

Learning from Australia's Traceability and Meat Standards Program



The effectiveness and value of any traceability system is ultimately determined by the system itself and the rigour with which it is applied. Both factors must exist for a traceability system to succeed in enabling businesses to increase their profitability and an industry to protect its competitive interests.

Full chain traceability is a relatively simple concept. In practice it is a highly complex undertaking, which can require enormous investments and produce little benefit if not planned and executed correctly.

In conjunction with Beef Farmers of Ontario (BFO), Value Chain Management International (VCMI) facilitated a visit to Australia to learn about the National Livestock Information System (NLIS).

Judged in terms of potential economic impact, NLIS has for some time been considered one of the most effective livestock traceability systems in the world.¹ This comes from the breadth and precision of the data gathered by the system at a national level, and the extent to which state governments, such as Victoria, have partnered with industry to ensure the system can be utilized by individual businesses to make informed management decisions.

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The three pillars of effective chain-length traceability are movement reporting, premises ID, and animal ID. As Ontario moves towards chain-length traceability, the purpose of the visit was to provide senior industry representatives with the opportunity to view firsthand the challenges and drivers that led to the development of NLIS, how the system is sustained and governed, and how innovative business leaders are utilizing NLIS to improve the production and marketing of beef. The visit also provided an opportunity to learn about linkages that exist between the NLIS system and value-adding initiatives such as Meat Standards Australia (MSA). This in turn enabled the participants to identify lessons learned that could be applied in Ontario, as Ontario seeks to develop a more effective traceability system than has previously existed.

Summary

NLIS collects data on individual animals that extends across their lifetime and along the value chain from birth to slaughter. That 99.5 percent of movement transactions are received electronically within 24 hours of the movement occurring illustrates how effective the NLIS system has become in the gathering of data.

The Australian meat industry is heavily reliant on exports. While market access and risk mitigation remain the primary drivers behind the development of NLIS, the industry and business-level capabilities that have stemmed since the system's implementation have resulted in greater operational efficiencies, competitive advantage, and market-focused innovation than could otherwise have occurred. That the NLIS continues to be developed in conjunction with value-adding initiatives such as MSA illustrates the commercial and economic opportunities that can stem from viewing traceability from a long-term strategic perspective.

The secret of NLIS's effectiveness is that it is simple, solid, and secure. This is due to a number of factors that have been critical to both its initial development and evolution over time. They include mandating

1. exactly why the NLIS exists and its role in ensuring the long-term competitiveness of Australia's livestock industry, before determining what technology was required and why;
2. that traceability is a tool and an outcome, not the purpose for why NLIS exists;
3. that the management of NLIS is overseen by an independent entity (NLIS Ltd.), whose board of directors comprises representatives from industry, research, and government;

4. that actors operating along the entire value chain use the system appropriately and are accountable for uploading data to the national database in a timely and accurate fashion;
5. that the physical components of the system (e.g., ear tags and readers) are “fit for use,” tested extensively prior to their introduction, and used in a consistent manner across the country;
6. which data can be accessed by businesses, government departments, researchers, etc., and for what purpose(s);
7. that the costs of the system are borne by the entire industry through levies; and
8. that data contained on the NLIS national database system is accurate and can be analyzed to identify then find individual animals within hours of a disease outbreak occurring.

These outcomes have been achieved by having established explicit roles, responsibilities, and accountabilities that are written into a combination of federal and state level legislation and regulations.

National Livestock Information System (NLIS)

Animal Health Australia describes NLIS (Cattle) as “Australia’s system for identifying and tracking all cattle through their life. It is a permanent, whole-of-life identification system, which aims to ensure that individual animals can be tracked from property of birth to slaughter for biosecurity, food safety, and product integrity and market access purposes.”² With an outbreak of foot-and-mouth disease predicted to cost the Australian livestock industry \$50B if not managed effectively, NLIS is viewed as an insurance policy — not just for Australian agriculture, but for Australia’s economy overall.

There are two distinct aspects to the NLIS system. There are also two types of database, each of which is automatically updated several times a day. The first is the national program, which houses data that is uploaded from across Australia. The data is housed on a database operated by Meat and Livestock Australia (MLA), an independent industry body focused on market development and R&D. The focus is limited to determining and licensing appropriate technology, maintaining an accurate record of Property Identification Codes (PICs), and recording livestock movements. Only MLA, which manages the national database on a daily basis on behalf of NLIS Ltd., is able to mine the data to identify individual producers by matching PIC with NLIS tags. By law NLIS data cannot be used for tax or revenue-related purposes.

The second aspect of the NLIS system occurs at the level of individual states, with state-related aspects of NLIS being governed by rules that are enshrined in state legislation. This is where a second database, one in each state, houses premises ID data onto which movement data is downloaded daily from the national database managed by MLA. The movement information contained on this database is updated with data from the national NLIS database, and operationalized through a combination of

government agencies, industry bodies, and individual commercial enterprises that extend from farm inputs and breeders through to processors.

Each state, by owning its own PIC database, can accurately track cattle movements and use this information to compile an accurate picture of the industry. This information also provides each state with the ability to immediately react to a disease outbreak or food safety related incident. However, because states vary in how proactively they involve themselves in the management and application of NLIS for commercial or economic purposes, differences exist in how the NLIS program is executed between the states. It also results in differences existing in the extent to which individual businesses view NLIS as a strategic management tool. At the time of writing this case study, Western Australia, South Australia, and Tasmania are steadily adopting systems and approaches developed by Victoria, which has proactively promoted NLIS from an industry perspective and continues to play a hands-on role in its development and implementation.

History of NLIS

Australia's traceability systems began in New South Wales during the early 1960s, with the introduction of wrap around tail tags as part of a bovine brucellosis eradication program. In 1992 new tail and ear tags were introduced nationally to identify growth hormone free cattle, whose meat was eligible for sale to the EU. From this point on the focus was on identifying individual animals for the purpose of protecting Australia's exporting interests and enabling informed business decisions along the value chain.

The development of a coordinated national traceability system resulted from Australian beef being quarantined due to its containing excessive levels of insecticide (chlorflurazuron). The lack of an effective traceability system meant that it took a considerable amount of time and effort to determine that the chemical had been ingested from cattle being fed cotton trash and where this had occurred. While the cause was traced back to a relatively small number of farms, the incident severely interrupted the export of beef and impacted Australia's reputation as a dependable exporter of safe, high quality meat.

The experience led to the tail tag traceability system being augmented by the introduction of the National Vendor Declaration (NVD) program. This is a legally binding document (example shown below) signed by the seller and delivered to the buyer along with the shipment of cattle that they have purchased. The NVD requires sellers to state whether their cattle have been treated with hormonal growth promotants, the length of time that they have owned the animals, and whether the cattle are still within any drug or chemical associated withholding period. Though the NVD is not mandatory, it is taken so seriously by buyers that failure to provide one will likely result in the shipment being rejected.

