shipment Identification Number (GSIN) is a number assigned by a seller and shipper of goods to identify a shipment comprised of one or more logistic units that are intended to be delivered together. www.gs1.org
Consignment	Grouping of logistics units assigned by the transport company	Global Identification for Consignment (GINC)	**N30**	The Global Identification Number for Consignment can be used by companies to identify a consignment comprised of one or more logistic units that are intended to be transported together. www.gs1.org
Weights & Measures	Variable count of items. Count of items on a logistics unit. Total weight of pallet in NET Kilos. Total Length of goods delivered in Metres. Total volume of goods delivered in Cubic Metres	Must be accompanied with a GTIN	**Varying**	Variable measure trade items use GS1 Application Identifier data fields that contains the quantity or dimension of a variable measure trade item. It also denotes the unit of measure. These element strings are used to complete the identification of a variable measure trade item. They contain information such as the weight, size, volume, or dimension of a variable measure trade item Section 3.6www.gs1.org

Data Element	Examples	Valid Values	Data Type/ Format	Further information
Assets	Returnable assets (GRAI): e.g. IBC or Individual assets (GIAI): e.g. A crate	Global Returnable Asset Identifier (GRAI) Global Individual Asset Identifier (GIAI)	**N13**	Can be identified as an asset type only or an optional serial number can be added to distinguish individual assets www.gs1au.org
Service provider and recipient relationships	Feedlot Operator, Meat Processor, Storage Operator, Packing Staff, Driver ID	Global Service Relation Number (GSRN)		Service providers and service clients can be individuals or businesses. The GSRN can identify either a recipient or a provider of the organisation's services, and often both roles need to be captured or recorded simultaneously. www.gs1.org
Document Identifiers	Meat Processor License Number, Vehicle Maintenance Certificate Vehicle Inspection Certificate Driver Animal Welfare Certificate	Global Document Type Identifier (GDTI)		Can be encoded in a barcode or printed directly on the document. Companies can use the GDTI as a method of identification and registration of documents and related events. www.gs1.org

How to capture the KDEs

The following section details how information is to be collected via the use of barcodes and/or other identification methods e.g. EPC/RFID.

The use of barcodes and scanners to capture key data elements for each defined Critical Tracking Event greatly enhances data quality and speed of data capture.

Marking/barcoding traceable objects

Traceable objects —and in some cases also parties, locations, transactions and documents— will need to be physically identified to enable traceability. Physical marking is usually in the form of a barcode or in the case of cattle, an EPC/RFID ear tag.

Traceability systems can use GS1-approved barcode symbologies and EPC/RFID tags to encode GS1 identification keys that uniquely identify products, trade items, logistic units, locations, assets, and service relations worldwide. Additional information such as best-before-dates, serial numbers, and lot numbers may also be encoded into barcodes or EPC/RFID.

Other carrier-based technologies (such as digital watermarks) and carrier-less technologies (such as image recognition) may also play a role depending on the environment and nature of information that is required to be captured as part of a Critical Tracking Event.

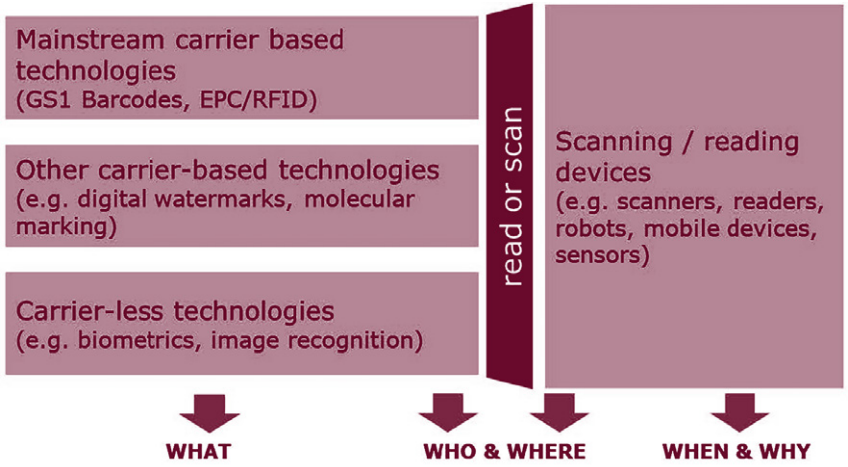


Figure 8: Data Capture technologies used to capture the KDEs

In addition to the data that is captured when scanning barcodes, data provided by the equipment used to scan or read the data —such as date & time, read-point and user (operator)— will be important in determining the Who completed the data capture, Where the data capture took place, When and Why e.g. receipting transaction, picking.

Barcodes

Barcodes are symbols that can be scanned electronically using laser or camera-based systems. GS1 refers to barcodes as data carriers.

The marking of traceable objects is driven by the level of identification. Batch/lot-level or serialised identification are dynamic data and therefore need to be printed on-demand at the time the traceable item needs to be identified and the label is applied.

