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Scoping study to strengthen Indonesian red meat supply chain traceability systems – abridged summary

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Executive summary

In 2019, Meat & Livestock Australia (MLA) was awarded a grant from The Commonwealth of Australia represented by the Department of Agriculture and Water Resources, issued as part of the Indonesia Australia Partnership on Food Security in the Red Meat and Cattle Sector (the Partnership). Its purpose was to undertake a scoping study to strengthen Indonesian red meat supply chain traceability systems.

This study reviewed existing relevant regulatory and commercial arrangements within Indonesia, identified options for strengthening industry self-regulation to improve supply chain traceability, identified drivers for food authenticity issues, how the policy and regulatory context in Indonesia affects Australian red meat supply chains, and identified additional work that can be undertaken to improve consumer confidence and awareness of Australian red meat in Indonesia. Dependant on the scoping study outcomes, MLA was to develop a project scope for pilot studies to test the use of authenticity/traceability systems or products and follow the path of beef from Australia to Indonesia end-to-end.

An existing commercial Australia-Indonesia supply chain was mapped and studied as a part of this project. It highlighted the complexity of both the supply chain itself and the many parties involved in delivery of the product to the end consumer as well as the regulatory framework within Indonesia, which is multifaceted and constantly shifting.

The issue of food fraud is not going away, and MLA-led Rural R&D for Profit Insights2Innovation project identified “Food without Fear” as being an important global concern. A report from Food Innovation Australia Limited (FIAL) estimates ~AUD 272 million pa fraud perpetrated on the industry in export markets and costing the industry 2% of trade value for exports to Indonesia (McLeod, 2017), which may or may not underestimate the extent of fraud since it is based on economic modelling with no sampling or testing in the marketplace to verify the estimate. Management of this threat is both a responsibility for individual supply chains and government. International, inter-governmental and multiparty cooperation is needed to combat the problem.

It’s clear that the market for authenticity/traceability systems is still maturing with both service providers and supply chain participants facing a steep learning curve. It can be a costly exercise to implement these systems, so a thorough understanding of the end consumer’s key drivers is necessary for the market (or segment) in question, including their willingness to pay for such a service. The initiator (party seeking to increase traceability) then faces the question of how to motivate all parties along the supply chain to participate and contribute to the system. Any supply chain efficiencies which could be gained should be highlighted as should any possible redistribution of profits. Plus of course the indirect benefit of mitigating risk. The benefits of these types of systems can be intangible. For example, a reduction in risk only becomes tangible if it results in reduced insurance premiums. For Australian red meat processors adoption of these systems is being slowed by a lack of clear value gain (or reduction of loss). Regardless, major international retailers are driving the adoption of authenticity/traceability systems and using them for multiple purposes including Walmart, Marks & Spencer and Carrefour.

The pilot scope has been proposed and preliminary investigations documented.

This document is the abridged summary of the full report, which was supplied to the Department of Agriculture, Water and the Environment Australia on 26 Feb 2020.

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1 Background

1.1 Purpose

In 2019, Meat & Livestock Australia (MLA) was awarded a grant from The Commonwealth of Australia represented by the Department of Agriculture and Water Resources, issued as part of the Indonesia Australia Partnership on Food Security in the Red Meat and Cattle Sector (the Partnership). Its purpose was to undertake a scoping study to strengthen Indonesian red meat supply chain traceability systems. This study was intended to include reviewing existing relevant regulatory and commercial arrangements within Indonesia, identifying options for strengthening industry self-regulation to improve supply chain traceability, identifying drivers for food authenticity issues, how the policy and regulatory context in Indonesia affects Australian red meat supply chains, and identifying additional work that can be undertaken to improve consumer confidence and awareness of Australian red meat in Indonesia. Dependant on the scoping study outcomes, MLA was to develop a project scope for pilot studies to test the use of authenticity/traceability systems or products and follow the path of beef from Australia to Indonesia end-to-end.

1.1.1 The Indonesia-Australia Red Meat and Cattle Partnership

The Partnership was developed by the Indonesian and Australian governments to combine their strengths to improve the red meat and cattle sector supply chain in Indonesia and to promote a stable trade and investment environment between Indonesia and Australia. The 10-year Partnership spans until 2023, with AUD$60 million in funding from the Australian Government and co-contributions from project Partners (The Partnership 2020). The Partnership Objectives include:

- Increase domestic and foreign investment in the red meat and cattle supply chain
- Improve security, prosperity and productivity of the Indonesian and Australian red meat and cattle industries
- Build a trusted relationship between Australian and Indonesian red meat and cattle industries and governments
- Increase Indonesia's cattle population to help meet local demand and food security targets
- Be able to respond to the increased demand for beef products in Indonesia across differentiated market segments with pricing meting consumer demands.

1.2 Australian-Indonesia relationship

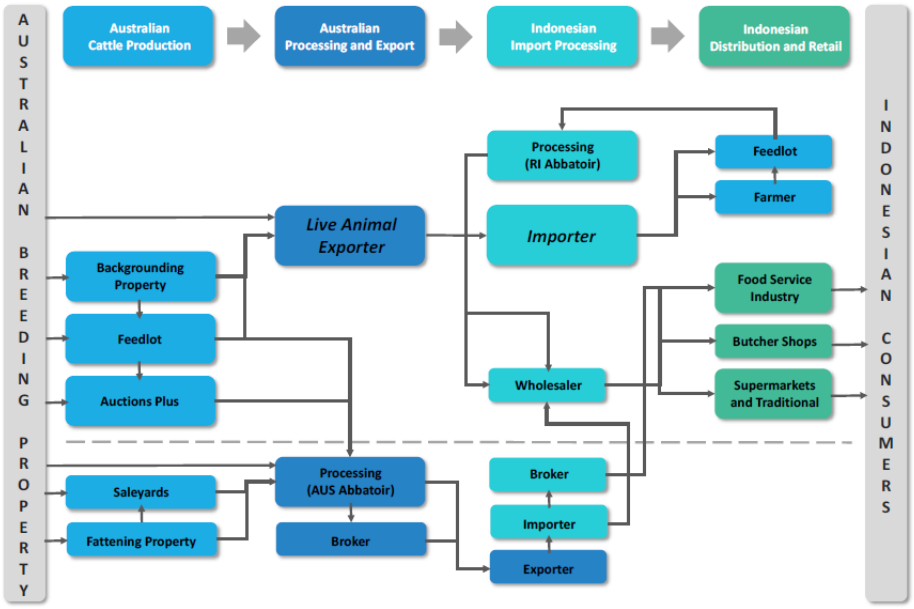
Indonesia is Australia's fourth largest agricultural export market. Australia's trade in boxed beef (and veal), cattle and beef offal with Indonesia was in 2019 valued at AUD1.2 billion (IHS Markit 2020). Trade in beef and veal alone in 2019 was valued at AUD390 million. Indonesia is Australia's largest exports for live cattle as well, with over 670,000 head exported in 2019 (MLA).