NATIONAL VENDOR DECLARATION (CATTLE) AND WAYBILL		C0411																		
This form cannot be used where eligibility for the EU market is required.																				
Part A To be completed by the owner or person who is responsible for the husbandry of the cattle.																				
<p>Owner of cattle _____ (FULL TRADE NAME)</p> <p>Property/place where the journey commenced _____ (ADDRESS)</p> <p>(ADDRESS CONTINUED) _____ (TOWN/STREET) _____ (STATE)</p> <p>Property Identification Code (PIC) of this property This MUST be the PIC of the property that the stock is being moved from</p>																				
<p>Description of cattle</p> <table border="1"> <thead> <tr> <th>Number</th> <th>Description (BREED, SEX, E.G. HEREFORD CROSS STEERS)</th> <th>Brands or Earmarks (IF PRESENT OR REQUIRED)</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td>Total</td><td colspan="2">Use the Attachment Forms for consignments that require more lines to describe the stock. (See Explanatory Notes)</td></tr> </tbody> </table> <p>Consigned to _____ (NAME OF PERSON OR BUSINESS)</p> <p>(ADDRESS) _____ (TOWN/STREET) _____ (STATE)</p> <p>Destination (if different) of cattle _____ (LOCATION ADDRESS)</p> <p>NLIS devices used on these cattle Number of ear tags _____ Number of rumen devices _____</p> <p>Details of other statutory documents relating to this movement e.g. animal health certificate</p> <p>DOCUMENT TYPE _____ NUMBER _____ OFFICE ISSUE _____ EXPIRY DATE _____ / /20</p> <p>1 Have any of the cattle in this consignment ever in their lives been treated with a hormonal growth promotant (HGP)? (Use a second document for mixed consignments.) Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>2 Have the cattle in this consignment ever in their lives been fed feed containing animal fats? Yes <input type="checkbox"/> No <input type="checkbox"/> (See Explanatory Notes)</p> <p>3 Has the owner stated above owned these cattle since their birth? Yes <input type="checkbox"/> No <input type="checkbox"/> If No, how long ago were the cattle obtained or purchased? (If purchased at different times, tick the box corresponding to the time of the most recent purchase.) A. Less than 2 months <input type="checkbox"/> B. 2-6 months <input type="checkbox"/> C. 6-12 months <input type="checkbox"/> D. more than 12 months <input type="checkbox"/></p> <p>4 In the past 60 days, have any of these cattle been fed-by-product stockfeeds? Yes <input type="checkbox"/> No <input type="checkbox"/> If Yes, attach a list of the by-product stockfeeds, date when last fed and a copy of an analyst's report if available.</p> <p>5 In the past 6 months have any of these animals been on a property listed on the ERP database or placed under any restrictions because of chemical residues? Yes <input type="checkbox"/> No <input type="checkbox"/> If Yes, give details: _____</p>			Number	Description (BREED, SEX, E.G. HEREFORD CROSS STEERS)	Brands or Earmarks (IF PRESENT OR REQUIRED)													Total	Use the Attachment Forms for consignments that require more lines to describe the stock. (See Explanatory Notes)	
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Total	Use the Attachment Forms for consignments that require more lines to describe the stock. (See Explanatory Notes)																			
<p>6 Are any of the cattle in this consignment still within a Withholding Period (WHP) or Export Slaughter Interval (ESI) following treatment with any veterinary drug or chemical? Yes <input type="checkbox"/> No <input type="checkbox"/> If Yes, give details: (Record additional details in question 9)</p> <table border="1"> <tr> <td>CHEMICAL PRODUCT</td> <td>TREATMENT DATE</td> <td>/ /20</td> <td>WHP</td> <td>ESI (IF SET)</td> </tr> </table> <p>7 In the past 60 days, have any of the cattle in this consignment consumed any material that was still within a withholding period when harvested, collected or first grazed? Yes <input type="checkbox"/> No <input type="checkbox"/> If Yes, give details:</p> <table border="1"> <tr> <td>CHEMICAL PRODUCT</td> <td>DATE APPLIED</td> <td>/ /20</td> <td>GRADING WHP</td> <td>DATE FIRST GRAZED</td> <td>DATE FEEDING/GRADING CEASED</td> </tr> </table> <p>8 In the past 42 days, were any of these cattle: a) grazed in a spray risk area; or b) fed fodders cut from a spray drift risk area? (See Explanatory Notes for definition of spray drift risk area.) Yes <input type="checkbox"/> No <input type="checkbox"/> If Yes, Date sprayed: <u> / /20</u></p> <p>9 Additional information: see requirements in Explanatory Notes for completing this document.</p>			CHEMICAL PRODUCT	TREATMENT DATE	/ /20	WHP	ESI (IF SET)	CHEMICAL PRODUCT	DATE APPLIED	/ /20	GRADING WHP	DATE FIRST GRAZED	DATE FEEDING/GRADING CEASED							
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<p>Declaration</p> <p>I, <u> </u>, FULL NAME _____ FULL ADDRESS _____ ADDRESS STATE _____</p> <p>declare that, I am the owner or the person responsible for the husbandry of the cattle and that all the information in Part A of this document is true and correct. I also declare that I have read and understood all the questions that I have answered, that I have read and understood the explanatory notes, and that, while under my control, the cattle were not fed restricted animal material (including meat and bone meal) in breach of State or Territory legislation.</p> <p>Signature* _____ Date* <u> / /20</u> *Only the person whose name appears above may sign this declaration, or make amendments which must be initialed.</p> <p>Tel no. _____ Fax no. _____</p> <p>Part B To be completed by the person in charge of the cattle while they are being moved. Completion of this part is optional in SA and VIC.</p> <p>Movement commenced: <u> / /20</u> DAY MONTH YEAR (am/pm)</p> <p>Vehicle registration number(s): _____</p> <p>I, <u> </u>, FULL NAME _____ am the person in charge of the cattle during the movement and declare all the information in Part B is true and correct.</p> <p>Signature _____ Date <u> / /20</u> Tel no. _____ *When more than one truck is carrying the cattle, other vehicle registration numbers are to be recorded.</p> <p>Part C Agents declaration for cattle sold at auction. (Completion of Part C is optional.)</p> <p>Agents completing Part C should retain the original or a scanned copy of the original declaration or a summary for a minimum of two (2) years, or three (3) years in WA and supply a copy or summary to any buyer on request.</p> <p>Vendor code / No.'s _____ Agent's code _____</p> <p>Stock agent company _____</p> <p>Buyer's name _____ Destination PIC _____</p> <p>No. of cattle purchased _____ Saleyard arrival time (am/pm) <u> : </u></p> <p>Agent's signature _____ Date <u> / /20</u> DAY MONTH YEAR</p>																				

Though no Victorian farms were found to have fed cotton trash to their animals, the state of Victoria was particularly concerned about the Endosulfan incident. It impacted the beef and dairy industry, along with sheep and lamb, all of which are exported and important to Victoria's agricultural economy. For example, Victoria produces significantly more milk than any other state in Australia.³ And compared to other states, a larger percentage of Victoria's milk production is processed into dairy goods, which are then exported.

In February 1999 a realization among Victorian producers and government officials that they required a means of verifying the safety and quality of livestock and associated products led to the introduction of the first electronic NLIS ear tags in cattle. In June 1999, following Victoria's lead, NLIS was accepted as the national means of tracking the eligibility of cattle destined for the EU.

