LIVESTOCK DATA LINK – ANALYSIS OF BENEFITS FOR PROCESSING SECTOR

FINAL REPORT

FOR MEAT AND LIVESTOCK AUSTRALIA

April 20 2012

PROAND ASSOCIATES AUSTRALIA PTY LTD

65 Payten Avenue
Roselands. Sydney. NSW 2196
Australia

Telephone: +61 2 9879 5500
Facsimile: +61 2 8079 6971
www.proand.com.au

CONTENTS

TABLE OF FIGURES

ACKNOWLEDGEMENTS

ProAnd Associates Australia acknowledges the assistance of the numerous processors who agreed to requests for appointments and consultation in March 2012. Their responses included provision of commercial data and practical information relating to compliance and specification issues which have contributed to our understanding of the potential for the Livestock Data Link. We would also like to thank representatives of stakeholder and advisory groups who supplied data on a range of issues to assist with this analysis.

EXECUTIVE SUMMARY

The report assesses the benefits available to the meat processing sector through use of the Livestock Data Link (LDL) initiative. The report found that non-compliance of beef carcases against agreed specifications costs the production sector up to $51 million annually. In addition, there is an estimated $64 million lost annually through carcase condemns and between $12 million and $49 million in offal and meat condemns, largely due to animal disease. LDL presents a robust and efficient means of managing non-compliance and losses due to disease in the processing setting.

Non-compliance, or non-conformance, occurs when a beast is out-of-specification to one or more parameters. Parameters can include carcase weight; fat depth; fat coverage; age by dentition or ossification; and marble score. The importance of each of these parameters varies according to the intended market destination. Other parameters are linked to quality, such as pH. For example, carcase weight is the most common cause of non-conformance for domestic supermarket and retail butcher grade cattle and for B2 Japan Ox. The marbling score parameter also features for Japan Ox; while meat colour and fat depth feature for the Korean steer category (which has the highest level of non-compliance of all the categories reported).

If the processor finds the carcase has missed a parameter, the company may penalise the supplier by discounting the amount paid on a cents per kilogram carcase weight basis. The penalty acts as a disincentive to the supplier who has sent out-of-specification stock which must be replaced in order to fill the order with the processor's customer.

LDL enables the processor to review carcase attributes for one or more carcases on-screen against a pre-defined grid for a given market or category, and to see each carcase's level of compliance against the grid's specifications, as well as for the group overall. The user can then hyperlink to relevant information on-screen to improve future carcase compliance. LDL also summarises the number of condemned stock recorded in a given group of animals. The software has the potential to include a disease-tracking feature to assist in quantifying volumes and revenue lost in offal retrieval to sub-clinical disease.

Conservative estimates by the project team found that some market categories lose as much as $280 per head through discounts for failure against one or more criteria. This is passed back to the producer in the form of a financial penalty. Consultation with processors explored the level of non-compliance experienced in their plants and established the main attributes or criteria against which they assess carcases for specific market categories to arrive at estimates of the cost of non-compliance.

Processors identified that LDL could be used as a business tool to track and better manage compliance and related issues (like disease incidence) and to provide more feedback to suppliers/producers. The tool can be used by companies and industry groups to obtain an insight into performance against pre-defined product/livestock grids. When developed, LDL could work as an important adjunct to a company's existing carcase data management systems. It could also be used by companies which have not yet committed human and financial resources to gather and analyse compliance data. For this latter group, LDL is a real and immediate solution to their information management needs.

Compliance against contracts is managed by different businesses in different ways: processors can turn out-of-specification carcases to advantage by taking a penalty off the

supplier and using the bodies received for more appropriate orders. Most companies, locked into tightly-specified contracts with customers, prefer to minimise the risk of processing non-complying bodies and avoid the cost and disruption of sourcing additional livestock. These companies would find LDL a significant boost to their situation.

The issue of transparency of data collected and accessible through LDL needs to be considered, including which parties can access compliance data (not currently available to whole-of-chain); and also what might potentially be revealed about companies' management of non-compliant bodies.

Processors are interested in the LDL offering because it can be used as a business analysis tool for handling complex specification data. Matching carcase suitability to different target markets will be substantially improved using this software and the ability to add user-defined grids is a positive factor in selling the concept to processors.

A literature search for the Australian, New Zealand and US processing sectors found a dearth of information about the costs of sub-clinical disease in cattle to processors (as opposed to the on-farm sector), yet plant operators routinely absorb lost revenue (as well as labour, inspection and disposal costs) when disease is detected. Building LDL with an animal disease information and feedback application could well encourage processors to look closely at the LDL offering. The option would enable information to go back to the producer about disease issues such as liver fluke and pneumonia, as well as collect information to quantify the costs of disease to the industry.

Consultation also uncovered positive interest about an LDL designed for the sheep sector. The report addresses this briefly and recommends this be further investigated.

A case study of Meat Standards Australia (MSA) identified some of the challenges and benefits likely to flow from rolling out LDL. Although MSA is a product description system, not a business tool like LDL, synergies definitely exist between the two concepts which will enable LDL's potential to be better realised. The case study suggests a modest but steady buildup in participating numbers is the best way to build lasting improvement and benefit from the system. As more processors take up LDL, the quality of feedback they are able to provide to growers will increase and this will strengthen the producer-processor relationship as well as enhance their own standing as a preferred buyer for private consignments including over-the-hooks. The report estimates the value of improved compliance under the MSA program 2007-2011 to be in the order of $17 million or an additional $7.90 per head graded.

1 INTRODUCTION AND TERMS OF REFERENCE

1.1 Purpose of the Project

The purpose of the project is to assess Livestock Data Link (LDL)'s capacity to provide benefits to the Australian beef processing sector by providing better information on non-complying carcases.

Livestock Data Link is a web-enabled interface that enables exchange and utilisation of information about individual beef carcases using the identifying NLIS code of each beast. (This potentially enables analysis at herd, supplier, regional, state and national level and keeps all data private and secure.) It offers significant potential to call up information on consignment lots and to indicate percentage compliance rates. LDL reports on compliance levels for specific groups of carcases against pre-defined livestock product grids, with the ability to drill down to individual carcases within the group to discover the reason for non-compliance. A series of livestock product grids has been developed for different market sectors (e.g. Lightweight Yearling, JapOx and similar descriptors) to enable carcase performance to be analysed specifically against the standard. All this information is presented in an on-screen graphics format. In its present stage of development, LDL also contains hyperlinks to the Solutions to Feedback feature which gives on-screen information about non-compliance factors and how to minimize them in future. Users can define their own grids for specific livestock categories or target markets as circumstances require, then add those to the grid library for later use.

LDL shows an on-screen estimate of the cost of any non-compliance for a particular range of data (beasts) against several key criteria. The cost is calculated on the basis of the discount which would be applied for the carcase/group of carcases not meeting the target. Information about the value of the discount can also be altered by the user for their circumstances and practices.

A tool of this kind could potentially assist processors in assessing livestock for different markets and in appreciating what impact non-compliance has on their day-to-day business, including taking into account mortalities/condemned bodies; over-fat carcases which will require the application of further labour for trimming; and downgrades due to other non-complying criteria. The results of the project should assist Meat and Livestock Australia (MLA) to better understand how beef processors currently approach compliance criteria; the likely impact of improved compliance information on their businesses; features which could be altered or added to the interface, including disease information; and the lessons learnt from the evolution of Meat Standards Australia (MSA), an industry program which also manages detailed carcase information for improved value.

1.2 Methodology

The methodology used in the project is discussed below and was developed in response to the project's Terms of Reference. The main elements of the methodology comprised the following:

1. familiarization with the LDL interface, its components, logic and base data, through the use of test data on the LDL website;

2. assessment of what compliance and non-compliance entail in the processing setting, and the steps that processors instinctively take to lessen their exposure to non-complying carcases;

3. development of a consultation questionnaire/discussion guide to discover the salient issues for processors, the systems and details used to record non-compliance, as well as incidence of animal disease;

4. conducting a desktop review of animal health / disease issues for processors and likely impact on profitability;

5. organising a visit program with processors and other groups to yield relevant information about:
    a. their carcase feedback protocols
    b. existing level of data usage and analysis
    c. perceived impact of compliance on profitability
    d. hierarchy of compliance characteristics
    e. penalties/discounts against non-compliance
    f. other relevant findings

6. undertaking the consultation program;

7. assessing uptake and progress of the MSA program of the MSA program development, particularly in regard to program uptake, education of producers, premiums against other non-MSA product;

8. analysis of results and findings from the processor consultation including development of a benefits matrix; and

9. preparation of a final report with conclusions and recommendations about the potential benefits of LDL for processing and, where appropriate, the wider industry.

In this report, compliance means the level of adherence by a carcase or group of carcases to a defined standard or standards. Compliance to MSA standards means relevant pH, fat cover and meat colour characteristics.

2 PROCESSING SECTOR BENEFITS

2.1 Overview of Consultation Phase

The project team organised a visit programme to beef processors (including independent operators and corporate groups) and supermarkets in the period 13 March – 28 March 2012. A total of 28 entities was approached, with approximately 80% of approaches resulting in an interview.

All states were represented in the consultation phase, with particular emphasis in Qld and southern NSW/Vic regions. There was also a good cross-section of firms in regard to throughput levels and ownership structures, with large, medium scale and smaller works being approached. All except 3 enterprises are export-registered.

Interviews were conducted with one or more company representatives in the following capacities: proprietor; managing director; chief executive officer; general manager; and principal livestock buyer.

A brief introduction was given about the purpose of the visit, followed by a demonstration of the LDL test interface. Where the LDL website could not be accessed over the internet, a

short PowerPoint summary showed the interactive aspects of the LDL system, especially the graphics indicating compliance/non-compliance for various criteria. The team also advised participants that they would be able to devise their own customised livestock grid with relative ease.

A written interview guide helped establish information about average throughput levels, livestock acquisition methods and the main livestock categories and market sectors currently being targeted by the firm. The team then sought to identify:

1) the 3-5 most important compliance criteria for these livestock categories/target markets;
2) the current levels of compliance;
3) the method for recording level of compliance;
4) penalties/discounts against specific non-compliance
5) how feedback is provided to the livestock supplier (producer or lotfeeders), if at all; and
6) the company's likely use of information about compliance levels.

2.2 Perceived Benefits of LDL for the Processing Sector

The team encountered a wide range of responses about the perceived benefits to the processing sector. Some companies demonstrated a very high degree of protectionism around the subject of information sharing and what this meant to the commercial relationships they develop with their clients. Companies that had already invested heavily in software and systems to provide data to their clients were initially less accommodating about the concept of Livestock Data Link, although the majority of companies were able to identify some features of the system that could enhance their own internal report systems.