The Indonesian population is estimated at 265 million, with Jakarta the key consumption market with over 10.8 million estimated population in 2019. GDP continues to rise in Indonesia and demand for animal-based protein such as beef, chicken meat, eggs and dairy remains strong. The ASEAN-Australia New Zealand Free Trade Area (AANZFTA) agreement is in place and the Indonesian-Australian Comprehensive Economic Partnership Agreement (IA-CEPA) is anticipated to enter into force by May 2020. This means remaining tariffs on Australian-Indonesia beef exports will be eliminated by 2023. IA-CEPA also provides the platform for businesses to explore broader market opportunities, including access into third export markets.

1.2.1 Beef and cattle supply chains

Beef and cattle supply chains from Australia to Indonesia are complex (Figure 1). Given at least 20 entities will have some interaction with the product across the two countries, a high degree of cooperation and accurate data transmission from one entity to the next is required for end-to-end traceability, which is challenging.

Figure 1: Australia-Indonesia cattle and beef supply chain. Source: Maman et al 2018.



1.2.2 Market and consumer preferences

Peace of mind is identified as one of the six major growth drivers for beef in Southern Asia*, including Indonesia in the next five years (Figure 2). It is a fundamental need of consumers when they purchase meat, with safety, trusted quality and naturalness among the most sought-after attributes.

Figure 2: Southern Asia category growth drivers for beef. Source: MLA

*In this report, Southern Asia refers to the six key markets in the region, including Indonesia, Singapore, Malaysia, Vietnam, Thailand and the Philippines. These other markets are included in this report for comparison.

Of the top five most important attributes Indonesian consumers look for when buying beef, four (halal, natural, quality grade, and shelf life) are required to be transmitted from the producer and processor to the consumer through labelling or certificates.

Transparency is important to Indonesian consumers, and this can draw a premium, especially from the affluent. Indonesian consumers want to know where an animal has come from and how it has been raised and are willing to pay a premium (MLA ASEAN Attractive Cities Study 2018). Product traceability is a pre-requisite for credibility of product claims. Implementation of a traceability system would certainly assist in communicating Country of Origin claims to Indonesian consumers. Shelf-life is also important to retailers and can impact on the colour of the meat, so this too needs to be communicated via the traceability system.

1.3 Definition of traceability

Traceability, for the purposes of this project, focuses around the maintenance of product integrity. This includes tracking the chain of custody, verification of authenticity and a system to track and trace product flow. These are all forms of risk mitigation which are used in food supply chains. Achieving traceability requires cooperation throughout the whole supply chain and effective data/information sharing. Used in this way, it is a vital component to effective decision-making. 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).

1.4 Drivers of demand for traceability

MLA's Rural R&D for Profit Insights2Innovation project identified "Food without Fear" as being an important global concern. A report from FIAL estimates ~AUD 272 million pa fraud perpetrated on the industry in export markets and costing the industry 2% of trade value for exports to Indonesia (McLeod, 2017), which may or may not underestimate the extent of fraud since it is based on economic modelling with no sampling or testing in the marketplace to verify the estimate. Types of food fraud are listed below.

Table 1: Types of Food Fraud Source: UK Food Standards Agency, 2016.

Threat	Example
Adulteration – involves lowering the quality of agri-food products by adding inferior substance	Melamine included in infant dairy formula
Substitution – Replacing foods with other similar products without altering their overall characteristics	Wagyu beef is substituted with another, less expensive type of beef.
Diversion – Redirecting foods and other agricultural products from their intended usage.	Spoiled food or animal wastes used for human consumption
Misrepresentation - Marketing an agri-product as something which is not	False declaration about fish and seafood species geographic origin
Identity theft – The identify of a business or brand is used fraudulently for economic gain	Food sold using false company identification

McLeod (2017) noted that products can vary greatly in the possibility of being compromised via food fraud. More expensive items, those with large potential markets, prominent brand recognition with simple logistics and ability to camouflage operations are at higher risk from perpetrators.

1.5 Product integrity

There are strong anti-fraud systems within the Australian meat processing. Government officials supervise the operation of export meat processing establishments. Transfers of product destined for export from one registered establishment to another are controlled. Meat leaving Australia in a carton (majority of product, though some carcases, and large carcase parts are exported) has a

unique GS1-compliant barcode (per carton) and is accompanied by a Government issued certificate. Once product leaves Australia, any number of opportunities for fraud present themselves. Consumers in many of Australia's export markets presently have few ways to judge the integrity of the products they consume. Even dissatisfaction with product quality may not be reliable if the product is not genuine. Several elements should work together to provide consumer confidence before purchase, and multiple components are required to satisfy the consumer need to ensure a high level of product integrity. The components may include:

- known composition or addition of a specific tag to meat as a unique identifier
- packaging materials that may have specific/difficult-to-counterfeit features
- a label that has security features
- a label that provides access to information that flows in one or two directions between the product owner/customer/end-consumer
- auditing and information at points in the chain where a process (such as cutting and repacking) further splits products

Many of these components may be supported by data storage and transfer in the cloud or backed up by verified ledgers such as Blockchain. There is opportunity for the beef sector is to develop and improve traceability systems. Consumer assurance concerns related to food safety and religious and cultural practices are creating an increasing interest in traceability systems in Indonesia for domestic consumption and Indonesian export markets such as China. In addition to the visual cues, other approaches may be taken to ensuring the integrity of the product. A combination of elements of the integrity and traceability system may or may not interface with the consumer near the end of the value chain but do operate throughout the chain. The integrity elements facing the consumer may be linked in various ways throughout the supply chain, and may link to well-established traceability systems for animals, such as the Australian National Livestock Identification System (NLIS).