In 2002 Victoria passed legislation that made it mandatory for all cattle born in Victoria to be identified on NLIS using electronic tags. Stemming from a report by SAFEMEAT Australia,⁴ in 2003 an agreement by the Primary Industry Ministerial Council⁵ led to the implementation of a national system for identifying and tracing livestock. This in turn led to the agreement by all of the Australian states to implement a common standard for cattle tracing requirements and performance. Subsequent agreements include visually read tags and paper records for sheep and goats (2006). In 2008 the

development of NLIS for pork commenced, along with the development of NLIS for alpaca and llama. The mandatory use of electronic NLIS tags in sheep and lambs is likely to occur in 2014.

Mandated Rigour

Without rigorous governance it is impossible to establish an effective traceability system, especially one that can be used by businesses situated along the value chain to increase their profitability. The rigour of NLIS in part stems from it being a mandated system and its development being focused on enabling progressive producers and downstream businesses to achieve outcomes that would not otherwise be possible. In the words of Kim Haywood from Tasmania Farmers and Graziers Association and Lyndon Iles from the Tasmanian Department of Agriculture: "If traceability is not mandatory it will not work, because those that do not use traceability will pull the entire system down."

The rigour and design of NLIS has resulted from governance that occurs at the national and state or territory level.

National Governance

The management of the NLIS database and national operations has traditionally been overseen by MLA. During 2014 the management and operation of the NLIS database is being transferred to Animal Health Australia. This change in governance reflects the primary purpose from a national perspective, to enable emergency response in the event of a disease outbreak.

National level governance of NLIS primarily focuses on strategic considerations. These include determining

- Who can access data stored on the national NLIS system and for what purposes,
- The enforcement of the 2004 National Traceability Performance Standards (NTPS),
- Specifications that technology must meet as part of the NLIS system,
- Hardware allowed to be used in conjunction with the NLIS system,
- How hardware is used and its implementation at any point from farms through to processors,
- Daily management of the national NLIS database including the call centre,
- Who can change the status of a PIC to show that cattle associated with a PIC are within a mandatory withholding period, and
- Industry levies collected to cover the cost of operating the national NLIS database.

The national governance of NLIS also encompasses ensuring that it is ready and able to implement emergency disease response activities and assume responsibilities described in Emergency Animal Disease Response Agreement (EADRA)⁶ and Ausvetplan⁷ documents.

The most observable aspects of NLIS governance from a national level is the hardware, including ear tags and readers. Because rigour relies on the NLIS system being equally effective at any point from birth through to slaughter, and electronic interference being an issue in processing facilities, only half duplex RFID ear tags and reading devices are allowed. RFID ear tags must be placed in the animal's right ear, and all readers must be located on the right side of cattle chutes, weighing equipment, etc. As well, ear tags must conform to clearly defined specifications, including their design and impact on the rate at which they may be lost. These mandated protocols have reduced the occurrence of incorrectly read and unread ear tags to less than one percent. Examples of how permanent readers are installed and a handheld reader are presented below.



Other observable practices governed at a national level include that a producer must obtain a PIC number before he can order and begin applying RFID tags. This is because his PIC number is embedded into the unique identifier of each ear tag. Shown below is how the unique number contained in each ear tag and displayed in the above hand reader are comprised.

Device Numbering



9	8	2		0	0	0	0	1	2	3	4	5	6	7	8
Manufacturer code (3 digits) e.g. 982 = Allflex 951 = Leader etc.		Unique number (12 digits)													



N	A	1	2	3	4	5	6	X	E	A	C	2	3	4	5
Property Identification Code (PIC) of the property the device was issued to (8 characters)								Manu factur er Code	Devic e type	Year manu factur ed	Unique number (5 characters) The first character may be numeric or alphabetic				

Below is how the 8-digit (grey section in the above) of Victoria's NLIS numbering system is determined.

PIC = 3MRDF022
3 = State (Victoria)
MR = Shire (Macedon Ranges)
D = District identifier
F = Check letter
022 = Sequential number



Another nationally mandated rule is that the original tag placed in the animal's ear before it leaves the property of birth is white. This tag contains the information described above. If this tag is lost at any point in time, it is replaced with an orange coloured tag. An orange tag means that the animal does not have lifetime traceability. Beyond limited information on the animal's life history, this also means that its meat cannot be supplied to the EU. At Warrnambool saleyards in Victoria, this combination of factors led to a difference of approximately 15 percent being paid for finished animals that have lifetime traceability versus those that do not. Whether an animal has lifetime traceability is communicated to potential buyers during the auction process.

The estimated annual operating cost of the national NLIS system is \$5 million (CAD). This covers staff, along with hardware and software updates. The greatest proportion of costs is incurred by the NLIS helpdesk, which employs up to 50 people.

If a producer is found to have shipped cattle that are subject to a mandatory withholding period from having applied a drench or other chemical treatment, stakeholders such as processors can apply a notice to a specific PIC listed on the NLIS database as the most recent owner. This "status" means that the PIC cannot sell any finished cattle or cattle for slaughter within the mandated period, unless they can prove beyond doubt that the "status" does not apply to the cattle concerned.

State Governance

While the foundational elements of NLIS apply to every state across Australia, to an extent each state has historically managed its NLIS operations differently. This is changing with Western Australia, Southern Australia, and Tasmania, following Victoria's approach to the management and implementation of NLIS, including the adoption of the same database and associated software.

The primary focus of states and territories is on operational and tactical factors. The differences in how they have executed the NLIS system is mainly due to three interrelated reasons:

1. The application of NLIS "on the ground" is supported and enforced by state legislation;
2. No two states are exactly alike in the size, nature, and structure of their livestock industries; and
3. The differing cultures of each region's agricultural industry have had a marked influence on their perceptions towards and acceptance of traceability.

Interestingly a similar difference in culture and attitude towards traceability appears to exist between the livestock industries and culture of southern versus northern Australia (e.g., Tasmania and Victoria compared to Queensland), and eastern versus western Canada (e.g., Ontario compared to Alberta). This is said to stem largely from three interrelated factors:

1. The extent to which different sectors of the livestock are viewed as being interdependent, viewing themselves as sharing common challenges and opportunities;
2. Producers' attitudes towards protecting their independence and entrepreneurial control; and
3. Certain sectors exacting greater political influence over government and industry decisions than others.

The operational and tactical aspects of NLIS that occur at the state and territory level include

- mandating how ear tags are ordered and distributed;
- registering and mapping the location of properties;
- issuing PICs;
- maintaining the accuracy of the PIC database;
- ensuring that producers, saleyards, processors, etc., upload information to the national NLIS database within seven days of a movement occurring; and
- granting individuals and businesses permission to remove and retire RFID tags.