GS1 manages several types of barcodes. Each is designed for use in a different situation.

Figure 9: GS1 Data Carriers

Besides the batch/lot ID and/or serial ID these may also include the pack date, best before date, weights, etc. The proper linkage of the barcode, the related data and the produced instances of the trade item, is a key aspect.

Figure 10: GS1-128 Barcode capturing GTIN, Use By Date and batch/Lot number.

Figure 11: GS1-128 Barcode capturing GTIN, production date and batch/Lot number.

Figure 12: GS1-128 Barcode capturing variable weight GTIN, use of application identifiers (AIs) net weight in kilograms, packaging date and serial number date.

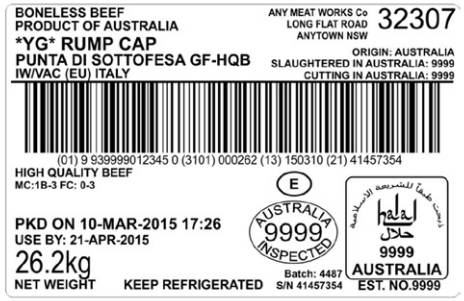


Figure 13: Trade item beef carton/Case label example

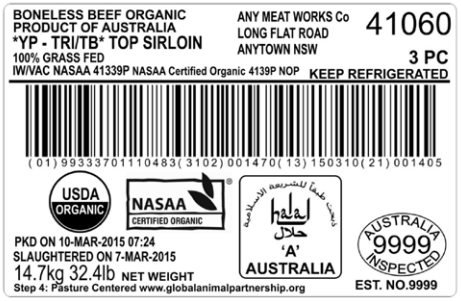


Figure 14: Trade item beef carton/Case label example

Figure 15: Trade item beef carton/case label example

For logistic units the barcodes have always been based on the SSCC, which is a serialised identifier. This means that logistics labels will be printed when the goods are packaged, and that the link between data and label will be secured that way.

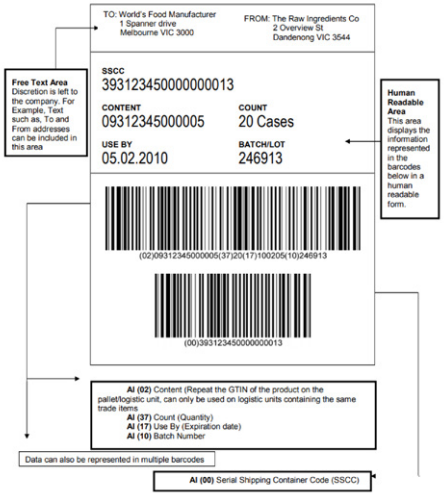


Figure 16: GS1 Logistics Label for homogenous pallet

Figure 17: GS1 Logistics Label homogenous logistics unit containing variable weight products.

Assets

Assets can be identified as either returnable assets or internal assets. Returnable assets are typically those that travel through the supply chain containing products e.g. crates, pallets. Internal assets, such as farming equipment, computers are classified as internal assets.

When identifying returnable assets, the Application Identifier 8003 should be used.

(8004)9312345000000001

Figure 18: Global Returnable Asset Identifier, AI (8003), represented in a GS1-128 Barcode.

When identifying internal assets, the Application Identifier 8004 should be used.

(8003) 093123450012480001

Figure 19: Global Individual Asset Identifier, AI (8004), represented in a GS1-128 Barcode.

How to capture data/events

An important principle is the separation of data content from the way the data is exchanged (the communication method).

Best practices for maintaining traceability is to capture 'all agreed to traceable information' and store it within their systems by scanning the information directly from the trade item / case / input barcodes.

Scanning enables data to be captured, stored, and retrieved without the need to visually review the human readable information and manually key that information into systems. This typically involves the use of a scanning device, usually a barcode scanner.

Product can be scanned for Critical Tracking Events e.g. as it enters the packhouse; as it is shipped out of the packhouse; as it is received at a processing facility or abattoir or as it is opened for further processing.

More and more suppliers, processors, distributors and wholesalers are putting processes in place to collect and store at least the minimum product information required to support traceability.

When it comes to capturing the data, the main questions are:

1. Which process steps need to be captured?
2. What is the most cost-effective way to capture the data?

Usually the first step will be scanning of inputs, livestock etc upon receipt. Where barcodes are present, this usually done using handheld devices or fixed mount scanners. For EPC/RFID tags both handheld and fixed readers can be used.

Other process steps where data will be captured are harvesting, storing, picking, packing, shipping, transporting, selling. Often a combination of fixed mounted scanners or readers and handheld devices will be applied to capture the critical tracking events.

The emergence of mobile devices deserves a special mention here, since it increases the availability of scanning capability (making scanning as pervasive as the barcode) and so may make it feasible to record additional events at limited additional cost.

Figure 20: range of scanners that read liner, 2D and RFID tags

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