1.6 Traceability/integrity systems in action

In Indonesia, food traceability initiatives are active, including in products such as cocoa (Syahruddin and Kalchschmidt 2012); wild-caught tuna (Accenture 2018); and fish traceability and stock systems in Bitung (STELINA 2018).

Cocoa

A 2012 report by Syahruddin and Kalchschmidt reviewed traceability in the Indonesian cocoa supply chain. There are approximately 400,000–500,000 smallholders producing cocoa in Indonesia (Panliburton and Lusby, 2006). The supply chain includes growers, collectors, traders, exporters, multinationals, processors and manufactures (Bedford et al, 2002).

Low adoption, limited technology and the need for a legal framework which is more enforceable were hampering traceability at the time of Syahruddin and Kalchschmidt's study. Identification within the supply chains includes labelling systems. The labels often only included the grower names and harvest date. Later in the supply chain the product is labelled for quality. Many steps in this process are manual and this of course leads to the risk of data error (Thakur and Donnelly, 2010).

One option being considered for implementation is the Failure Mode Effect and Critically Analysis (FMECA) proposed by Bertolini, et al (2006) which is used in the industrial food industry. The introduction of regulations targeting supply chains which focused on food quality assurance (Savov and Kouzmanov, 2009) was a recommendation of the report.

Fish

In August 2018, the Indonesia Ministry of Marine Affairs and Fisheries (MMAF) launched the National Fish Traceability and Stock System (STELINA) to facilitate various international market

requirements. These included the United States' Seafood Import Monitoring Program (SIMP) and the European Union (EU) regulations which are designed to tackle Illegal, Unreported and Unregulated (IUU) fishing while supporting food safety.

2 Project objectives

2.1 Objectives

The objectives of the grant included:

1. Review and document the existing regulatory and commercial arrangements within Indonesia that lead to supply chain traceability for import and export of red meat products
2. Identify options for strengthening industry self-regulation to improve supply chain traceability
3. Identify the drivers for food authenticity issues and how the policy and regulatory context in Indonesia affects Australian red meat supply chains
4. Identify and plan additional work that can be undertaken to improve consumer confidence and awareness of Australian red meat in Indonesia
5. Dependant on the scoping study outcomes, develop a project scope for pilot studies to test the use of authenticity/traceability systems or products and follow the path of beef from Australia to Indonesia end-to-end.

3 Methodology

Terms of reference were developed to begin addressing objectives 1-2 within the grant. The purpose was to examine ways to protect Indonesian consumers, as well as the reputation of Australian beef suppliers to the Indonesian market, through improvements to red meat supply chain traceability. The study mapped the processes, players and records used to achieve end-to-end traceability in an Australia-to-Indonesia beef supply chain. Deakin University was awarded the contract for this phase of the project and their detailed finders were supplied to the Department of Agriculture, Water and the Environment Australia on 26 Feb 2020 as a part of the full final report for this project.

Since receiving Deakin University's findings, MLA has been working to contract one-two commercial case studies to test the report findings (feeding into project objectives 4 and 5). Supply chain partners with Indonesian connections have been engaged and the supply chain partner who volunteered has a fully integrated and globally recognised processing facility with capacity for value adding and retail-ready packaging. The facility is capable of processing 350,000 head per year or approximately 90,000,000 carcass kilos per annum. Following confirmation of this partnership, further terms of reference were developed and circulated via closed tender to over 40 service providers. Ten applications were received and assessed.

4 Results

4.1 Objective one: Existing arrangement within Indonesia

What follows is a summary of the relevant regulations within Indonesia. This summary has been taken from the Deakin University report which provides additional details (section 5.3 of the Deakin University report).

4.1.1 Indonesian regulatory systems related to beef imports

4.1.1.1 Indonesian livestock policy

Beef self-sustainability is one of the driving forces within the Indonesian policy environment. It's a long-term goal supported over the years by subsidies and trade constraints which were aimed at reducing import reliance. The current timeframe is to achieve beef and buffalo meat self-sufficiency by 2026. More information here. The Ministry of Agriculture's Livestock and Animal Health Statistics 2018 publication states that between 2014 and 2018 the Indonesian beef cattle population increased from 14.7 million to 17 million representing an average annual growth rate of 3.7%. Policy related to traceability.

There are several definitions of traceability and for this report policies have been highlighted which point to "the ability to trace" the history of a meat product. Hobbs (2016) classed the roles of livestock traceability systems into three sections: ex-post cost reduction; allocation of liability; and ex-ante quality verification function. Regarding Indonesia, a regulatory framework for food traceability does not existent. Traceability is on the whole, regarded as either an integral part of or with a focus on compliance with the halal certification requirement. Beef import trends are influenced by factors such as Australia's domestic livestock prices, competition from other suppliers including Indian buffalo meat and complex regulations. Given the focus on self-sustainability, imported feeder cattle are usually perceived more favourably than imported boxed beef.

4.1.1.2 Halal, Food Safety and Labelling

Halal is regularly used in reference consumable goods like food, cosmetics, and pharmaceuticals, among others. More than 87% of Indonesians identify as Muslim and the Indonesian government has invested significantly in a halal assurance system.

4.2 Objective two: Options for strengthening industry self-regulation

4.2.1 Retail motivation

Improvements in traceability systems and therefore quicker location of the source of a contamination has a three-fold effect: reduced product loss, mitigating a further loss of consumer trust and in some cases saving lives. This is the motivator for a number of large international retailers who have implemented traceability programs. Several examples are listed below, and these approaches could potentially be adopted by the larger Indonesian retail chains.