The state of Victoria has historically been the most proactive state in terms of guiding the development and implementation of NLIS. Its approach has and continues to encompass

- establishing an industry led advisory committee that deliberates on all major issues relating to livestock traceability and provides advice directly to the Victorian Minister of Agriculture
- ensuring the accuracy of its PIC database by mandating that producers reapply for their premises ID every two years
- establishing performance standards for RFID technology that can be used in Victoria
- carefully and purposefully phasing-in the mandated use of tags and RFID
- investing in educating producers on how to use and benefit from NLIS
- proactively encouraging producers to comply with NLIS by leveraging a mandatory charge of AUD\$28 for a replacement tag, not threatening prosecution for individual cattle without tags
 - The threat of prosecution is reserved for individuals who are found to be habitually and purposefully attempting to evade the NLIS system.
- issuing RFID tenders and managing confidential supply arrangements with tag manufacturers
 - A combination of investing public monies and volume discounts are used to reduce the cost of RFID tags to producers.

- Public monies are provided by the cattle compensation fund, which collects a 20 cent levy on the sale of each animal. This ensures that everyone along the value chain contributes to the overall cost of tags.
- part-funding the implementation of RFID infrastructure along the value chain
 - Producers' costs were shared 50/50.
 - Processors' costs were shared 60/40, subject to uploading all the required data on hot carcasses to NLIS and retiring tags correctly. The mandatory uploading of data to NLIS by processors is written into Victoria's legislation.

The Value of Traceability

NLIS has created market opportunities for Australia's beef industry that amount to many hundreds of millions of dollars.

Dr. Tony Britt – Director of Biosecurity and Animal Welfare, Victorian Department of Environment and Primary Industries – stated that the NLIS has created market opportunities for Australia's beef industry that amount to many hundreds of millions of dollars. The evidence for this includes Australia's becoming the preferred supplier to countries due to the comfort and dependability created by the NLIS system. The following section describes some of the enormous benefits that NLIS has provided individual producers and downstream business.

Producers

John Wyld – Principal, Koolomurt Pastoral Pty. Ltd. – is one example of the many progressive producers utilizing NLIS to make informed management decisions and, in turn, increase the profitability of his farming operations. At the farm level, John uses the RFID tags to acquire a wealth of valuable information such as Estimated Breed Values (EBV). He achieves this by tracking live weight gain and monitoring animal health, then correlating this against carcass reports to identify genetic traits and make breeding decisions. The regular collection of data on individual animals' and the overall herd's live weight gain enables John to identify anomalies or opportunities by correlating the performance of individual animals across the herd and over time. This level of insight also allows John to determine the performance of individual paddocks, then make appropriate management decisions sooner and with greater precision than otherwise possible. The collection and subsequent manipulation of live weight gain data is achieved by using the system and the "Koolcollect" software shown below.



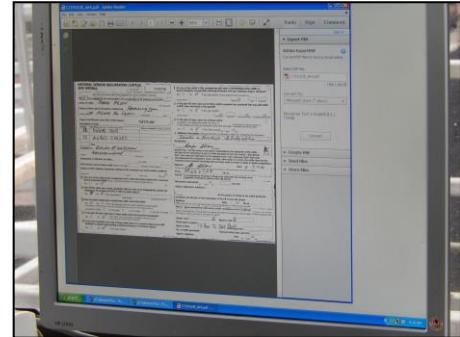
The recording of each individual animal ID by the processor also allows John to use the NLIS system to monitor the carcass performance in relation to MSA grading. This provides even greater insights into the management decisions that John can apply to continually improve the performance and profitability of his herd. In addition to his commercial beef operations, John operates a breeding stud. The NLIS and MSA data enables John to value bulls by monitoring their progeny's performance — on the farm and post slaughter. As a breeder, John can also log into the NLIS and MSA systems to view how individual cattle performed — regardless of whether he or another producer sold the finished cattle for processing.

Beyond beef, NLIS is a valuable tool for producers operating in all sectors of the livestock industry. The most notable is dairy, where RFID tags allow producers to determine what to feed and when. It also enables producers to better manage health, production, and replacement related issues. The most challenging sector of livestock for applying RFID is sheep and lamb, due to the speed at which they race through chutes and readers, which leads to readers trying to read multiple tags at once. The cost of RFID tags is also a concern for the lamb industry. Victoria is addressing this through utilizing the same combination of public investment and sourcing policies that it has used for beef, resulting in RFID tags for sheep and lambs costing approximately \$1.00 (CAD).

Saleyards

Two saleyards were visited in Australia: Killafaddy in Tasmania and Warrnambool in Victoria. A graphical representation of how they manage then upload movement information to the national NLIS database is contained in the appendix.

Commencing in 2003, Warrnambool was the first Victorian saleyard to implement the NLIS system from the receipt of cattle through to their dispatch to buyers. They were also the first saleyard in the world to implement the mechanism that enabled them to simultaneously weigh and read the RFID tags of six cattle at once. A software program called Livestock Exchange is used to link together an electronic copy of the NVD with data from the ear tag that was read on arrival. That the computer immediately flags any discrepancies between information contained in the NVD and the property on which the cattle were last registered provides buyers with greater assurance. It also increases the potential value of animals possessing lifetime traceability, and is a service that the saleyard uses to create added value for sellers and buyers.



The yard also checks to ensure that the property from which they came or have lived at during any point in their life has not had a withholding status placed against it. An example of the value that the system provides buyers and processors was shown in the instance where an animal was identified as having been just two weeks earlier on agistment on a Queensland property that was contaminated with lead. This had resulted in the animal being unfit for human consumption, though it had not been previously identified as such. All of the information described above is then provided to each buyer in the form of a presale catalogue, a page of which is shown below.

NON-EU Cattle NVD										NVD Questions									ERP Check Result	Brand
nt Vendor	NVD Qty	Vendor PIC	NVD No	Version	1	2	3	4	5	6	7	8	9							
1	38	39	3WVLE006 13823679	C0412	N	N	Y	N	N	N	N	N	N	SAUDI ELIGIBLE	RUSSIAN ELIGIBLE	CLEAR NO TEST;LPA	A			
982	123492772757		TAG		3WVLE006XB010098															
982	000191809427		TAG		3WVLE006XB07277															
951	000018886492		TAG		3WVLE006LBG07941															
982	000116160257		TAG		3WVLE006XB04334															
982	000116160107		TAG		3WVLE006XB04565															
982	000116160280		TAG		3WVLE006XB04813															
982	000142404291		TAG		3WVLE006XB06266															
982	123492772452		TAG		3WVLE006XB1J0069															
982	123492772681		TAG		3WVLE006XB1J0081															
982	123492772691		TAG		3WVLE006XB1J0090															
982	123479330164		TAG		3WVLE006XBH09236															
982	123497778353		TAG		3WVLE006XBH09552															
982	123479324416		TAG		3WVLE006XBH09379															
982	123479330099		TAG		3WVLE006XBH09238															
982	123479324121		TAG		3WVLE006XBH09391															
982	123479330123		TAG		3WVLE006XBH09248															
982	123492771817		TAG		3WVLE006XBH09408															
982	123492778281		TAG		3WVLE006XBH09536															
982	123479329641		TAG		3WVLE006XBH09119															
982	123492778152		TAG		3WVLE006XBH09415															
982	123492778144		TAG		3WVLE006XBH09453															
982	123492778276		TAG		3WVLE006XBH09859															
982	123492778326		TAG		3WVLE006XBH09532															
982	123479330006		TAG		3WVLE006XBH09227															
982	123479334576		TAG		3WVLE006XBH09395															
982	123479329798		TAG		3WVLE006XBH09215															
982	123479329946		TAG		3WVLE006XBH09192															
982	123492778212		TAG		3WVLE006XBH09496															
982	123479330014		TAG		3WVLE006XBH09231															
982	123492778588		TAG		3WVLE006XBH09406															
982	123479324129		TAG		3WVLE006XBH09381															
982	123492701147		TAG		3WVLE006XBH10010															
982	123492778410		TAG		3WVLE006XBH09544															
982	123492772293		TAG		3WVLE006XBH09000															
982	123492777045		TAG		3WVLE006XBH09018															
982	123492778351		TAG		3WVLE006XBH09551															
982	123492778430		TAG		3WVLE006XBH09504															
982	123479329977		TAG		3WVLE006XBH09207															
982	123479324130		TAG		3WVLE006XBH09397															
Total RFIDs scanned from this vendor Declaration										39										
B	2	33	1	3MPL265	13736445	C0412	N	N	D	N	N	N	N	N	SAUDI ELIGIBLE	RUSSIAN ELIGIBLE	CLEAR NO TEST;LPA	A		