As an adjunct to the NLIS system, Livestock Data Link obtains immediate credibility with processors because they are able to relate to the success and advancements the NLIS system has delivered for capturing information and data about individual beef animals. Many processors now recognise the implementation challenges associated with the development of the NLIS systems were worthwhile and have given the industry a robust and transparent system which can now be used to identify the previous stakeholder in their supply chain. The fact that the NLIS system only permits the industry user to go back one PIC number in the supply chain is, however, also one of the factors that neutralises one of the major perceived benefits identified with the Livestock Data Link, that is, the ability to connect the Breeder – Backgrounder – Finisher in the supply chain.

2.2.1 A Positive for Benchmarking Production Performance

The capacity to be able to benchmark production performance was identified as a major benefit of the Livestock Data Link system. The benchmark could come in several different formats and deliver a variety of assessments along different parts of the supply chain. Some processors even considered that the benchmarking of yield, recovery and quality issues within the processing sector's part of the supply chain could prove useful. However most of the focuses on the benefits of benchmarking were perceived to be for the benefit of the producers as they examined lot and herd performance, in conjunction with property, geographical factors and applied climatic and environmental elements to the results.

The benefit of benchmarking the financial returns of different kill lots, through the ability to apply different grids to the kill results captured in the LDL system, was the subject of mixed views on the acceptability of such a tool. The general consensus was that if the functionality within the system was such that it allowed producers to consider the different marketing options available due to physical attributes of a line of cattle, then the system was of benefit. However a number of processors expressed concern that the functionality of the system was

such that the main purpose of the benchmarking was to compare the financial returns available from different grids from competing processors, although some companies also saw this as an advantage of the system that should be retained.

2.2.2 LDL's E-data Facility Will Build Processors' Own IT Capacity

The processing sector recognised the benefit of the electronic transfer of data associated with Livestock Data Link. Most importantly in this area, the industry was accepting of the fact that, because the information was disseminated in all the same format, it provided producers with the ability to consolidate different kill information from different sources to the benefit of the producers' own internal administration efficiency. This benefit was most strongly recognised by the processors that were specialists in single market segments and acknowledged that their relationship with the producer was neither exclusive nor guaranteed. All processors acknowledged that benefits in improving administration functionality for producers have flow-on benefits to the entire industry. The degree to which processors accepted this was a priority development for the industry varied in some correlation with degree to which the companies had already invested in their own internal systems to deliver producer information electronically. This is supported by the fact that some companies currently without their own internal data recording systems saw LDL as a possible solution for their immediate needs in this field.

The system's delivery of MSA data in a consistent format was perceived as a benefit of the LDL system. The team was questioned about the amount of doubling up of information there would be between a refined LDL system and the current MSA reporting format. It was suggested that perhaps the two systems could be amalgamated into one system that delivered the requirements of MSA and AUS-MEAT reporting and could then be enhanced with some of the functionality of the LDL system.

The benefits of improved (or in many cases first time) reporting of disease incidences for the benefit of producers was widely endorsed by processors, even though the majority of companies placed disease information in cattle as very low priority.

2.2.3 Interest in an LDL for Sheep

Two processors, including one major player, said the LDL system could be of more benefit to their sheep business than to the beef business. Neither of these companies has a well-developed system for feeding information back to producers. The MSA program for sheep is still relatively new, so this may be a favourable time to incorporate the benefits of both MSA and LDL style reporting into an information model that improves reporting back to sheep producers.

Currently a high proportion of lambs slaughtered in the eastern states are purchased on an All Weights All Grades basis. This can create a significant issue with over-fat product, which LDL could start to address through the Solutions to Feedback capability. Disease issues in many respects are of greater concern to processors in sheep than they are in beef; therefore processors recognise the benefits this LDL component could provide to whole of industry. For example, seed infestation is a significant problem in lamb production. Processors acknowledge their own reporting systems are largely inadequate to capture this issue and, when it occurs, it can become the subject of discontent between lamb growers and lamb processors.

2.2.4 Lessons from the Consultation Phase

Non-compliance or non-delivery on quality attributes costs beef producers up to $150 per head. The above figure contains a reasonably high level to discount factor in the deductions

that are incurred by producers from cattle that grade outside the grid criteria. The methodology that processors use in determining the appropriate deductions to impose for quality criteria varies across processors, supply chains and also across geographical locations.

Non-compliance deductions, or discounts, are one of the most powerful methods of motivating producers into taking action to improve the quality of the animals they supply into their respective beef market supply chains. From a processor's point of view, the tighter his own customers' requirements are, the greater the issue of non-compliant carcases will be to his business. In the case of a processor using an integrated supply chain, whose entire business is to supply a customer each day with a specified quantity of chilled carcases, all within a tight weight range, a run of non-compliant cattle presents him with two major problems. First, he must replace the beasts that failed the weight criteria. Second, he must now divert the carcases that do not have a natural market in his business. He discounts the non-compliant carcases in order to send a strong price signal to the producer about the importance of weight ranges in his selection criteria. As the volume of cattle sold Over-the-hook or through integrated supply arrangements grows, the greater the need to enable messages about quality and selection criteria to permeate back to the supplier, either the farmer of the feedlot.

Awareness of the Livestock Data Link initiative amongst the processing sector varied considerably. Many senior executives were aware of the concept from exposure at industry committee level, but the detail of the project was not widely understood. Overall, smaller operators were altogether unaware of the project and yet this group expressed good to strong interest in further information about LDL. One pastoral company visited by the team recently invested in an in-house Information Technology project to deliver the same functionality that Livestock Data Link is designed to deliver.

Coupled with the concern of doubling up on internal systems already in place was the concern from some companies about maintaining third-party data bases. The relationship between LDL and MSA was acknowledged as critical to the beef sector, as was the space that LDL occupies within the NLIS system. Questions were asked about the anticipated degree of industry participation, with one senior executive insisting it would need to be made compulsory on behalf of all of industry before his company would make the commitment to support the system. Another operator appeared determined there would be no voluntary involvement from their company in LDL at all. As a standalone initiative, LDL may be hard to sell to some industry participants in the processing industry because it is not clear yet where this system fits into the MLA's overall industry systems and information portfolio.

Notwithstanding the previous point, there is strong support in theory amongst the processing sector for any system that provides information to help producers and provides them with better information about carcases through their processing plants. There is acknowledgement from within the sector that improvements in producer reporting are also necessary due to inadequacy and inconsistency in some of the current systems and indeed lack of use of the current systems. Overarching all these viewpoints is the strong concern expressed by industry that commercial information must be maintained in-confidence between the farmer and the respective meat company at all times. (It is acknowledged that some parties may be opposed to initiatives which gives information gleaned at processing stage to other participants, as a crude means of keeping market and pricing information to themselves.)

In the course of consultations, four businesses stated they wish to be contacted about possibly becoming test sites and providing kill information for the LDL initiative. Details of these

firms will be provided to MLA separately. Three of the businesses are small to mid-sized processing plants, privately-owned, with proprietors that take a close and direct interest in livestock sales and carcase performance.

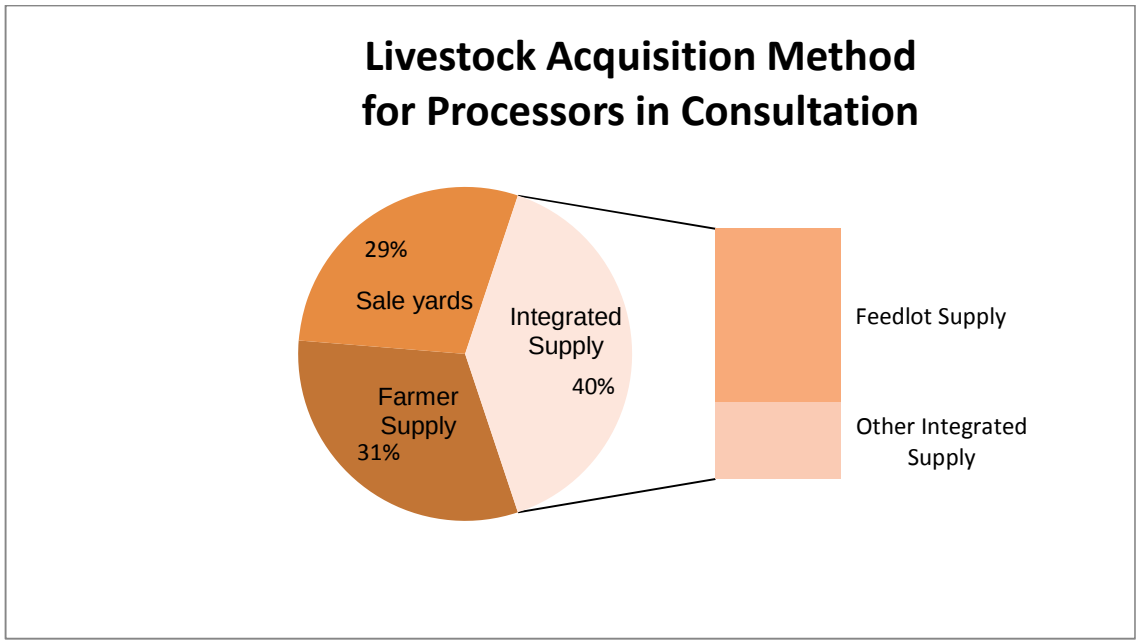
2.3 Feedback Currently Provided to Producers

The consultation stage covered a wide range of meat processors and producer groups connected to the beef supply chain at different points and in different business models. These business models include:

- Dedicated integrated supply chains with their own complex feedback and livestock supply mechanisms
- "Over-the-hooks" (OTH) buyers of livestock
- Sole-plant operators and multi-plant groups (interstate and intrastate) sourcing livestock through sale yards and paddock auctions and supply chain arrangements.

These business models may also be influenced by their primary market focus. In considering the way livestock are acquired, the project team observed that the different supply routes were fairly evenly represented, as indicated in Figure 1. Integrated supply chains represented about 40% of plant acquisitions by volume, with direct-from-farmer and other private methods at 31% and the sale yards-sourced route at 29%. This fact is significant because it suggests a high proportion of cattle are currently acquired through mechanisms which readily lend themselves to conveying information back to the grower about non-compliance issues. The trend could grow if the integrated supply chains favoured by supermarket chains expand further.

FIGURE 1 –LIVESTOCK ACQUISITION METHOD BY VOLUME



Source: ProAnd data from consultation

Large and small companies are involved in integrated supply chain systems in the various forms that exist in the Australian beef processing sector. The most common type of integrated supply system includes the use of feedlots. These feedlots may be owned and operated by the meat processing companies, or completely independent of the processing company and dealing with their choice of processor or processors on a straight commercial basis. Either way there is normally a contractual arrangement and understanding of the deliverables in the relationship between the feedlot and processing company. On the whole, the relationships between feedlots and processing companies are robust, presumed to be long-term i.e. not speculative and driven by common objectives of delivering quality cattle to specification on time and to order. These relationships create the need for strong communication systems to be built between the parties. Often this communication has been developed on the back of informal conversations and feedback methods.