Within Indonesia, the retail environment is fragmented, with modern retail accounting for only about 7% of the channel. Products moving through these channels are likely to be higher quality and more value-added, thus more susceptible to fraud (more profitable to substitute). High end food service outlets also receive these types of products, so their supply chains are another possible target. In the traditional retail or wet market environment, there is no self-regulation around traceability and consumers usually buy meat from stall vendors based on visual cues and touch. Consumers interact with meat vendors and rely on the meat sellers to provide them with the information relating to product origin, freshness, halal and other attributes. Based on MLA-conducted survey in 2017, wet market traders stated that their customers do look for safety and quality attributes beyond price. However, limited information exists on whether meat sellers would be interested in instituting any self-regulatory measures. Given the fragmented nature of wet markets, any research on self-regulation would best be initiated in the modern retail such as supermarkets and hypermarkets.

A number of the modern retail chains in Indonesia is certified for standards such as HACCP and ISO (9001, 22000) but no traceability systems right through to consumers have been implemented to date (see Deakin report). It is estimated that about 20% of Australian boxed beef goes through the modern retail. Willingness and capacity of modern retail, including online platforms, to take up a traceability program can be tested through the end-to-end commercial supply chain pilot in phase 2.

4.2.1.1 Retail systems

A number of international retailers have implemented traceability programs. There is opportunity for Indonesian retailers to follow suit. Examples include Walmart, Marks & Spencer and Carrefour. Walmart is using a blockchain technology called Hyperledger Fabric and has significantly reduced the time it takes to track a product through their supply chain (Hyperledger 2019). In 2018 Marks & Spencer ran a "We trace it, so you can trust it" beef campaign promoting its new traceability system backed by DNA sampling through a company called Identigen (Marks & Spencer 2018). All beef is British and regular testing is carried out to ensure Marks & Spencers' standards are met. It's claimed that through the system the retailer can trace every slice of beef back to its origin farm and animal. Carrefour has implemented a blockchain traceability system for several of its product lines and plans to roll this system out gradually to other categories (Morris 2019).

4.2.1.2 Consumer willingness to pay

Before implementing an expensive traceability program tackling food fraud, supply chain participants need to have thorough understanding of consumer demand for this as well as willingness to pay. Several case studies on willingness to pay have been completed, though most focus on more developed countries. China is a focus for studies targeting emerging economies (Ortega et al. 2016; Zhang et al. 2012) and their demand for traceability systems. Ortega et al. (2016) explored emerging markets for imported beef in China and assessed Beijing consumer demand for quality attributes. The food quality attributes considered in the study included food safety, animal welfare, Green Food and Organic certification while taking into account country-of-origin. The high-level findings from the study were:

- There is strong demand for food safety assurance in beef products.
- Consumers are willing to pay more for Australian beef products than for US or domestic beef.
- Consumers prefer Green Food to Organic certification (a Chinese eco-certification scheme for food (Paull 2008)).
- Consumers are currently not willing to pay a high premium for animal welfare information.

There are presently no published case studies reviewing the consumer willingness to pay for beef traceability in Indonesia. However, MLA's market research identifies attributes which will help a product attract a premium price (MLA Global Consumer Tracker Indonesia, Malaysia, Thailand 2018, Singapore 2017). A well-integrated traceability system (information transfer) supported by verification, such as DNA sampling will assist in reducing product fraud and substitution. If, for example, buffalo meat was being repacked into Australian beef packaging and sold with under this claim, there is a direct and clear impact on the level of product consistency. A traceability system can/should be supported by a communication program which can then feature claims of relevance to that market, such as '*the animal is well cared for*'.

4.2.2 Technology interventions

McLeod (2017) concludes there are a variety of range of technologies and tools which could be used to combat food fraud. These include biological identification, DNA markers, track and trace and anti-counterfeiting packaging and labelling. These were reviewed by Rural Industries Research and Development Corporation (RIRDC) in 2016 (Table 2).

Table 2: Technology Validation capability by objective Source: RIRDC (2016)

Validation Objective	Biological identification techniques			Track and trace			Anticounterfeiting packaging and labelling		
	Trace mineral markers	Spectroscopic analysis	DNA testing	GS1 Universal Product Code Applications	GS1 Unique Product Code Applications	RFID	Low Tech labelling	Tamper proof packaging and labelling	Embedded labelling
Prevent re-use of packaging									
Prevent counterfeiting of labels/packaging									
Prevent substitution									
Prevent contamination									
Prevent spoilage									
Respond to product recalls and supply chain integrity issues									
Ensuring authenticity of origin									
Ensuring contents and ingredients									
Ensuring production practices									
Ensuring supply chain practices									
Enabling supply chain and consumer feedback									
Enabling supply chain and consumer marketing									

This is a fast-evolving space. A catalogue of potential technology service providers has been compiled and was supplied to the Department of Agriculture, Water and the Environment Australia on 26 Feb 2020 as a part of the full final report. MLA has engaged with a number of technology providers. Our experience is that technology providers have limited understanding of the complexity of red meat supply chains, over promise the technology's capability, and a tendency to overcomplicate existing processes. Australian red meat supply chains present several challenges including the geographical spread of production, in some areas limited uptake of electronic services such as eNVDs (electronic National Vendor Declarations for cattle) which could more easily feed into a blockchain system and the use of contract processing plants. For those exporters essentially buying 'kill space' at a contract processing plant, complexity is added both for them and the processor. The processor may be requested to participate in a variety of different information systems by different clients. Packing and labelling may be more time consuming beyond the usual international standards. This all adds time to the process and therefore costs the processor. The exporter is reliant on the processor's cooperation to contribute to, for example, a blockchain system and to potentially undertake additional labelling such as application of QR codes.

Information push vs pull to consumers

A combination of passive and active information channels needs to be considered when private and public sectors are trying to get their messages to their target audience (University of Melbourne 2019).