LPA = Livestock Production Assurance

Accredited LPA

Property never had a issue

Properties # when vendor declared Gated



Processors

Two processors were visited: Greenhams in Smithton, Tasmania; and Midfield in Warrnambool, Victoria. Both processors stated that NLIS is an enormously powerful device, the potential of which has yet to be recognized by many producers. In part this stems from the perspective that the individual animal ID provided by NLIS creates a greater opportunity to leverage the MSA program, domestically and internationally, than would otherwise exist. Midfield also believes that the time sensitive data provided by NLIS enables producers and processors to prove that they have abided by animal welfare practices, whether they be legally binding or voluntary industry standards.

Greenhams has been particularly proactive in using NLIS as a tool to target higher value markets, by working with producers to produce higher quality beef through continually improving their production methods and handling techniques, and identifying the genetic markers required to increase EBVs.



Greenhams records data from the RFID tag on the animals' arrival at the plant, then again at the knocking box. Data collected at the knocking box is connected to a carcass number, which travels with the animal through the plant. It is also grouped into time periods, which enables them to trace specific cuts back to a point in time if any issues arise downstream. This provides Greenhams with the ability to monitor the performance of cattle procured from individual producers from an MSA eating quality and food safety perspective, and relate information back to producers in a form that enables them to make informed management decisions. It also enables Greenhams to ensure cattle are fit for purpose and, in partnership with

producers, increase the value proposition that is offered to customers versus that offered by competing abattoirs.

GREENHAM Greenham Tasmania Pty Ltd											
A.B.N. 61 099 121 301											
Bacon Factory Road, Smithton, TAS 7330											
Tel: (03) 6452 2101 Fax: (03) 6452 1479											
PO Number:	65420	Purchase Date:	14/02/14	Purch Type:	Per KG	Carc. Trim:	Standard	Fat Site:	Rump	Slaughter Date:	14/02/14
Body Details											
Body Ear Tag	Sex	Dent	Fat	Butt	PIG	PCC Code	WT	SKG	\$	Hung	Chs
246	F	8	7	G	MHCH0451	982 00002000731985	K	280.6	\$2.80	500.00	40 300
249	F	8	10	C	MHCH0451	982 00002000498331	307.2	\$2.80	\$798.72	50 400	1 380 0
263	F	8	10	C	MHCH0451	982 000044868753	288.2	\$2.80	\$892.12	50 350	1 370 2
197	F	8	15	C	MHCH0451	982 000134684143	329.0	\$2.80	\$954.80	55 500	4 660 2
205	F	8	16	C	MHCH0451	982 00059547992	307.0	\$2.80	\$883.60	49 500	4 670 2
233	F	8	16	C	MHCH0451	982 000044868719	341.4	\$2.80	\$1087.64	50 500	3 570 2
236	F	8	19	C	MHCH0451	982 00003471958	344.4	\$2.80	\$989.44	40 500	3 560 2
222	F	8	20	C	MHCH0451	982 00078162950	384.8	\$2.80	\$1040.48	50 400	1 320 2
198	F	8	28	C	MHCH0451	982 00044867492	336.0	\$2.80	\$975.36	50 500	3 520 2
190	F	8	15	C	MHCH0451	982 000044868754	320.0	\$2.80	\$938.28	49 500	4 640 3
200	F	8	15	C	MHCH0451	982 00010895823	321.2	\$2.80	\$933.12	55 500	3 540 3
306	F	8	15	C	MHCH0451	982 00050479584	398.8	\$2.80	\$1,034.80	45 500	2 420 3
208	F	8	19	C	MHCH0451	982 00024695158	349.2	\$2.80	\$1005.32	50 500	2 460 2
239	F	8	11	C	MHCH0451	982 00101885608	325.2	\$2.80	\$845.52	55 500	2 480 2
Average Body Weight: 322.8											
MSA Grading Results:											
Cattle Beef Cow Never Ever											
246	F	8	20	C	MHCH0451	982 00048521360	300.6	\$2.80	\$781.56	50 500	1 380 4 4 20 6 40
249	F	8	17	C	MHCH0451	982 0001439434	288.6	\$2.80	\$755.36	45 400	1 350 2 4 14 6 52
221	F	8	25	C	MHCH0451	982 12348480427	344.8	\$2.80	\$1056.96	49 500	2 460 2 4 16 8 58
228	F	8	20	C	MHCH0451	982 00054020716	301.0	\$2.80	\$768.16	50 350	1 350 2 4 10 8 38
Average Body Weight: 308.9											
MSA Upgrades											
Cattle Beef Cow Never Ever											
229	F	8	20	C	MHCH0451	982 000028925013	285.6	\$2.80	\$742.56	35 400	5 750 6 3 14 5 56 60 6
184	F	8	15	D	MHCH0451	982 0008933949	381.0	\$2.80	\$1676.60	50 400	3 550 4 2 12 5 56 64 77.9
217	F	8	13	C	MHCH0451	982 00012579385	325.0	\$2.80	\$845.00	45 350	1 350 5 1C 14 5 58 72 57.0
241	F	8	18	D	MHCH0451	982 00016132688	347.0	\$2.80	\$948.20	40 500	5 730 3 2 16 5 62 64 68
224	F	8	17	C	MHCH0451	982 00026872685	205.4	\$2.80	\$684.04	40 400	3 350 5 1C 14 5 58 66 64
242	F	8	15	D	MHCH0451	982 00078182685	292.8	\$2.80	\$807.28	50 500	3 530 2 2 16 5 56 52.8
Failed to meet company specification											
Cattle Beef Cow Never Ever											
229	F	8	20	C	MHCH0451	982 000028925013	285.6	\$2.80	\$742.56	35 400	5 750 6 3 14 5 56 60 6
184	F	8	15	D	MHCH0451	982 0008933949	381.0	\$2.80	\$1676.60	50 400	3 550 4 2 12 5 56 64 77.9
217	F	8	13	C	MHCH0451	982 00012579385	325.0	\$2.80	\$845.00	45 350	1 350 5 1C 14 5 58 72 57.0
241	F	8	18	D	MHCH0451	982 00016132688	347.0	\$2.80	\$948.20	40 500	5 730 3 2 16 5 62 64 68
224	F	8	17	C	MHCH0451	982 00026872685	205.4	\$2.80	\$684.04	40 400	3 350 5 1C 14 5 58 66 64
242	F	8	15	D	MHCH0451	982 00078182685	292.8	\$2.80	\$807.28	50 500	3 530 2 2 16 5 56 52.8