There was limited consultation directly with feedlotters for this project, however, the feedback received suggested that information systems between feedlots and processors is predominantly designed around the requirements of the processor, rather than delivering all the carcase and related information that feedlots could potentially use to improve the efficiency of their operations. These improvements could be effected on a short-term basis i.e. different feeding regimes in the fortnight prior to slaughter; drafting and selection processes, transport and other facets which can directly impact carcase characteristics. Longer-term improvements may be related to carcase confirmation, breed and Tropical Breed Content (TBC) facets which the feedlot may wish to consider in their acquisition systems. Feedlot operators that deal with multiple suppliers were particularly insistent on this issue, stating that the ability to consolidate kill results is equally as important to feedlot operators as it is to meat processing plants. This is an aspect which LDL development will possibly seek to address.

Some processing companies in turn expressed the view that when it comes to their relationship with feedlots as suppliers or clients, the functionality and information which would be available through LDL is potentially doubling up on their own feedback systems. From the range of feedback sheets the project team were shown during consultation, it was observed that current reporting systems supply the basic carcase information to show the supplier how carcases performed against particular criteria, but that many do not capture all the information available on what the carcases' full potential could have been.

The supply stream sourced directly from farmers remains of high importance to all meat processors. The percentage of individual kills sourced directly from farmers ranged from a low of 20% to a high of 100% (i.e. these companies take no feedlot or sale yard cattle), depending on their procurement policies. Regardless of where individual companies sat in this range, each perceives the relationship with farmers as critical to the sustainability of their processing objectives and values it accordingly.

Some processors maintained that feedback from their plants to producers is stymied by the involvement of livestock agents. Traditional kill reports are limited to the basic information necessary to explain the outcome of the cattle processed. If farmers have in the past been non-reactive about the information they receive, this could explain in part why processors genuinely believe their reporting systems to be adequate for farmer's requirements. However it is observed that industry has spent considerable funds over the past decade through beef extension projects that are designed to produce improved performance throughout the supply chain. Farmers need more than the basic data if they are to achieve this and start to deliver to potential, and this means monitoring and improving their on-farm performances. An example

of the compliance in this area is the current attitude to the supply of live weight to dead weight yield data: only three of approximately 15 companies supplied or offered to supply to growers this important information.

The significance of cattle procured from sale yards for slaughter remains high at 29%. The NLIS management systems have improved the accountability and traceability of cattle going through the sale yards systems in the past five years. This has given processors confidence to include sale yard cattle in market supply chains that would have previously excluded this source of supply due to the uncertainty the public auction system once had. Unlike the relationship with farmers direct, the view of the meat processing sector about sale yards was divided quite strongly. There are the processors that place a significant importance on sale yard purchasing (as high as 80% of the kill in one case) and there are the processors that avoid this method of procurement entirely. Reporting on cattle killed from sale yards is again limited to meeting the basic requirements between vendor and purchaser, predominantly the data related to price and weight. Life time traceability is however possible through this form of procurement and therefore any form of information transfer that provides extra detail and the ability to go back beyond the prior owner could enhance this sub-sector in the beef supply chain.

2.4 Developed Matrix of LDL Benefits and Other Factors

In considering the different carcase attributes that the meat processing sector currently captures, the project team found that the factors that help determine the level of importance of each attribute to the processor include intended market outlet, customer requirements, the company's involvement in MSA grading and also geographical location of their operations.

Of the numerous attributes discussed with processors in the consultation stage, five consistently rated high on the scale of importance. These are:

- carcase weight (HSCW);
- meat colour;
- fat colour;
- fat depth; and
- age by dentition.

Of these criteria, weight and meat colour were probably the most critical, with 90 percent of the companies rating these two attributes as their critical measures of compliance. Meat colour was considered the most important quality measure, regardless of market destination or grading system. Good colour is taken as a prerequisite for a company to be able to deliver quality meat products to its customers. The emphasis on weight criteria was also apparent in most companies, but in this case the importance of this attribute was driven by operational efficiencies (and determination of market specification requirements).

Two fat attributes - colour and depth – also rated consistently highly in priority. The amount of fat that was acceptable varied between different companies, with more tolerance apparent at plants having an even focus on export and domestic markets. However, while the acceptance levels of fat depth varied across the board, the financial penalty for non-compliance was reasonably consistent, at approximately 10 cents per kg discount. Fat colour was regarded as slightly less important than fat depth, but when applied, the criteria was kept reasonably tight by processors. The amount of the non-compliance penalty however was somewhat less consistent across the group of processors.

Age by dentition is also a critical yardstick to virtually all processors, no doubt reflecting the content of contracts with buyers. Some companies have a stricter criteria than others operating in the same markets, however, breaches of the requirements were classified as non-compliance and were almost uniformly heavily penalised. The importance of dentition was slightly influenced by the percentage of cattle destined for the local market: on average meat processors that rated the importance of dentition as high sell about 60% of their throughput domestically and processed 55%-60% of their kill using MSA principles as a quality measure.

In respect of the measurement and rating of age by ossification, there was significantly less industry uptake. Meat processors using ossification as a specification attribute were more inclined towards being in the domestic trade, with around 75% of their output on average being sold into this market. Even more significant for this quality attribute was the fact that these same operators are currently grading on average 88% of their total kill using the MSA system. This strongly suggests that meeting MSA guidelines is the principal reason that operators view ossification as an important quality compliance attribute.

Several attributes were identified as being not as important to processors as the five factors discussed above. Measurement for bruising, for example, seems to be a low priority to many processors, although it was slightly more sensitive for several Queensland-based companies. Geographical considerations could also be a factor when determining which disease attributes are of high importance, however, the overriding observation at this stage is that disease status is not currently rated as a high priority. Meat Marbling is clearly favored as a quality attribute by export processors, but appears as a low order priority for domestic-focused operators. Those that recognised meat marbling as being of high importance export on average 75% of their kill.

It is important to note other attributes and criteria which emerge as being important to processors: these could conceivably find a place on the LDL interface. Determining that livestock have been handled using Best Practice in respect of Animal Welfare rated highly. Meat processors emphasised the increasing importance of this issue in determining if the meat supply chain quality systems comply with the highest quality standards. This comment was widespread across the industry and all parties agreed that 100% compliance on animal welfare issues is important to their businesses. Relevance to low-carbon production methods is conceivably another attribute that could be added to the LDL retinue.

2.5 Matrix of LDL Benefits

This section presents an estimate of the national value to the production sector of non-compliance. The cost of cattle downgrades due to non-compliance is at best an approximation and with this caveat in mind is estimated on the following basis. Processors provided estimates through consultation about the level of non-complying carcases in their throughput mix for four specific domestic and export markets. Together these target markets account for approximately 65% of total adult cattle slaughterings. They also ranked the most important carcase attributes for each market (weight range, fat colour, fat depth and other criteria). There was variation across the four markets for these criteria. The total number of carcases destined for the four markets is provided from MLA calculations.

Processors also indicated the value of the discounts they deduct (per kg carcase weight basis) for non-compliance. Carcases may fail on one or more criteria, therefore, the model needed to account for a ‘doubling up’ factor. It is at the processor’s discretion to deduct for all incidents of non-conformance and how often deductions are made, however, processors routinely apply

penalties in order to enforce their contract and to deter the supply of unsuitable cattle. These amounts are deducted from the payment made to the producer/agent, with the remittance showing the category for the deduction but sometimes no other information.

The estimates as to level of non-compliance in the report matrix differ somewhat from the results of previous studies completed on this topic. Slack-Smith (2009) estimated[1] non-compliance on weight range of approximately 28% to the Japan B2 market compared to this report's finding of 10%-15%; and 16% on fat cover compared to 5%-10% in this report. Reasons for this are not fully understood, however, there may be a degree of self-regulation occurring whereby producers increasingly refrain from sending livestock likely to be out-of-spec to works where penalties for one or more transgressions are known to be passed back to the grower. Hence, the works that provided estimates may have a better compliance performance than the average across the sector.

.

[1] Slack-Smith, Griffith and Thompson, *The cost of non-compliance to beef market specifications*, Australasian Agribusiness Review, Volume 17 Paper 9, 2009.

The matrix estimates that up to $47.1 million is currently lost annually to non-compliance through penalties across the four specified markets, with a total estimated utilization of 4.9 million beef bodies or 0.9% of total farm gate value of slaughter cattle (annual slaughter value estimated at $5.2 billion using ABARES data).If the estimate is pro-rated to the wider industry (excluding cull cow and bull slaughterings), the figure is in the order of $51 million. LDL can assist in reducing the incidence of non-compliance and thus the value of penalties incurred by producers.

FIGURE 2 –ESTIMATED NATIONAL VALUE OF NON-COMPLIANCE

Domestic Supermarket Grade	Estimated No of cattle in grade	Ranking	"Out of spec" Incidence from consultation (estimated % throughput)		Estimated cost of non-compliance	National total lost value of "out of specs"			
	2,600,000		low	high	per head	low	high	average	Estimated total
HSCW		High	5%	6%	$78	$10,140,000	$12,168,000	$11,154,000	
Fat depth		High	1%	2%	$26	$676,000	$1,352,000	$1,014,000	
Meat Colour		High	2%	5%	$26	$1,352,000	$3,380,000	$2,366,000	**$14,027,000**
Age by Dentition		High	1%	2%	$78	$2,028,000	$4,056,000	$3,042,000	
Age by Ossification		High	2%	3%	$78	$4,056,000	$6,084,000	$5,070,000	
Japan B2	600,000	Ranking	"Out of spec" Incidence from consultation (estimated		Estimated cost of non-compliance	National total lost value of "out of specs"			
			low	high	per head	low	high	average	Estimated total
HSCW		High	10%	15%	$64	$3,840,000	$5,760,000	$4,800,000	
Fat colour		High	1%	15%	$96	$576,000	$8,640,000	$4,608,000	
Fat depth		High	5%	10%	$160	$4,800,000	$9,600,000	$7,200,000	**$11,592,000**
Meat Colour		High	5%	10%	$128	$3,840,000	$7,680,000	$5,760,000	
Marbling		High	10%	10%	$160	$9,600,000	$9,600,000	$9,600,000	
	Primary non-conformity						Estimated total		cont'd ---->
	Estimated total lost value of out-of-spec. carcases, calculated as value of primary non-conformity plus 25% of value of remaining 4 traits.								
	If this figure is extended to cover total adult slaughter cattle not falling within these 4 destinations shown above, and excludes cull kill, the estimated lost value is in the order of $51 million.								