- **A website** that consumer search for is one of the most basic forms of information technology. Parties with limited interest in smart packaging may find this to be a less onerous option to consider when trying to manage food fraud risk.
- **Pictograms on a package** is a simple way to provide information to the end consumer and must be balanced with the risk that many consumers may be overwhelmed with too much information on the package. Design of the graphics is key to ensure the information is intuitive and not overwhelming to consumers.
- **Brochure in a box** is an option for on-line retail where the product is shipped in a secondary outer container allowing for inserts to be included or prints included on the secondary packaging. Again, design of these packaging graphics is critical.
- **Apps** allow for far more complex information to be accessible to the consumer. QR codes or Near Field Communication devices (NFC) are extremely common and can direct consumers to a website and provide other company or product information (i.e. authentication, animal welfare claims).
- **Government Driven/ Other** includes the value of government certifications and how the above technologies may integrate or assist with product claims made (i.e. organic).

End to end solution
A fully comprehensive end to end traceability system will most likely need to include a combination of technologies and communication tools, particularly if, in addition to traceability, some protection against fraud is desired. In order to provide the maximum assurance, attention to both packaging (and its associated information) and product (and its associated qualities) is required. As the market for these technologies matures, more and more solutions are looking to integrate tools such as biological fingerprinting, cloud computing and smartphone capability.

4.2.3 System design

Food fraud is a global concern that drives the development of systems that can also be used for product traceability and providing assurance and information for consumers. A number of approaches are being taken to food fraud including the development of analytical methods that are often very sophisticated, but those relating to information sharing and vulnerability assessment are probably of greatest value in contributing to the development of traceability systems.

There is much opportunity to learn from each other and share knowledge. Collaborations on this issue, for example, Global Food Safety Partnership (GFSP) and Global Food Safety Initiative (GFSI), encourage information sharing, capacity building and development in both government and business. Information channels need to be well integrated to ensure relevant information is clearly and quickly shared. Several commercially available databases collect and collate food safety and food fraud incidents so that supply chains can be rapidly informed, for example, Decernis (includes the United States Pharmacopoeia (USP) database), Riskplaza and HorizonScan.

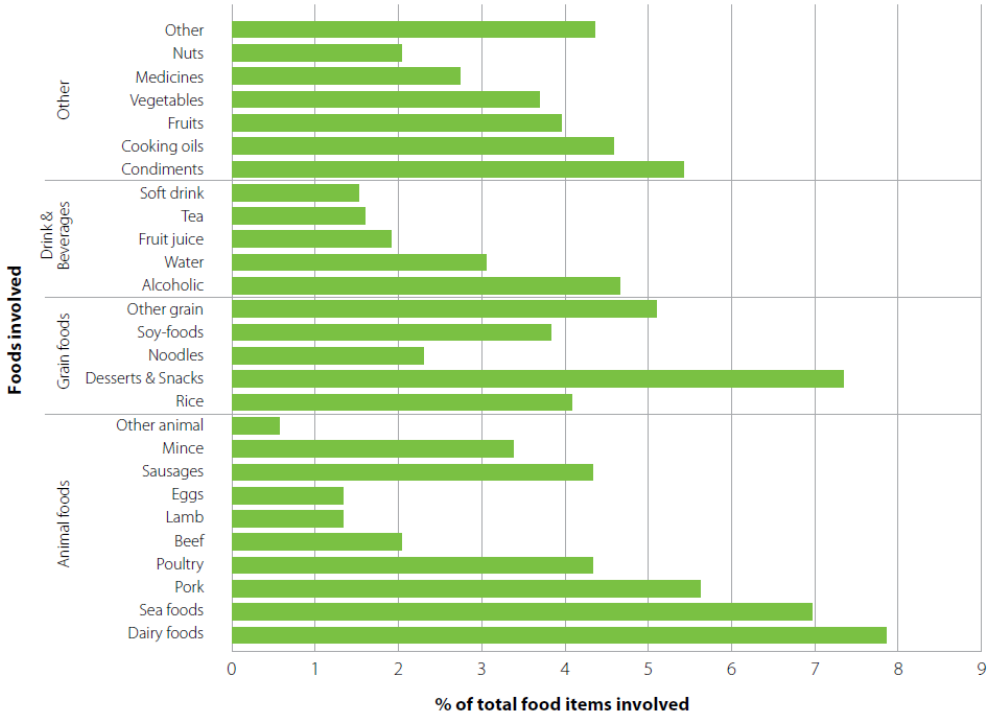
Vulnerability assessment, sometimes through a process analogous to food safety analysis (Hazard or Vulnerability assessment and critical control points; HACCP/VACCP), focuses on food fraud including systematic prevention of any potential adulteration of food, whether intentional or not, by identifying the vulnerable points in a supply chain. It is especially concerned with product substitutions, unapproved product enhancements, counterfeiting, stolen goods and others. GFSI-benchmarked certification programs (such as British Retail Consortium and FSSC 22000 programs) have a requirement for VACCP implementation. Businesses in food supply chains can benefit from taking a systematic approach to protecting their product and providing assurances to consumers, responding to retail drivers, and utilising available technologies to overcome known potential problems in their supply chain.

4.3 Objective three: Drivers for food authenticity

4.3.1 What's driving food fear

Food fraud isn't new and over time scandals have emerged within the global food industry causing both (real and perceived) public health hazards as well as economic losses. This trend continues and is evolving to become a multimillion-dollar threat to the food industry. Because of the potential impact to public health and possible erosion of access to sufficient, safe and nutritious foods, governments, academia and industry representatives from around the world now see food fraud as an increasingly important priority. The below figure shows the economic impact for foods involved in fraud incidents.

Figure 3: Food Fraud Incidents in China from 2004 to 2014. Source: Zhang and Xue (2016)



4.3.2 Drivers for practice change

Productivity gains, risk mitigation and competitive advantage/s are just some of the possible benefits to be realised by taking effective steps to manage food fraud. Given the push from both retailers and consumers for more transparency in this space, it is almost inevitable that supply chains will need to adjust their practices. McLeod (2017) outlines the drivers and benefits of mitigating food fraud, see below table.

Table 3: Drivers and benefits of food fraud mitigation

Driver	Benefit
Management of Risks	Protect brand name – Minimise reputation and revenue losses arising from counterfeiting and fraudulent use of brand name. Biosecurity – Quick and accurate tests lead to avoidance or limitation of sales ban and mandatory destruction of assets. Market Access – Unhampered access to markets where traceability is mandatory (USA, Europe, Japan). Product recall and withdrawal – Reduce costs, increase precision and efficiency while demonstrating control. Addresses consumer confidence, perception and negative publicity.