Midfield described how having NVDs and NLIS tag numbers communicated to them electronically, ahead of cattle arriving at the plant, had enabled them to identify an animal that was still within the mandated withholding period after having been given medication. Similar to the incident at Warrnambool saleyards, this had ensured that the animal did not enter the food chain and create a costly food safety incident before it had even arrived at the plant. The National Residue Agency (NRA) had also been notified, thereby ensuring that a withholding status had been lodged against that farm's PIC on the NLIS database. This ensured that any subsequent shipments of cattle from that farm – regardless of whom they were sold to – would be monitored to ensure adherence to withholding dates.

Meat Standards Australia

Meat Standards Australia (MSA) is a predictive program designed to enable the Australian beef industry to capture value by taking the guesswork out of buying beef, through producing meat that is statistically more likely to offer consumers a more pleasurable eating experience than beef produced according to traditional approaches. The MSA brand is policed by a team of trained professionals from Meat and Livestock Australia (MLA), who license the MSA brand to processors and retailers, and deliver training courses to their employees. Policing the use of the MSA brand, which most businesses use to underpin their own brand through communicating independent third party verification, has on occasion led to MLA prosecuting businesses and individuals under Australian marketing law.

The MSA program resulted from a major R&D program conducted in the mid-1990s (86,000 consumer taste tests conducted in 8 countries, using 603,000 samples and 8 cooking methods) to “investigate the relationships between observable beef and cattle characteristics, cooking methods and consumer appreciation of beef palatability.”⁸ Accounting for all development and implementation costs, MSA is estimated to have produced \$200 million (AUD) in net benefits for the Australian beef industry since its introduction in 1999/2000. In 2007 an MSA program was introduced for Australian lamb. MSA has also spawned international initiatives, such as New Zealand’s FarmIQ for lamb and BeefEQ.

The link between MSA and NLIS comes from how Australia’s traceability system enables the carcass grading data on individual animals to be collated, analyzed, and accessed through a central database. In the words of Matthew Lester, a Tasmanian cow-calf producer and beef finisher supplying the processor Greenhams, “Without NLIS, MSA could not have achieved the outcomes it has.” NLIS enables the MSA system to operate more effectively and efficiently than otherwise possible. It also enables producers and processors to track and compare cattle performance individually or as groups from a local, regional, and national perspective. This information incentivizes progressive producers to continually improve their own performance. It has also encouraged the emergence of producer groups, whose members collaborate by sharing lessons learned and experimenting together.

From a production perspective, MSA encompasses choosing pathways to market and determining appropriate management decisions. MSA grading is determined by evaluating carcasses on factors that include carcass weight, age, breed, ossification, meat colour, rib fat, cut type, and a pH level of less than 5.71. Carcass pH is important as it directly correlates to glycogen, which determines tenderness. As glycogen levels are impacted by handling and stress, finished cattle purchased by processors at a saleyard are not eligible for MSA. Darren Maloney, the works manager at Greenhams, believes that the developers of MSA did not realize how much it would change industry practices: "The science that lies behind management decisions and the knowledge that it has created has changed the industry forever and in ways that were unforeseen." Examples include how the delivery of shipments to the processing plants are carefully timed to minimize stress, and how they are fed electrolytes prior to shipment. As stress at any time during an animal's lifetime and growth rates have the potential to negatively impact eating quality, the knowledge created by MSA is influencing changes in cattle handling and feeding practices from birth to slaughter.

In recent years the speed of MSA's expansion across Australia's cattle industry has increased; so has its recognition by retailers and foodservice outlets. In 2011/12 the number of producers signed onto the MSA system increased by 43 percent to 5,416. The largest growth in numbers of cattle graded under the MSA system occurred in Victoria. Also in 2012, Australia's largest retail chain, Woolworths, adopted MSA as their preferred quality mark for beef and lamb. With the USDA now having verified MSA as a means of communicating quality to consumers, 2.9 million cattle are expected to be graded against MSA in 2014.

Shown below is the MSA grading sheet used by the Greenham Bros. abattoir in Tasmania. It reflects the 136 cut, cook, and age combinations that exist for MSA grade 3 and above.

MSA Cut/ Cook/ Days Age Report							
MSA Cut/ Cook/ Days Age Report							
Primary options		Alternative options		Cooking Methods			
M.A.M No.	Cut	H.A.M Number	Cut	Grid	Roast	Fry	Casseroles
2130	Tenderloin	2198	Tenderloin Butt Off	TOH062	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2170	Butt Tenderloin			TOH034	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2240	Cube Rump	1690 / 2240	Cube Rump / Eye Muscle	SPN091	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2249	Cube Rump Plate			SPN092	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2143	Breast	1552	Short Loin	TPF010	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2900	Steaks	2380 / 2300	Boiler Brade, Cid	BLD010	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2313	Chuck Round			CHY036	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2310	Chuck Tender			CHY037	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2208	Rib Blade Mefit	1692 / 2470	Short Rib / Rib Cap	RRB041	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2195	D-Rump	2152 / 2000	Rump Blf / Lip of Rump / Eye Rump Centre / Rump	RMP131	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2094	Eye Rump Side	2055 / 2090		RMP231	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2081	Eye Round Cap			RMP232	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2095	Round Cap			RMP032	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2131	Tripe			RMP087	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2070	Knuckle	2098 / 2900	Knuckle Corder / Thick Flank	KNU099	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2087	Eye of Knuckle			KNU098	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2099	Eye of Knuckle Undercurl			KNU098	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2090	Eye Round			KNU099	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2040	Eye Round			SEY075	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2364	Heart Muscle			OUT029	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2000	Topside	2001 / 2010 / 2011	Topside Cap / Off / Heavily Inside Cap Off	TOP023	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2013	Eye of Topside	2012		TOP020	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 3 @ 5 days
2012	Topside Cap			TOP033	MSA 3 @ 27 days	MSA 3 @ 5 days	MSA 4 @ 5 days
2278	Chuck	2271 / 2270 / 2280 / 2294	Chuck Square Cut / Neck	CHK068	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 4 @ 5 days
2278	Chuck Crust			CHK068	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 4 @ 5 days
2278	Chuck Rump Side	2040 / 2465	Chuck Rump / Snout	CHK078	MSA 4 @ 11 days	MSA 4 @ 6 days	MSA 4 @ 5 days
2288	Chuck Rump Plate			CHK081	MSA 4 @ 5 days	MSA 4 @ 5 days	MSA 4 @ 5 days
2292	Chuck Plate			CHK082	MSA 4 @ 5 days	MSA 4 @ 5 days	MSA 4 @ 5 days
2295	Thin Flank	2204	External Flank Plate	TFL051	MSA 3 @ 5 days	MSA 3 @ 5 days	MSA 4 @ 5 days
2203	Internal Flank Plate	2205	Filo meat	TFL052	MSA 3 @ 5 days	MSA 4 @ 19 days	
2210	Flank Steaks			FL064	MSA 4 @ 5 days	MSA 4 @ 5 days	MSA 4 @ 5 days
2338	Brisket	2346 / 2335 / 2360	NE brisket / PE Brisket / PE Brisket Double Off	BR006	MSA 3 @ 5 days	MSA 4 @ 5 days	MSA 3 @ 5 days
2360	Shin			QSM01			MSA 4 @ 5 days
2360	HQ Shin			HQH01			MSA 4 @ 5 days