FIGURE 3 –ESTIMATED NATIONAL VALUE OF NON-COMPLIANCE – CONTINUED

	Estimated No of cattle in grade	Ranking	"Out of spec" Incidence from consultation (estimated % throughput)		Estimated cost of non-compliance	National total lost value of "out of specs"			
			low	high	per head	low	high	average	Estimated total
Korean Steer	600,000	Ranking	"Out of spec" Incidence from consultation (estimated		Estimated cost of non-compliance	National total lost value of "out of specs"			
			low	high	per head	low	high	average	Estimated total
HSCW		High	10%	15%	$28	$1,680,000	$2,520,000	$2,100,000	
Fat colour		High	5%	10%	$28	$840,000	$1,680,000	$1,260,000	
Fat depth		High	15%	30%	$28	$2,520,000	$5,040,000	$3,780,000	**$6,993,000**
Meat Colour		High	20%	30%	$28	$3,360,000	$5,040,000	$4,200,000	
Age by Dentition		High	1%	15%	$84	$504,000	$7,560,000	$4,032,000	
Domestic Retail Butcher Trade	1,100,000	Ranking	"Out of spec" Incidence from consultation (estimated		Estimated cost of non-compliance	National total lost value of "out of specs"			
			low	high	per head	low	high	average	Estimated total
HSCW		High	10%	15%	$80	$8,800,000	$13,200,000	$11,000,000	
Butt Shape		High	3%	10%	$53	$1,749,000	$5,830,000	$3,789,500	
Fat depth		High	5%	15%	$53	$2,915,000	$8,745,000	$5,830,000	**$14,471,875**
Meat Colour		High	3%	5%	$27	$891,000	$1,485,000	$1,188,000	
Age by Dentition		High	2%	5%	$80	$1,760,000	$4,400,000	$3,080,000	
	Primary non-conformity						**Estimated total**		**$47,083,875**
	Estimated total lost value of out-of-spec. carcases, calculated as value of primary non-conformity plus 25% of value of remaining 4 traits.								
If this figure is extended to cover total adult slaughter cattle not falling within these 4 destinations shown above, and excludes cull kill, the estimated lost value is in the order of $51 million.									

Format: courtesy of Weeks Consulting Services.

Processors also provided indicative information about the extent and impact of mortalities and offal/meat condemns to their businesses. Mortalities may be the result of several factors but regardless of cause they represent a per head value (absorbed by the owner at the time of delivery to works). The mortality rate in the Australian beef industry has fallen well below 1% of throughput for over two decades and further change may be only marginal. However, because all the potential carcase value is lost from condemns (less a small retrieval value from rendering), the total lost value is significant - based on estimates from processors this lost value equates to approximately $64 million per annum.

Processors also encounter lost product yield and revenue from diseased/condemned offal (e.g. livers, cysts on red and white offal) as well as trimming/rejection of carcase parts due to the detection of disease or wastage. These items also incur labour costs and lost processing time required to retrieve and trim/rectify or dispose of condemned material. Estimates are made in the matrix as to the national value of mortalities; and of per head and national value of revenue lost due to the major offal/anatomical reasons for condemns.

The LDL software will make tracking and comparison of these costs and volumes an integral part of the analysis it can perform on per carcase or per group basis.

FIGURE 4 -LDL – ESTIMATES OF PER HEAD AND NATIONAL VALUE OF LOSSES TO MORTALITY AND DISEASED CARCASE PARTS

MORTALITIES & DISEASE				
	Priority to Processors	Incidence from consultation	**Estimated cost of non-compliance** Estimated $ per head	Estimated national total
Carcase Condemns	Medium	0.5%[2]	$795.00	**$63,600,000**
Offal & meat condemns:				
Liver issues	High	7%-40%[3]	$12.00	$6,720,000-$38,400,000
Pneumonia	Low	10%	$3-$7	$2,400,000-$5,600,000
Cysts	Medium	7%-20%	unspecified	na
Leg issues	Medium	15%	Unspecified Say 500g-1kg/ccs trim	$1,530,000-$3,060,000
Metabolic issues e.g. in cows[4]	Low	15%-20%	$1.00-$2.00	$1,200,000-$2,400,000
				$11,850,000-$49,460,000

[2] The AQIS records on mortalities and diseased/condemned materials corroborates this estimate.
[3] Linked to other factors including seasonal conditions and 'runs of bad cattle' from specific suppliers. Mild incidence of cysts may be common but low-impact, while lost livers may also be common but more costly. Assume lower incidence for grassfed component.
[4] Mainly reflected in loss of rendering raw material.

3 ANIMAL DISEASE ISSUES AND LDL

There is scope to include in the LDL interface a disease-focused component which would provide the user with information about any sub-clinical disease found in a specific carcase or group of carcases. This would use hyperlinks, like the existing Solutions to Feedback feature, to identify the disease issue, offer information/resources and potentially feed into a wider surveillance system which could notify relevant parties in the supply chain.[5] Other diseases such as liver fluke are not apparent on-farm, remaining undetected until the carcase and viscera are examined post-mortem. The potential relevance of the animal disease feature in LDL was investigated through a literature search and the consultation phase with processing companies.

Animal Health Australia 2009 report on E-surveillance for sheep and goats noted:

[C]carcases and carcase products (offal) that do not meet the Australian Standard [are] condemned from human consumption. Depending on the degree to which carcase and offal are affected, product is either fully or partially condemned by meat inspectors. Where carcases are partially condemned they are diverted to the 'retain' rail where meat inspectors remove the condemned product. Condemned product is diverted to the rendering process to be manufactured as meat and bone meal and tallow. There is a consequent reduction in value of product…[6].

Economic costs to processors from disease are caused by condemnation of carcases (full or partial), loss of offal yield and hide downgrades. Currently, the Australian Quarantine and Inspection Service (AQIS) maintains partial surveillance data relating to carcases and items condemned at export abattoirs, however, this information is not readily available to industry and does not cover domestic works and is technically rather than commercially based.

3.1 Animal Health Literature Search

A literature search uncovered scant information about research into the cost to processors of sub-clinical disease in bovines. There are currently several research initiatives being undertaken regarding ovine diseases, including the E-Surveillance Sheep & Goats initiative by Animal Health Australia (AHA). The literature search and related discussions with AHA and other parties including Cattle Council identified the major bovine disease issues typically encountered at the processing level. Notes about these factors were incorporated into the consultation guide in order to discover the measures taken by processing companies to record, estimate or mitigate the cost of disease incidence in their businesses, as well as any feedback mechanism to the producer/supplier. Privacy issues apparently prevent processors from contacting previous owners of diseased stock to alert them to serious health concerns: this may be addressed in LDL's roll-out.[7]

3.1.1 Australia literature review

Few resources were located on the economic costs to the processing sector of meat defects or sub-clinical disease in bovine species. There is a rich literature available for on-farm animal

[5] Some bovine diseases, e.g. hydatids, can adversely affect human health and may warrant further action.

[6] AHA 2009 p. 12.

[7] Personal comms, 15 March 2012, Canberra-based stakeholder.

disease and potential costs to production and revenue, along with estimates of disease control costs.

3.1.1.1 Paton M (1994) Utilization of meat inspection findings to improve livestock production. Research Project DAW.034 Report to the Meat Research Corporation.

This is an early piece of research into the costs of sub-clinical disease identified at the processing stage.

3.1.1.2 Animal Health Australia 2009. Quantifying the costs and benefits of E-surveillance Sheep and goats.

The report seeks to quantify the costs and benefits of introducing an e-surveillance system for the sheep and goat industry throughout Australia. It provides estimates of the cost to the production and processing sectors of sub-clinical diseases in sheep and goats, along with AQIS-sourced estimates of the prevalence of disease and conditions in sheep. It provides details of a proposed E-surveillance network.

3.1.1.3 Meat & Livestock Australia 2008. Development of a system to improve offal recovery in beef at a processing plant.

This offers a synopsis of the results of a shared project at a beef processing plant. This project focused on the development of a data capture system for use by abattoir management and suppliers to enable modification of management programs to improve compliance levels. During the trials, the group found that just over 50% of incoming cattle recorded had some offal component/s condemned. The main causes of lung non-compliance is pleurisy, (9%), parasites (4%) and hydatids (3%). In regard to livers, the main cause of liver non-compliance is liver fluke (17%) followed by abscesses (10%). Disease in visceral organs can also be significant.

3.1.2 New Zealand literature review

There is no study conducted on the economic costs of meat defects arising from bovine diseases in the processing sector. Findings on related research are discussed below.

3.1.2.1 Economic costs and benefits of meat hygiene regulations (Cao and Johnson, 2006)

This study quantified the costs and benefits of meat hygiene regulations in New Zealand particularly the requirement for Risk Management Programmes (RMP) based on the principles of Hazard Analysis and Critical Control Point (HACCP). As meat processors did not maintain cost records (capital and maintenance costs) associated with HACCP/RMP implementation, a quality-adjusted cost function (using variable production cost data series from 1929-1984) was used to estimate changes in meat plants' variable cost arising from compliance. The increase in production cost due to food safety compliance was estimated at 6 cents to 53 cents per kilogram (2002 NZ$). This increased variable cost is driven by the slowdown in the production line due to monitoring, sampling and testing. While a benefit of HACCP/RMP is a reduction in number of defects detected in the plant (reduced pathogen levels), this was not quantified in the study.

3.1.2.2 AsureQuality reports on diseases and defects (Stapp, 2011)

AsureQuality is a New Zealand state-owned enterprise that is the main provider of meat inspection services. It reports disease and defect data to the Ministry of Agriculture and Forestry. This data includes the type of disease or defect identified at inspection, for each disease or defect type (its prevalence and number of carcases condemned) and the total volume of kill[8]. The reportable disease and defects relevant to all species include:

[8] This disease and defect dataset is not available at MAF website.

FIGURE 5 –NEW ZEALAND - MAIN DISEASE ISSUES AT PROCESSING LEVEL

- Arthritis
- Pleurisy
- Abscesses
- Contamination
- Wounds/bruises
- Sarcocysts
- Condemnation
- Emaciation
- Septicaemia
- Other causes (e.g. melanosis, scar tissue)

Disease and defect reporting specific to cattle are:

- Xanthosis
- C. bovis
- Tuberculosis
- Holdens

A study to quantify the economic costs of significant pests to New Zealand (Nimmo-Bell, 2009) identified output losses to agriculture segregated between plants and animals. The output losses related to animals in the agriculture sector amounted to NZ$635 million (2008 dollars).

The regulatory impact statement on the National Bovine Tuberculosis Pest Management Strategy (MAF Biosecurity, 2010) cited saved costs from implementing the strategy. These saved costs (2008 dollars) relate to carcase value saved (NZ$209.3) and beef/dairy/deer production saved (NZ$14.1)9.

3.1.2.3 Meat Hygiene Reform Taskforce (MIA, 2011)

The Meat Hygiene Reform Taskforce is a collaboration among the meat industry, MAF and AsureQuality that aims to examine the cost effectiveness of meat hygiene systems based on sound food safety reasons. The industry estimates direct meat hygiene costs at NZ$80 million plus indirect costs affecting productivity and potential opportunities.

3.1.3 United States Literature Review

No literature came to light on the economic costs of meat defects arising from bovine diseases. Findings on related research are discussed in this section.

3.1.3.1 Animal Disease Economic Impacts (Pritchett et al., 2005)

This study conducted a review of research related to economics of animal disease outbreaks at various levels such as producers, agribusiness (processors, suppliers, support activities) and consumers. The losses suffered by meat processors include physical loss of meat products, additional costs of certifying safe food supplies, a potential negative shift in demand and loss in consumer confidence. As proprietary agribusiness data is limited and expensive to obtain, event analysis (e.g. abnormal negative return on share prices, new meat regulations, meat recalls) and econometrically estimated efficiency models could be used to estimate losses.