	Liability – Increased ability to prove that you are not the source of a biosecurity or public health problem. Public health & safety – Minimise costs to the economy (e.g. health costs and lost productivity) arising from public health and safety incidents.
Competitive Advantage	Build product differentiation through verification of credence attributes. Enhance brand protection through product authentication. Deliver superior customer service through product information portals. Increase sales of high value or premium products to niche markets through provenance certification. Regionalisation.
Productivity gains through supply chain management	Improve inventory management through product quality monitoring – Sourcing raw materials that optimise the performance of the manufacturing process or finished product. Enhance customer / supplier relationships through information sharing. Consistency for global logistics.

For those companies involved in the exportation of Australian beef to Indonesia, a traceability system can be seen as 'insurance'. Not only does it help ensure a safe product can be delivered, but breakdowns in the chain can be more easily identified and economic liability assigned.

4.3.3 Policy and regulation impact on Australian red meat supply chains

It is clear through the policy summary provided for Objective One, that Indonesia is placing increasing weight and importance on the issues of food fraud, food security and beef self-sustainability.

4.3.3.1 Standards and regulations

Elphick-Darling et al (2019) noted the absence of government-imposed regulations requiring the recording trace and track information in Indonesia. Furthermore, no private standards were identified either such as animal welfare, or organic for beef in Indonesia. There is however opportunity to expand current regulations through the Food Act.

While the Food Act No 18/2012 does not specifically refer to the aspect of traceability it is attempting to improve the management of information in the food system. Article 75 of the Food Act necessitates government build, arrange, and develop an integrated food and nutrition information system. Article 76 states that this system will include collection, processing, analysis, storage, presentation and dissemination of data and information about food and nutrition (Elphick-Darling et al 2019). Should the system be successfully developed and launched, it could form the basis for or be an important part of a new traceability system/s in Indonesia. Industry associations should be consulted throughout this process, such as meat processors, distributors, abattoirs and feedlots. Regulation scope could then be expanded to ensure consistent information is included at point of sale. There is also opportunity to link to the product's halal accreditation which is a key requirement for Indonesian consumers.

Regarding market access, there are several opportunities including:

- Tariff reductions - under the ASEAN-Australia New Zealand Free Trade Area (AANZFTA) the base tariff of up to 5% will be eliminated for most lines by 1 January 2020.
- The Indonesia-Australia Comprehensive Economic Partnership Agreement (IA-CEPA) guarantees automatic issue of import permits for key products.
- MoT Decree No 13/2017 means an increase to the weight limit of imported feeder cattle providing exporters with more flexibility with shipments.
- MoA Decree No 34/2016 has broadened the type of carcass and meat that can be imported to include prime cuts, secondary cuts, manufacturing cuts, fancy meats and offal including liver, heart, lung, tongue and lips.

The regulations highlight that beef importation is contingent on both domestic supply and demand for animal products indicating the continued linkages between domestic industry performance, and government's attitude towards beef importation.

4.3.3.2 Traceability and labelling

Meaningful traceability is dependent on all transformations in the chain being recorded. Indonesia does not yet have any regulations which would require the recording of such transformations. Indonesia's halal assurance program involves the establishment of processes which would contain useful traceable information. However, it is not set up with traceability in mind. Other complications include:

- There are minimal cold chain facilities in wet markets meaning they cannot comply with import regulations, though infrastructure upgrades have started. These improvements should expand the regulation compliant outlets through which imported beef could be distributed.
- Data to accurately determine shelf life are not readily shared through the supply chain. Packing dates for all product, and time-temperature data for chilled product, would allow expiry dates to be determined. To improve this situation, retailers have set specifications for suppliers consistent with ISO 22000-22005. It is difficult for any domestic suppliers to comply readily with these standards.
- There is no requirement for labels to list all product ingredients, only the 'main ingredients' (highest quantity) for processed foods. Consumers therefore do not have access to all the ingredient information.
- Traceability is hampered by in-market distributors adding their own product labels which are not correlated with the original identifier (the carton barcode) meaning the original product information is inaccessible to future customers.

There are many opportunities for change for both government and supply chain participants which will improve visibility along the chain.

4.3.3.3 Competition and price

Price protection is actively practiced and supported by Indonesian policy, for example through the floor and ceiling price policy. The wholesale or retail price for imported beef is decided based on the product quantity and type, as well as the type of business exporting from the originating country. Australia does not regulate beef prices. Australia's beef and cattle industry operates in a global market environment. Being a globally traded commodity, cattle and beef prices are dependent on global supply-demand situation and market forces.

4.3.3.4 Cooperation and resources

Enforcement of food fraud regulations requires a multi-pronged approach across authorities, law enforcement departments and the general public (Elphick-Darling et al 2019). For example, Governments of the United Kingdom and the Netherlands have created technical food crime investigation departments, where the police help trace and investigate breaches (Elphick-Darling et al 2019). Again, provision of resources and authority to combat food fraud is an opportunity for government and a way to link in with the various other international bodies in this space.

4.4 Objective four: Additional work in Indonesia

The key drivers that Indonesian consumers consider when purchasing Australian red meat include consistent quality, halal and food safety and price (Elphick-Darling et al 2019). MLA is working with trade, retail and foodservice partners in Indonesia to promote the integrity and quality attributes of Australian red meat. This includes trade workshops and product knowledge sessions as well as

consumer-facing True Aussie international marketing campaigns. There is scope to broaden the awareness work to include partners with other like-minded organisations to raise awareness about food fraud and what Australia is doing in this space.

Given the impact of food fraud globally, there is much opportunity to learn from each other and share knowledge. The Global Food Safety Partnership (GFSP) and Global Food Safety Initiative (GFSI), both encourage information sharing, capacity building and development in government and business.