<http://www.mynsa.com.au/msaconfim/CutCookDaysAge.aspx?nb=111&l=1>

What Does This Mean for Ontario?

A number of implications can be drawn from what has occurred in Australia in relation to the development of NLIS and MSA, and how Ontario's beef industry can benefit from lessons learned.

Animal ID and traceability are two separate issues. Animal ID enables traceability to occur, but it is not traceability. Canada's current traceability systems and how they are implemented do not adequately reflect this reality. This in turn negatively impacts the effectiveness of Canada's traceability in beef compared to NLIS.

Ontario's beef industry could capture added value by differentiating itself from other provinces by leading the development of an effective chain length traceability system.

Ontario's beef industry could capture added value by differentiating itself from other provinces by leading the development of an effective chain length traceability system. This is especially true given the market opportunities that are emerging in the EU, where lifetime traceability is viewed as an imperative. Other importing nations also view lifetime traceability as an important differentiator and source of added value.

The complementary benefits of NLIS and MSA enable farmers and downstream businesses that experience higher costs of production than other areas of the same country (e.g., Tasmania vs. Queensland; Ontario vs. Alberta) to compete in ways that do not revolve around adopting a commodity-centric approach. Examples of what has occurred in regions with higher costs and smaller beef herds include Tasmania's Greenham's,⁹ whose "Never Ever" program sees the production of verifiable high quality beef raised without the use of hormones and antibiotics for sales in high value US markets. Greenham's has also used a similar approach to introduce grass fed Cape Grim branded beef, which is primarily supplied to the domestic market as a premium priced, premium quality product. Compared with North American branded beef programs, many of which are more of "a freezer sort" approach than a verifiable chain-length initiative, the Australian programs see a greater share of the value created returned to producers.

Ontario should not shy away from being the first to establish an effective chain-length traceability system. Similar cultural and political differences exist between the beef industries of Ontario and Alberta as exist between Victoria and Queensland. In the case of Victoria and Queensland, addressing these differences without forfeiting a national traceability system from which everyone can benefit has been achieved by many of the operational practices of NLIS being enacted by state level legislation. It is not one size fits all states. Only the principles upon which NLIS is founded are reflected in national level laws, regulations, and protocols.

More than one livestock species can benefit from a mandatory and effective traceability system. NLIS is not just a system for beef, lamb, veal, dairy, or pork; it creates opportunities from which all species of livestock can benefit, albeit with technological differences where required.

The development of an effective traceability system relies on the existence of strong committed leaders from industry and government who are willing to listen to others, while simultaneously developing a clear vision for why the system(s) is being developed and how it will benefit industry. Detractors cannot be allowed to undermine the opportunities facing progressive businesses' and the industry's future interests.

Adoption of the NLIS could offer Ontario a number of advantages, including the ability to implement a proven traceability system relatively quickly.

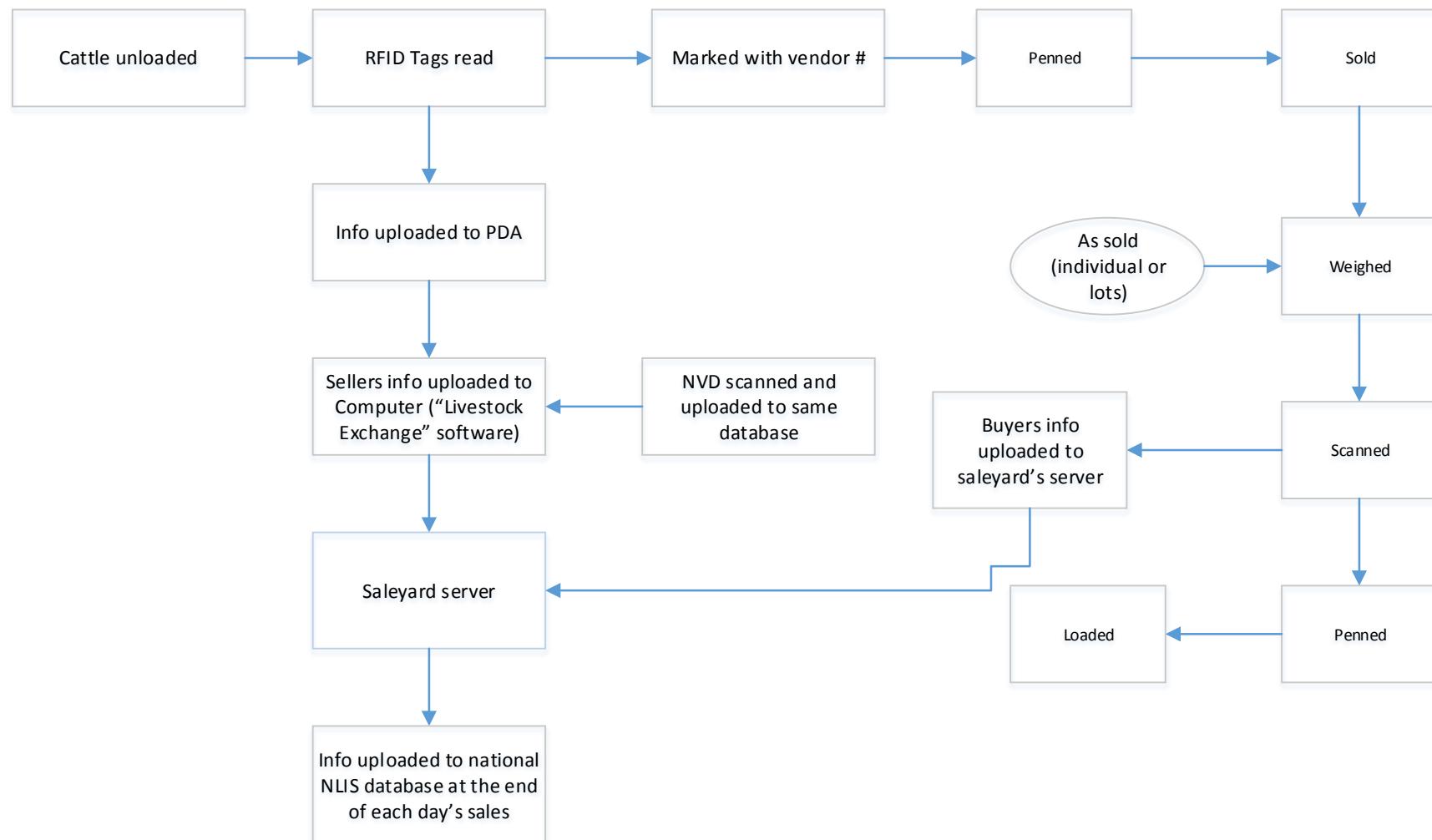
Victoria, the state that continues to lead the development of the NLIS system and its use by industry to capture value, has offered the NLIS software to Ontario/Canada. Adoption of the NLIS could offer Ontario a number of advantages, including the ability to implement a proven traceability system relatively quickly. While the development of an MSA type system would be a challenging undertaking, as shown by the FarmIQ and BeefEQ systems that are at different stages of development in New Zealand, along with other international initiatives, it would undoubtedly be possible.