3.1.3.2 Economics of Sanitation and Process Controls in Meat Plants (Ollinger and Mueller, 2003)

The costs of sanitation and process control as mandated by the Pathogen Reduction/Hazard Analysis and Critical Control Point (PR/HACCP) rule of 1996 in the United States is estimated to raise meat and poultry prices by about 1.1 percent (2.4 cents per kg for beef). While this is a small increase for consumers, it represents 2.2 percent of controllable costs (i.e. costs other than meat raw material) of meat plants.

3.1.4 Summary - Animal Health Issues Identified in Literature

The literature review identified several important points around the issue of animal disease in beef production. The first is the paucity of information other than AQIS summary records about volumes and incidence of disease in cattle as detected at the processing sector. Secondly the effort expended to identify and curb disease in livestock at the on-farm stage has not been matched with effort to quantify volumes and lost revenues for the processing stage at the national level or with some exceptions at enterprise level. The processing sector typically sustains the losses from sub-clinical disease detection and muscle wastage (leg damage from standing on hard yards and other disorders of this type). This could also be extended to damage to hides from disease and infestations, but was not addressed in this report. Moreover, the literature to hand that is actually focused on the processing sector looks at ancillary areas, such as inspection and resources costs (cleaning, labour, process controls) rather than estimating the value of the product lost therein.

3.2 Animal Health Issues Identified in Consultation

Some processors considered disease-related issues a relatively low priority for their beef businesses due to the fact that the animal has been slaughtered and there is other revenue to collect and process. There is little or nothing which can be done to rectify relatively minor losses from a larger transaction. Information capture and dissemination of details about disease incidences and causes assumes a low priority, unless the disease results in the condemnation of a beef carcase. Some processors also stated that privacy provisions effectively prevent them communicating disease incidence back to previous owners of livestock acquired through feedlot and sale yards.

Feedlot systems performance is influenced significantly by the incidence of disease, and pneumonia and liver issues were identified as specific concerns in stock from feedlots at different times of the year. Managing these incidences of disease is very important for the following reasons:

a) Processing inefficiency;

b) Livestock health and vitality; and

c) Production and product recovery.

Feedlots may be integrated into one processing company and specifically into one plant in the processing company's group. Feedlots currently rely on verbal feedback from the livestock management at the plant or the company that the cattle have been assigned to. This feedback is often limited to only addressing the condemned animals or condemned product, which are related to acute incidences of disease, and missing the more common and less serious disease incidences. As a result, stakeholders in these integrated supply chains may tend to understate the percentage of cattle affected by disease. This in turn results in understating the degree to which consignments of cattle have been restricted in the past from reaching their yield potential due to disease.

3.3 Potential for Inclusion of Animal Diseases in LDL Interface

An improved feedback system would capture all incidences of animal health issues and would provide processors and producers with the opportunity to instigate proactive animal health programs into the livestock supply chain. By understanding the origin of feedlot cattle this health information will improve decision making before the animals are presented at the relevant feedlot. Such programs will not only have the potential to improve offal, meat and

blood yields at the processor level, but also improve the animal's growth performance during relevant stages of its life cycle.

It is acknowledged that health incidences have improved over the last season, what was not identified was the reason for this improvement; it could be the better seasons have had the effect of disguising animal health trends. A common theme from the Qld processing sector is that the incidence of bruising over the past ten 10 years in Bos indicus cattle has reduced significantly and that this is a direct result of improved feedback and monitoring of animal handling issues. Producers have proven that they are capable of making the necessary adjustment to their farming practices, if they are given the appropriate information, and that it can be achieved without financial inducements. In this case the obvious follow-on effect of improved pH levels has benefited processors and consumers. The current reporting systems from meat processors are significant to monitor bruising and other externally-inflicted health issues. The method of delivering the information is often reliant on a paper-based reporting system, sometimes issued in the form of standardised letters.

In the past the ability to give producers feedback on animal health issues at the time of slaughter was limited by the ability of AQIS systems within the plant to be able to record the correct information against the appropriate animal. Past practices of recording disease incidences was unreliable, as even though most companies have invested in some sort of electronic recording system in the slaughter floors (very sophisticated computer touch screens in many cases), information was often inaccurate due to Meat Inspectors not keeping the information capture in line with the correct carcase. While the overall numbers recorded may have reflected the degree of the out of sequence within the line and also likely to be inaccurate across multiple lines.

Industry is only recently becoming comfortable with the human resources function aspect of disease recording, since the move from government-run AQIS meat inspection to the new AMEIS inspection system in July 2011 now gives processors the choice of using their own staff to collect this type of data. The scope to direct and improve the recording of both mandatory requirements and stakeholder eccentric information is predicted (by the processing sector) to improve significantly of the next 12-18 months. The dissemination of disease information that has been captured for individual bodies may continue to be limited by the ability of individual companies' information technology systems to handle the task. This potentially creates inconsistencies between different companies: producers dealing with multiple processors can find that the information on animals in a similar status of health can appear to vary markedly.

There is unlikely to be any resistance within the beef supply chain to an improvement in the quality of information that is available and dispensed on health and disease factors for the following reasons:

1. Animal health history will allow producers to be proactive on disease prevention systems;
2. Feedlots and finishers will be able to identify healthier store animals;
3. Processors will be able to identify the producers with healthier livestock; and
4. Processors will be able to define with more accuracy the difference between disease-related yield losses and production-related losses.

3.4 Potential Commercial Benefits of Improved Offal Recovery

The example uses a beef plant that kills 2500 feedlot cattle per week. Under current recovery and reporting methods, the plant loses approximately 2000 offal items per week, mainly livers and viscera. The revenue lost at specific plant level is presented in Figure 6, along with an extension to the wider industry, including an allowance for a higher grassfed component.

FIGURE 6 - ESTIMATED LOSSES FROM DISEASED OFFAL, QLD PLANT AND EXTENSION TO NATIONAL LEVEL

Item	Quantity non-compliant/week	Estimated % of weekly production	Average Product Weight (kg)	Market Price AC FOB/kg:	Total Revenue Lost
Beef livers	1,000	40%	8.2	$1.50	$12,300.00
Beef tripe sets	700	28%	7.0	2.30	$11,270
Beef kidneys	300	6%	0.70	0.95	$200.00
TOTAL/(WEEK)	2,000		13,300		**$23,770.00**
Extension to the national kill:[10]					
Beef livers		10%-15%	7.0	$1.50	**$8.4m-$12.6m**
Beef tripe sets		5%-15%	5.0	$2.30	**$4.6m-$13.8m**
Beef kidneys		8%-15%	0.5	$0.95	**$.3m-$0.6m**
Estimated total (3 offal items):					**$13.3m-$27.0m**

Extended across the wider industry, the benefit of capturing meaningful data about disease incidence for the primary red and white offal items is apparent. LDL would have a significant impact in this area and could seamlessly integrate results about losses to disease with the other reporting functions already incorporated in the software.

4 CASE STUDY: MEAT STANDARDS AUSTRALIA

Approximately 25-33% of all cattle now slaughtered are part of the MSA system[11]. This set of live cattle and beef carcase specifications known as MSA includes protocols for feeding, management, transport and slaughter. It is probably the largest single set of beef specifications available and is now accepted as the industry yardstick for domestic beef carcases; as such it is an obvious choice for a case study for analysis of the LDL project framework.

There are several clear links and synergies between the two concepts (even though superficially one is a product description system and the other is a tool for analysis and product improvement). These include:

[10] Assuming a lower incidence rate for grassfed cattle, liver condemns in the range 15%-20%. Incidence rate of 5%-10% for beef kidneys; and 8%-15% for beef tripe sets.

[11] MSA 2007-2011 data.

- Both systems are inclusive i.e. they seek to deliver economic benefits to the whole-of-chain;
- Both systems are customer-driven (MSA through its focus on retail labelling for consumers, LDL through the use of grids designed for specific market categories);
- Both systems encourage producers and processors to work together for the purpose of delivering towards customer requirements;
- Each system is strengthened overall by uptake, growth and consolidation in any single stage of the supply chain (whether producer, processor, or enduser client); and
- Both systems emphasise the importance of compliance against a series of pre- defined measures.

This section of the report presents a short overview of the MSA system. It then presents a number of charts which illustrate the growth of the system in terms of participants, volume of carcases and economic benefits. An estimate of the value to industry of improved compliance levels is also presented. In the conclusion to the case study, some observations are presented which are designed to assist with the development of the LDL program.

4.1 MSA Overview

In a single sentence, MSA can be described as a science-based consumer labelling system used to describe final eating quality. More deeply, it is a system which translates a wide range of data regarding the live animal, the production and feeding systems, the breed type, the transport and pre-slaughter handling, the slaughtering process, rate of chilling, and subsequent aging plus the anatomical aspects of the carcase in terms of muscle or muscle groups (primal cuts), to make consistent eating quality recommendations to the consumer expressed as a defined cooking method.

Meat Standards Australia commenced roll-out in 1997 as a way to address consumer uncertainty over selecting and cooking beef. MSA's objective is to accurately establish and satisfy consumer set standards which are linked to extensive consumer research. This research featured consumer taste parameters and attributes to establish the degree of variation that exists between consumers and to arrive at a consensus view of eating quality. The MSA scoring system and boundaries to define beef grades have been arrived at through the analysis of consumer results unrelated to all production factors. All MSA beef is graded on the basis of the consumer test score predicted for a particular beef muscle cooked by the nominated method.[12]

Appropriate livestock handling in the weeks prior to slaughter (for instance feed, supplementary rations, transport) are the cornerstones of MSA procedures, in tandem with appropriate lairage, slaughter and processing methods at the abattoir. Deviation from these standards will produce beef carcases that fail MSA grading. Carcases are assessed for MSA grading at MSA licensed abattoirs. The carcase receives a grade code of 0 if all the specifications are met. Cuts from the carcase can then grade under MSA for retail sale. If the carcase does not meet all the specifications it is given a grade code that indicates which of the specifications were not met. These carcases are deemed to be non-compliant and fail to be graded as MSA.

[12] The Meat Standards Australia Beef Information Kit was referenced for the overview and case study.

4.2 Insights from Consultation Phase

Selected MSA processors and retailers were visited and interviewed. During these discussions, data was obtained and aggregated to avoid identification of market-sensitive individual information (the retailers in particular were extremely sensitive to this issue) and the results tabulated to show compliance levels for use in the development of the target market matrix. Anecdotal responses regarding feedback methods and subsequent follow-up were also recorded and tabulated.

There appear to be positive links between the LDL initiative and the uptake of MSA by beef processors which could potentially boost interest and uptake of LDL. There is a strong interest in being able to track the level of compliance of bodies as they move through receival and into the chillers. It is important that the LDL not be perceived as duplicating the MSA interface already used by MSA plants but instead be positioned as a logical complement to the MSA program.