GFSI is a private organization, established and managed by the international trade association, the Consumer Goods Forum under Belgian law in 2000. GFSI maintains a system which benchmarks food safety standards for manufacturers as well as farm assurance standards. GFSI has three strategic objectives - benchmarking and harmonisation; capacity building and public-private collaboration. GFSP is a public-private initiative dedicated to supporting and promoting global cooperation for food safety capacity building. GFSP can review food safety systems and suggest interventions to address food sector concerns and prioritize hazards and threats. Both GFSI and GFSP are supported by major international food manufacturers and retailers. Both organisations have strong themes around capability building and knowledge sharing. Many of MLA's activities in this area closely align with GFSI's and GFSP's themes (Table 4).

Table 4: GFSI strategic objectives and relevant MLA activities

Themes	MLA activities
Benchmarking and standards	MLA provides the Australian red meat industry with opportunities to produce products to the highest standards and meet and exceed consumer expectations. Benchmarking performance of the Australian industry is an essential planning tool. Consumer attitudes towards Australian product, activities of other meat-producing countries, and available technologies in other industries are a first step in planning for future work. Harmonisation of activities and the standards employed between companies, commodities and countries is an important pre-requisite for efficient supply chains. MLA collaborates with Codex Alimentarius activities, GFSI food safety systems, GS1 product identification systems to ensure that the work we do aligns with global directions.
Capacity building	Possible technology solutions MLA has developed a service provider 'catalogue' for use by industry. Marker technology A project has been initiated to pilot a 'marker' technology in an effort to show beef and lamb produced in Australia can be scientifically distinguished from meat produced in other countries. The technology offering places no reliance on packaging, bar codes, tag and trace, or additives and delivers an innate chemical "fingerprint" for products (focusing on trace elements and isotopes). This fingerprint ties them to their production or manufacturer origin which supports provenance claims and identifies substitution and counterfeit goods. If the technology is successful industry will be in a position to audit (test) products from anywhere in global supply chains to determine that products labelled as Australian beef and lamb are true to their claimed country of origin. MLA is actively engaging with companies with 'marker' technology to participate in the below-mentioned case studies. Commercial case studies Through commercially-based case studies, MLA is seeking to test several options to provide customers and consumers with confirmation of the authenticity of product. • Trial 1 seeks to build on this project and features an Australian exporter with supply chains into Indonesian and Japan. The technology solutions likely to be trialled include a combination of source verification (DNA and isotopes) and data integration linking producers with the end consumers.

	• Trial 2 will trial a data integration system for an Australian exporter with supply chains into Singapore, Japan, and the United Arab Emirates. The technology solution is designed to provide solutions that offer end-to-end traceability and provide a "single version of the truth" for the consumer, producer and supply chain participants. • Trial 3 involves a fully-integrated beef supply chain into China. It will connect Australian farmers and exporters to retailers and consumers in China proving the authenticity of beef products and link those goods with evidence of the journey, brand story, and compliance collected and shared as the product moves along the supply chain. The trails will not only test the technology offerings but draw out the learnings via case studies which can then be used through MLA's communication channels to help build capability in other supply chains. Capability building is a high priority for MLA as the market seems to be particularly confused presently regarding how, when and where technologies can most effectively be used as well as which technologies (including Blockchain) can deliver as promised in a commercial environment. <u>Market research</u> MLA is contracting a project to undertake market research to better understand; a) who generates value from implementing a traceability system and therefore if implementation is 'worthwhile'; b) how supply chain participants can be incentivised to participate and c) identify which are the most promising products and markets (or market segments) where value can be derived from implementing an integrity system for various attributes. Findings from this work will be shared across the industry and with potential service providers. <u>Education and awareness-raising</u> MLA is working with commercial partners to promote Australia's red meat integrity systems and programs right through to end-consumers. In high end modern retail, there is further opportunity to partner and undertake in-store campaigns to investigate consumer's interest in product claims, country of origin labelling and other additional labelling.
Public-private collaboration	MLA is actively encouraging public/private collaboration. All case studies have been initiated once a commercial supply chain has agreed to participate and volunteer their knowledge and connections. The market research mentioned above is being funded by public funds and the case studies are wherever possible being funded via a mix of private investment and public.

Regarding the above-mentioned trials, the Partnership may wish to engage more directly to better understand their achievements and encourage other supply chains to consider a similar application. Further, the Partnership may desire to encourage Australia Indonesia supply chains to meet certain standards and follow certain approaches to supply chain traceability and providing proof of authenticity. The Australian and Indonesian governments may also choose to become more closely involved in how existing systems such as eCert and EXDOC on the Australian side and complementary systems on the Indonesian side can be integrated into the commercial information systems to learn what efficiency gains can be made.

MLA has not engaged with Indonesian retail chains extensively in the work conducted to date. The engagement of retailers is key, not just because they are near to the end of the supply chain, but because the benefits to consumers need to be communicated, and the benefits to retailers need to be shared with the supply chain. Commitment from retailers to the concept and the business model is crucial to wider success. The Indonesia Australia Red Meat & Cattle Partnership may wish to

initiate an engagement process with Indonesian retailers to increase their capabilities and involvement initiating future trials. Additional recommendations are listed in section five of this report.

4.5 Objective five: Possible pilot studies

Detailed below is the proposed project scope for pilot studies to test the use of authenticity/traceability systems and follow the path of beef from Australia to Indonesia end-to-end. Scope development was all that was required for this objective, not execution.

4.5.1 Pilot goals

The below goals have been identified for the proposed pilot study:

- Learn how to integrate technologies to design a supply chain that can provide adequate assurance to consumers
- Determine if the authenticity/traceability system chosen for trial works effectively and provides adequate assurance to customers in a commercial setting
- Generate case study materials for communication to supply chains, technology providers and other interested parties to encourage further development and adoption of appropriate technologies
- Assess the commercial benefits of applying such a technology
- Test the uptake of the traceability system at the end-customer/consumer level and validate the value proposition that customers and consumers are willing to pay a premium for traceable product.
- Increase usage of country of origin labelling for red meat.
- Increase the capability of technology providers and supply chain participants
- Increase the number of technologies explored so that supply chains are better able to make informed decisions
- Help supply chain partners to understand how to ensure that these systems deliver value for consumers and supply chain participants

The pilot must be implemented in conjunction with:

- An Australian-Indonesian supply chain with access to their systems, contacts, distribution networks etc
- Suitable technology service provider/s who can address the needs of the specific supply chain

Following this, learnings and communication collateral can start to be developed from the pilot. The ideal would be for commercial businesses to then take the lead on traceability. Apart from technological applicability, the trial should also provide insights on customers/end-consumers views towards food fraud, labelling and traceability, and validate whether they are willing to pay more for traceable products.