The final lesson is that the cost of establishing and maintaining an effective traceability system need not be prohibitive or penalize one level of the value chain in favour of another.

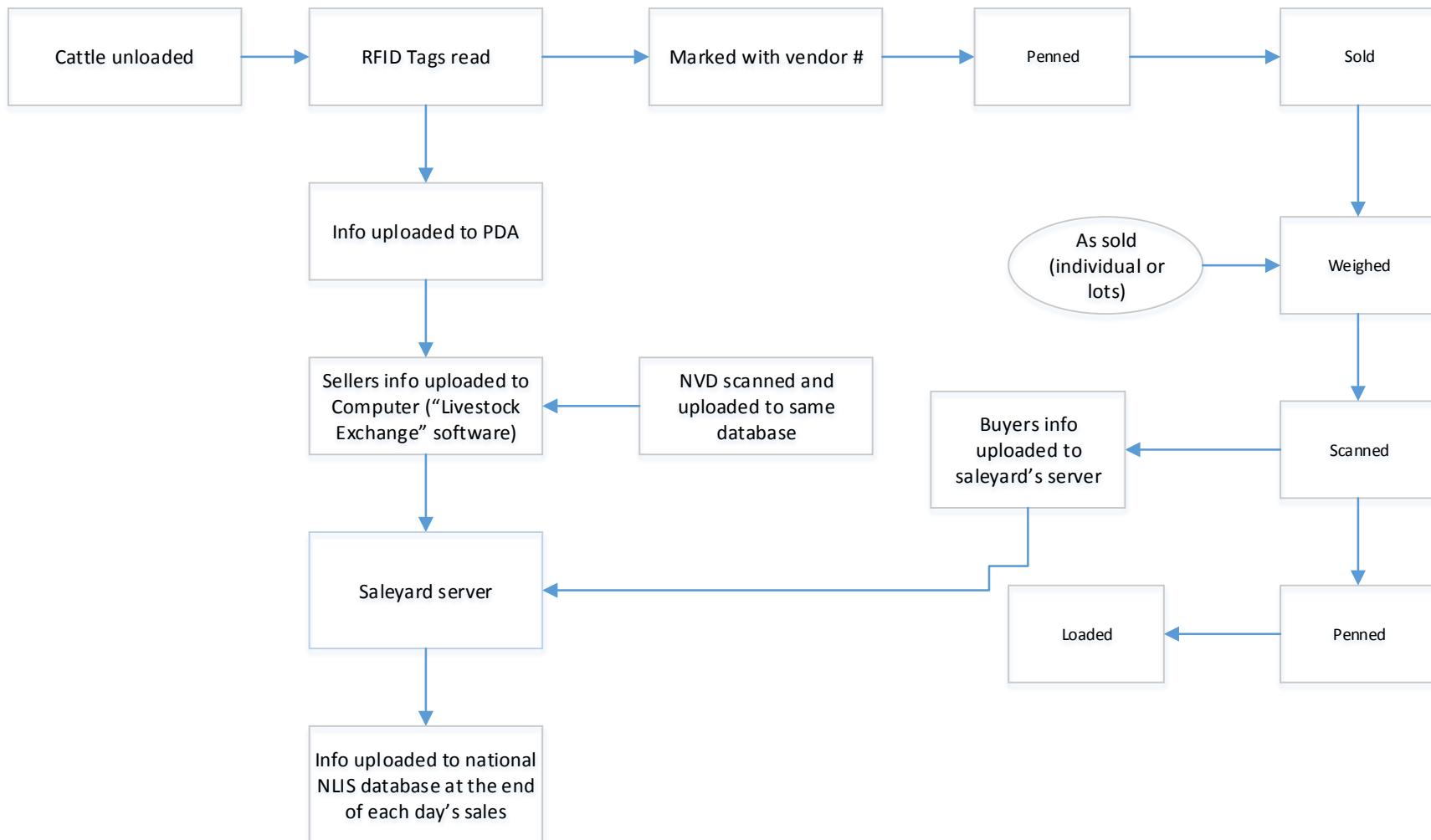
The final lesson is that the cost of establishing and maintaining an effective traceability system need not be prohibitive or penalize one level of the value chain in favour of another. To be sustainable and effective, traceability systems must be designed from a management perspective, with the entire chain contributing financially to its operation and evolution.

Appendix

Killafaddy (Tasmania) – Processes



Warrnambool (Victoria) – Processes



Notes

¹ Souza-Monteiro, D.M. and Caswell, J.A (2004). The Economics of Implementing Traceability in Beef Supply Chains. Tonsor, G.T. and Schroeder, T.C. (2006). Lessons for the U.S. Beef Industry Learned From the Australian National Livestock Identification System.

² <http://www.animalhealthaustralia.com.au/programs/biosecurity/national-livestock-identification-system/nlis-cattle/>

³ <http://www.dairyaustralia.com.au/~/media/Documents/Stats%20and%20markets/Production%20and%20sales/Latest%20stats/National%20Milk%20Production%20Report%20February%202014.pdf>

⁴ The purpose of SAFEMEAT Australia is to ensure the highest standards of hygiene are implemented and maintained along the entire red meat value chain. <http://safemeat.com.au/about-safemeat/overview.htm>

⁵ Comprises federal and state ministers from Australia and New Zealand, who are responsible for agriculture, fisheries/aquaculture, food, and forestry.

⁶ A contractual agreement between the Commonwealth, state and territory governments and livestock industry parties to increase preparedness for, and proper response to, emergency animal disease (EAD) occurrences.

⁷ <http://www.animalhealthaustralia.com.au/programs/emergency-animal-disease-preparedness/ausvetplan/>

⁸ Griffith, G., Thomson, J. (2012). The Aggregate Economic Benefits to the Australian Beef Industry from the Adoption of Meat Standards Australia: updated to 2010/11; Australasian Agribusiness Review - Vol.20 - 2012; http://ageconsearch.umn.edu/bitstream/125838/2/Griffith_Thompson.pdf

⁹ <http://www.greenhamnaturalbeef.com.au/>; http://www.greenham.com.au/cape_grim_beef.html

The views expressed in the report do not reflect those of the governments of Canada or Ontario.