A series of industry representative face-to-face interviews was held in Queensland, NSW, Victoria, SA and WA with MSA-licensed processors and with significant retailers, in which levels of non-compliance were quantified and issues surrounding non-compliance were discussed. One of the areas explored in the face-to-face industry interviews was the current range of mechanisms and levels of feedback used with suppliers (producers), and any follow-up communications that normally occur. The interviews conducted with processors using MSA showed that they have seven or eight parameters in common in what they regard as being of high importance. These are as follows:

- Dentition
- Ossification
- Hot Standard Carcase Weight (HSCW)
- Fat colour
- Fat depth
- Meat colour
- Butt shape, pH, Tropical Breed Content (TBC) [13]

One notable exception among the processors interviewed about their MSA beef component claimed that in his company's case they provide nil or very little feedback to producers. Despite this, they reported their levels of MSA compliance to be very high. This is a surprising result if true in that the same processor sources approximately 40% of its MSA stock through the sale yards pathway. The same processor is in favour of an LDL-like tool, and believes it would be valuable in both beef and sheep, which may prove their claim of limited feedback to be true.

In addition to the direct financial cost to the producer of non-compliance with the target specification, one must also consider the incremental inconvenience this causes the processor. As well as the logistical costs of drafting, retain rail diversion, offals separation, chiller and boning room management, with smaller and different boning room lots, chiller management

[13] Not rated High by all MSA processors, but by some processors, probably because they are of lesser occurrence as a defect in some geographical regions than others.

and other factors, the processor is also then forced to make up the shortfall in supply from elsewhere.

If supplying for a retail customer with a contracted number per week to a tight and inflexible specifications, this situation forces on the processor additional costs in time and staff in finding, accessing and co-ordinating the delivery of the extra carcases to make up the shortfall. It may also involve higher prices due to the time pressures to meet the contract volumes. Whatever original discount or penalty was applied to the producer does not compensate for this disruption to supply at the processor end, and jeopardises the consistency of quality.

Discussions with processors during the course of the project indicate many are of the opinion that discounting does not solve or compensate for the problem of non-compliance and, in fact, they do not want out-of-specification cattle delivered at all. This effect varies somewhat with geography: in the high-volume northern beef industry, where there are more specialist suppliers, processors seem to be impacted more than in the south by non-compliance. That is, even though the rate of non-compliance may be smaller in the north, when it does occur their operations are more significantly affected. In the southern regions, where individual herd size and lot size are smaller, and there are more mixed farms and fewer beef specialists, processors are perhaps more conditioned to have a portion of their intake that is outside the required specification grid.

Interestingly, most of the northern processors interviewed assiduously give feedback to producers by email or fax, and their livestock buyers follow up with phone calls. Feedback is generally given on the same day as slaughter, unless MSA chiller assessment delays it by 24 hours.

Given the commonality of grading parameters regarded by MSA processors as High is a reflection of the MSA grading process, this outcome is unsurprising. However, another finding from some respondents in the overall survey was that "MSA has let anything in now; you can even get old cows to grade MSA". Needless to say these comments were not encountered in talking with MSA processors, however, it may be that MSA needs to counter such a misunderstanding in the meat processing and retailing sectors, and also potentially in "consumer land," particularly given that the MSA brand itself is now being promoted to consumers as a symbol of consistent eating quality.

The high proportion of the domestic beef market held by the major supermarket chains, and their move to utilise MSA to deliver their product to retail, means there are impacts on the lot feeding industry. For example if a typical supermarket specification is a minimum 70 days on feed, dentition 0-2t, HSCW 180-280, P8 fat 3-15mm, Meat colour 1b-3, Fat colour 0-3, and Marbling 0-2, and a maximum Tropical Breed Content of say 50% specified through hump height, then there is an automatic impact on the animals going into the feedlots to produce such a set of specifications. For example, they must be younger animals to produce this set of specifications in less than 70 days without excess marbling.

This also relates well to a statement made about specifications for feeder steers in a recent industry publication: "The MSA Scheme has demonstrated that high eating quality can be achieved at low marbling levels especially under feedlot conditions. The fact that marbling is of little importance in the domestic market means that lot-feeders can utilise a wider range of breeds and breed crosses without having to sacrifice growth and retail carcase yield."[14]

[14] Alex McDonald, "Feeder steer specifications – domestic requirements", www.livestocklibrary.com.au/

While carcase parameters having a high impact on final eating quality such as Tropical Breed Content, hanging method, period of aging, and the level of ossification are all measured in the MSA grading process, other factors such as the primal cut (muscle or muscle group) are not measured in the grading process but are taken into account in the MSA model, which recommends a particular cut for a specified cooking process after a nominated period of aging (e.g. MSA 3 Cas @ 5 days, MSA 4 @ 14 days). In this way all the aspects of the live animal, the carcase, of anatomy and relevant processing information are translated into a clear and meaningful message about eating quality to the retailer and hence through to the consumer.

This consistency and transparency is the basis of the price premiums established for MSA beef. Processors currently in the MSA program see benefits in an LDL-type system; however, they also believe that their current levels of feedback to suppliers meet the same requirements. In other words, they already perceive themselves as educating their suppliers by passing market signals back up the chain; rewarding performance; and penalising non-compliance to specification.

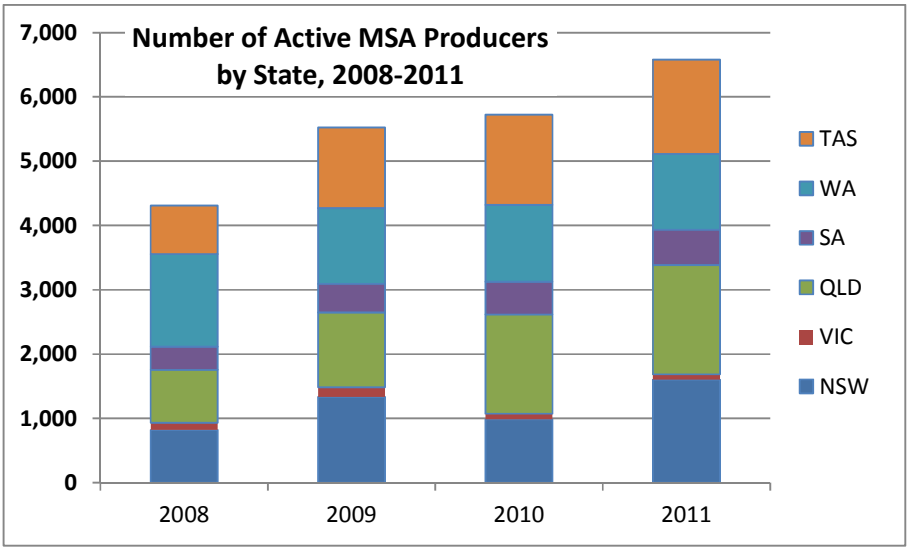
4.3 Trends from MSA Data 2007-2011

This section of the report presents and analyses some of the extensive data which can be derived from the MSA program and framework. It was provided to the project team in Microsoft Excel form and a series of graphs and charts have been compiled to illustrate salient points.

4.3.1 Uptake Rate for Producers, 2008-2011

Figure 7 indicates that total uptake rates for the MSA program among producers developed steadily in the period since 2008. There are currently 19000 producers registered with MSA. "Conversion" to MSA has been most successful in NSW and in Qld, with the total number of producers registered with MSA in these states being approximately the same at 1602 and 1969 respectively.

FIGURE 7 - MSA UPTAKE AND NUMBERS GRADED

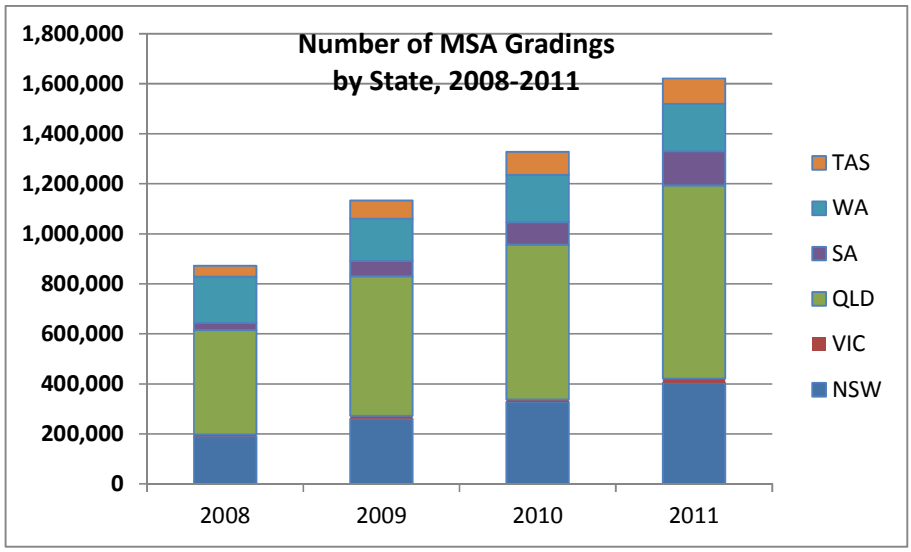


Recruitment efforts in Tasmania also showed good results, with the number of participating MSA producers doubling over the past four years to a total of 1463. Victoria, however, recorded a marked decline of 25% since 2008 in the number of active MSA-registered

producers from an already-low base. Last year, there were only 84 active MSA-registered producers in the state, a surprisingly low figure given the state accounts for around 8 percent of the country's beef cattle herd. The low rate of uptake compared to NSW and Qld may be linked to the relatively high number of small farms in Victoria with holdings under 30 head and may be worthy of more analysis. A similar situation may be developing in Western Australia, where MSA-active producer numbers have fallen from an initial level of 1440 in 2008 to under 1200 in 2011.

The number of producers in the MSA program, however, is only part of the story: of equal importance is the number of cattle graded as MSA. These figures are represented in Figure 8 and show total MSA gradings in 2011 surpassed 1.6 million head. Almost 50% of gradings were recorded in Qld and a further 25 % of gradings occurred in NSW.