It should be noted that MLA has taken some steps initiate a pilot as described above, above and beyond the remit of this project objective. Activity so far:

- A supply chain partner with Indonesian connections was sought out to participate. The company which volunteered has a globally recognised processing facility with capacity for value adding and retail-ready packaging.
- Tenders were sought from service providers across the globe to participate in the pilot. Ten applications were received and assessed, and applicants detailed their proposed solutions.

The technology solutions likely to be trialled include a combination of source verification (DNA and isotopes) and data integration linking producers with the end consumers.

Learnings from this trial will include technological limitations as well as non-technological (e.g. regulatory, environmental, social, economic, logistical, etc.) that may hamper sustainable application. Case studies will be produced for the industry's use showcasing the learnings from the process and applicability or not of the technologies used.

5 Conclusions/recommendations

5.1 Learnings

Learnings from this project can be summarised as follows:

- The Indonesian policy and regulation landscape is complex and ever changing so those actors wishing to interact in this market place must be vigilant to change in this space
- A strong policy theme within Indonesian policy is the drive toward beef self-sustainability
- Indonesia is placing increasing weight and importance on the issue of food fraud and even more so, food security
- Major retailers are driving the adoption of authenticity/traceability systems and using them for multiple purposes
- It is likely that multiple service providers and technologies will be required to work together for a full end-to-end solution to the meat supply chain.
- Service providers in this space still have much to learn about the agriculture sector and how they can truly add value to the process
- For many supply chain participants, the benefits of these types of systems can be intangible for example a reduction in risk only becomes tangible if it results in reduced insurance premiums. Adoption of these systems by Australian red meat exporters is being slowed by a lack of clear value gain (or reduction of loss).
- Before implementing an authenticity/traceability system, businesses must have a thorough understanding of their consumer's willingness to pay for this additional service.

5.2 Recommendations (general)

Recommendations from this project can be summarised as follows

- Adoption of traceability systems by Australian red meat exporters is being slowed by a lack of clear value gain as the benefits are largely intangible. MLA needs to build this argument and communicate clear savings to supply chains.
- Additional work is required to better understand how best to incentivise cooperation across supply chains and sectors for seamless data transfer
- Within Indonesia, pilot projects or case studies could be conducted to validate the traceability system as well as to be better understand the social and commercial benefits of its application. Depending on pilot project learnings, there is scope to expand this to other products, including the live cattle trade between Indonesia and Australia.
- Both individual supply chains and government must take responsibility to combat food fraud. The issue of food fraud is a global one and international, inter-governmental and multiparty cooperation is needed to combat it. All parties must stay abreast of this issue.

5.3 Recommendations (for The Partnership)

What follows are a series of recommendations for the Partnership which align to the group's objectives.

- Given the complexity of the Indonesian policy and regulation landscape for actors wishing to interact in that marketplace, the Partnership may be able to play a role in both helping to reduce complexity and communicate necessary changes to ensure supply chain partners remain up to date
- Improvements in cold chain management throughout the supply chains will improve consumer experiences and likely reduce product losses/rejections. Improvements could include cold chain monitoring throughout transport from the Australian processing plant to continued upgrades to Indonesian facilities (i.e. more modern wet markets). Many wet markets have no refrigeration facilities and thus cannot comply with import regulations. Improvements in cold chain management will assist in meeting consumer expectations regarding quality, shelf life and traceability.
- The Partnership may be able to play a role in facilitating improvements to product labelling. Labels need to include expiry dates, full ingredient lists and country of origin. Again, this will assist in meeting consumer expectations regarding quality, shelf-life and traceability.
- The Partnership may be able to facilitate improved/increased focus on food fraud. This may include:
    - technical food crime investigation or at least cooperation with international government departments
    - development of partnerships with organisations such as GFSP and GFSI to facilitate information sharing, capacity building and development in government and business
    - The Australian and Indonesian governments may choose to become more closely involved in how existing systems such as eCert and (N)EXDOC on the Australian side and complementary systems on the Indonesian side can be integrated into the commercial information systems to learn what efficiency gains can be made.
    - The Partnership may be able to facilitate engagement between Indonesian retailers, MLA and the Australian supply chain participants to ensure the retailers' and consumers' needs are well understood and met. This may also assist in the provision of improved communication of the benefits of traceability to retailers/consumers. The Partnership may wish to initiate an engagement process with Indonesian retailers to increase their capabilities and involvement initiating future programs.
    - The Partnership may wish to engage more directly with MLA's the trials to better understand their achievements, publicising their operation, encouraging other supply chains to consider a similar application etc. Funding in addition to that made available by the technology provider would likely be required. The Partnership may gain sufficient understanding of the systems and the benefits during multiple trials that there is a desire to encourage Australia-Indonesia supply chains, to meet certain standards and follow certain approaches to supply chain traceability and providing proof of authenticity.

5.4 Conclusion

The issue of food fraud is not going away, and the MLA-led Rural R&D for Profit Insights2Innovation project identified "Food without Fear" as being an important global concern with FIAL estimating ~AUD 272 million pa fraud perpetrated on the industry in export markets (McLeod, 2017).

This project has provided valuable insights into the nuances of the Australia-Indonesia red meat supply chains and has identified additional work that can be undertaken to improve consumer

confidence and awareness of Australian red meat in Indonesia. The market for authenticity/traceability systems is still maturing with both service providers and supply chain participants facing a steep learning curve, though regardless, major international retailers are driving adoption of these systems.

Management of the threat of food fraud is both a responsibility for individual supply chains and government. International, inter-governmental and multiparty cooperation is needed to combat the problem and there is much opportunity to learn from others who are further ahead in this space.

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