FIGURE 8 - MSA – GRADING NUMBERS BY STATE

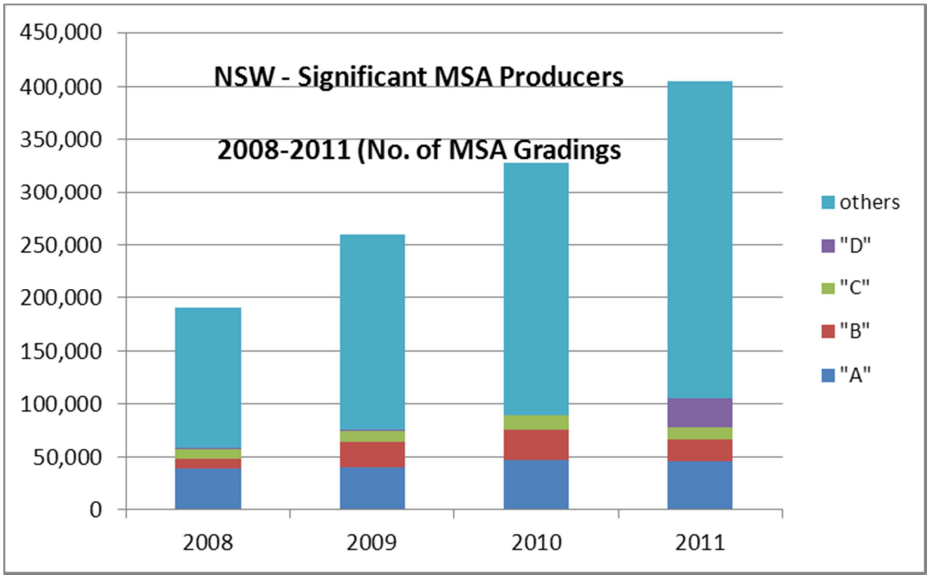


By contrast, Victoria accounted for only 1% of total MSA gradings. WA's contribution to the total base has stayed steady at approximately 190,000 head or almost 12 %, however, the state has not yet matched the growth in MSA gradings which is evident in NSW and Qld. South Australia's gradings under MSA have grown and now account for over eight percent of the country total.

4.3.2 Composition of MSA Gradings

The MSA data also provided some interesting insights into the composition of grading numbers. In each state, there is a small number of producers responsible for a high proportion of the state's MSA gradings. (Some producers are also active across in more than one state.) Figure 9 provides a breakdown of the MSA gradings for NSW, where 4 producers account for approximately 30 percent of total MSA gradings.

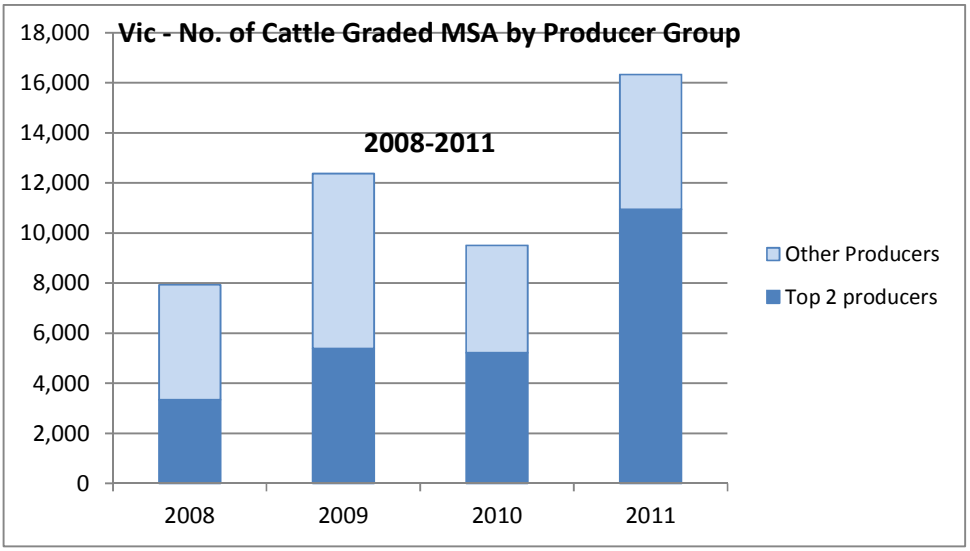
FIGURE 9 – NSW: COMPOSITION OF MSA GRADINGS BY TOP PRODUCER ID, 2008-2011



Producer ID "A", which accounted for 20% of NSW MSA gradings in 2008, now accounts for around 12% of gradings. Producer "D" has now emerged in 2011 as a key player and, on the basis of a brief assessment, would also appear to be a producer in Victoria. It is useful to consider that the bars in the figure above represent individual businesses and livestock producers who adhere to the MSA approach and seem intent in keeping it at the centre of their production practices. There is an opportunity to identify and develop the feedback from these significant players which should be further explored.

In Victoria, a high proportion of MSA gradings can be attributed to just a few producers, with two producers in 2011 responsible for around 60% of all the state's MSA gradings.

FIGURE 10 –VIC: COMPOSITION OF MSA GRADINGS BY TOP PRODUCES, 2008-2011



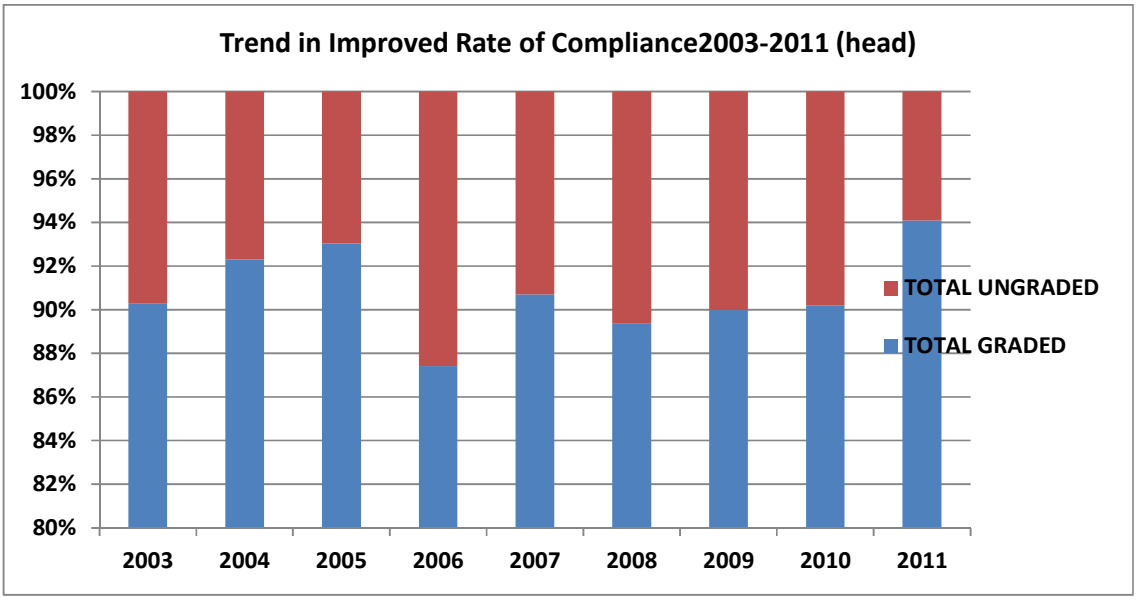
This situation is less pronounced in other states, with WA and Tasmania being evenly distributed in terms of total numbers graded across producers. This group of producers collectively perform much of the "heavy lifting" associated with getting MSA grading levels

up to a critical mass and it is a timely reminder about the power which can be harnessed through a system such as MSA.

4.3.3 Analysis of Grading Trends

There has been a significant improvement in the level of carcase compliance in MSA in the period 2007-2011. Currently compliance levels sit at approximately 94.1 % of total carcases presented for grading. How much further this can be improved will partly be determined by decisions made by producers about feeding requirements, livestock selected for MSA pathways, uptake of any feedback sent to producers from works about critical compliance issues, and consistency of grading standards across works.

FIGURE 11 – CHANGES IN LEVEL OF COMPLIANCE, CARCASES GRADED MSA, 2003-2011



The six charts shown at Figure 13 provide a state-by-state picture of the outcome for carcases compliance under the MSA program in the period 2008-2011. Carcases which pass MSA grading are shown in the system as "0" grade and in the charts are depicted as "OK MSA". Those which fail to be graded as MSA attract a grade code or codes appropriate to the deficiency identified. These codes range from 1 to 9. It is possible to record more than one criterion fail against a carcase. The table at Figure 12 shows the explanation for each grade code.

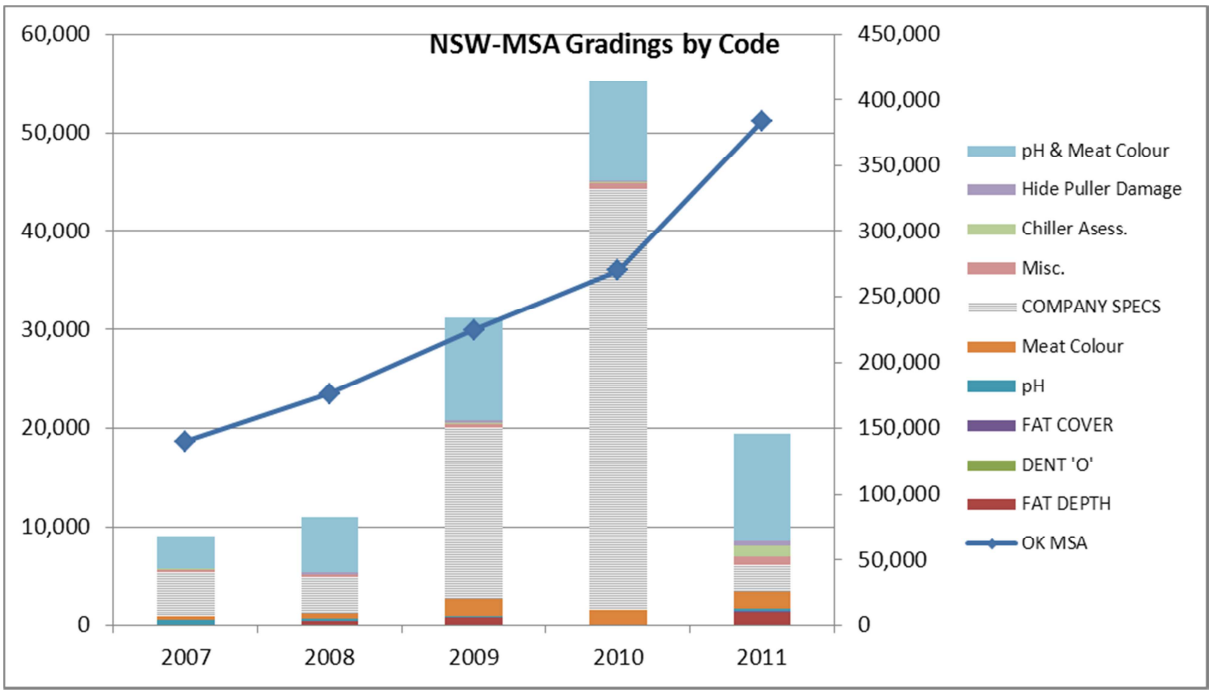
FIGURE 12 - MSA GRADE CODES

1	Subcutaneous fat depth inadequate	**6**	Met grading requirements but does not meet company requirements
2	Either age by Dentition or by Ossification	**7**	Miscellaneous (can include bad bruising)
3	Fat distribution inadequate	**8**	Outside chiller assessment parameters
4	pH above 5.70	**9**	hide puller damage
5	Meat colour out of specification	**0**	MSA Grade

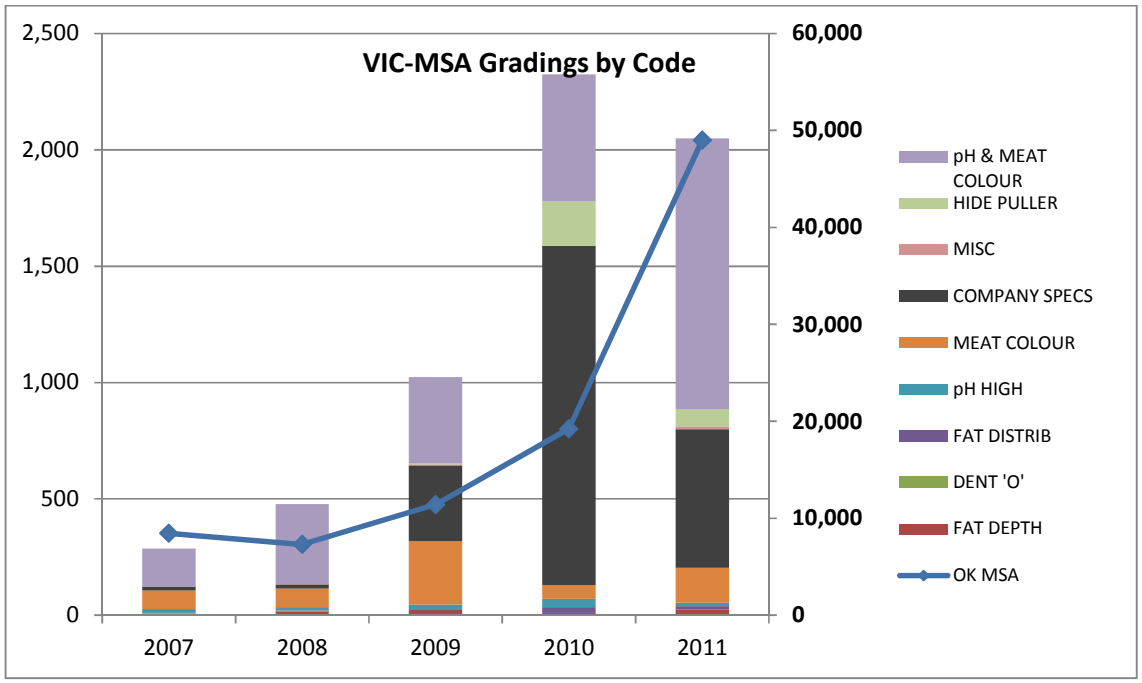
Frequently, a carcase will have a multiple grade code applied, e.g. "135", which indicates a carcase has inadequate fat depth, inadequate fat distribution and non-compliant meat colour. Multiple grade codes are not included in the analyses as they are too numerous to be meaningful and together represent less than two percent of total gradings. The exception is the combined grade code "45" (combination of pH above 7.5 and non-conforming meat colour), which is included in the analysis because it occurs frequently in all states each year and is a major reason for non-compliance.

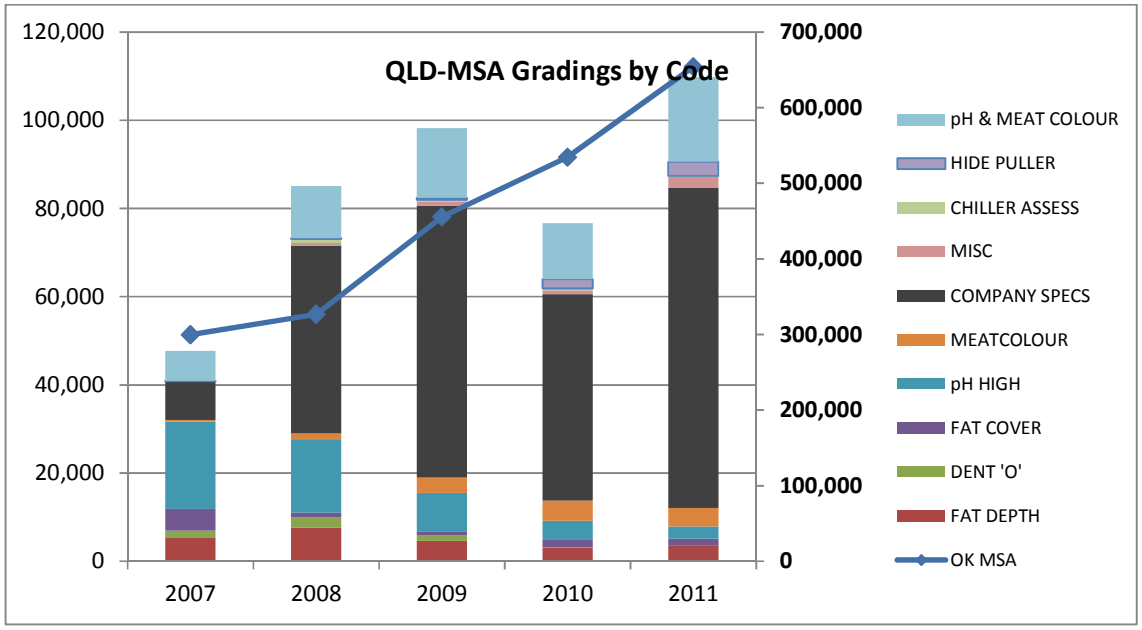
The combined factors of high pH and wrong meat colour can be seen to be major reasons for non-compliance across all states. Carcases failing MSA grading due to different company specifications is also a major issue and needs further investigation. Non-compliance due to fat cover and dentition by ossification are low priority issues, however, meat colour alone is a major reason for carcase fails in virtually all states.

FIGURE 13 –MSA GRADINGS BY GRADE CODE- NSW, VIC, QLD, SA, WA. TAS – 2008-2011



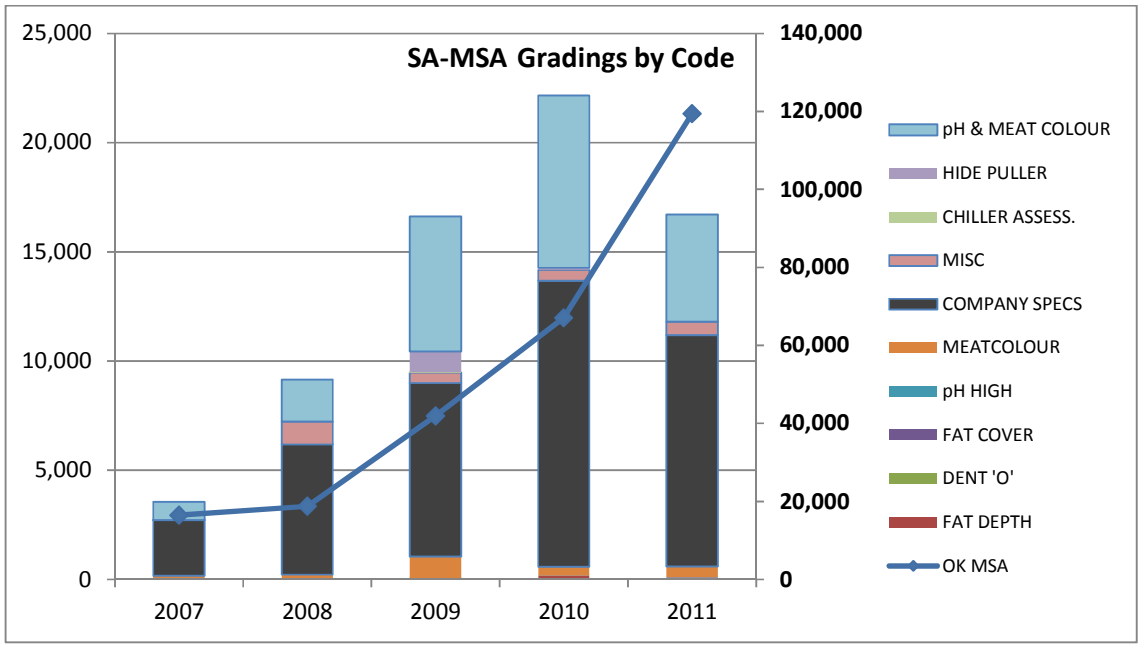
The chart for Victoria shows a good improvement last year for total carcases graded (solid line). It also shows meat colour alone as a non-compliance issue has fallen, but that combined high pH and wrong meat colour together are a more significant cause for non-compliance factor. Hide puller damage is potentially an issue to be addressed in Victoria.



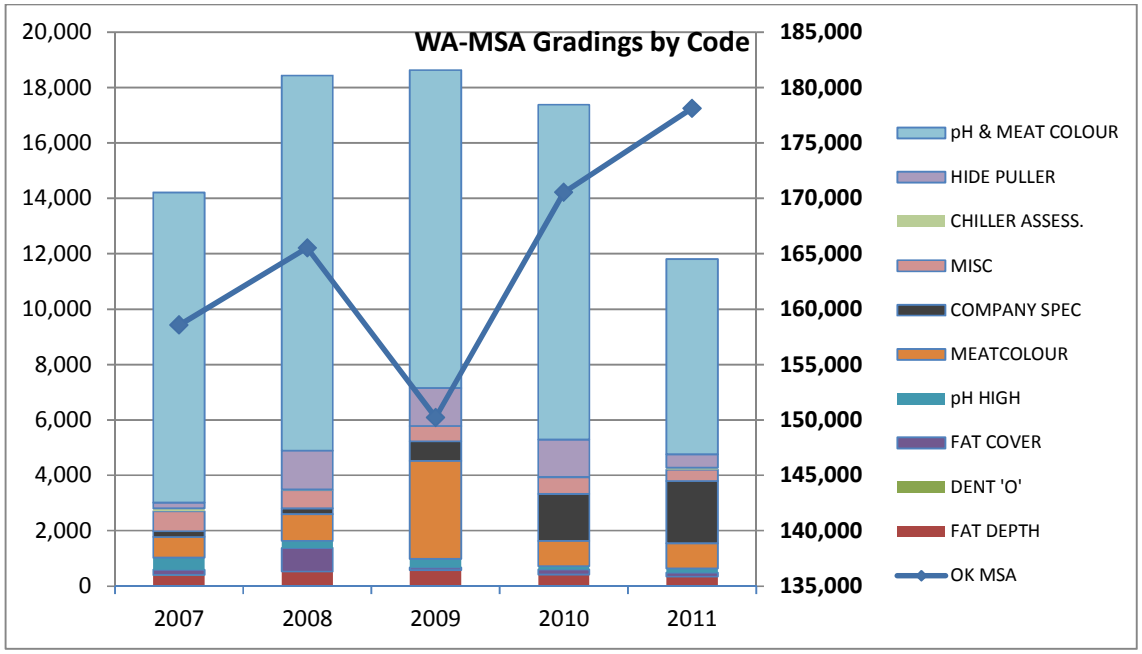


In the case of Qld gradings, the state with highest participation in MSA, incompatibility with company specs is the biggest reason for carcases failing grading. Meat colour, both alone and in combination with high pH, is a consistent factor as in other states. It is interesting to note the virtual absence in all states of fails due to carcases being outside chiller assessment parameters.

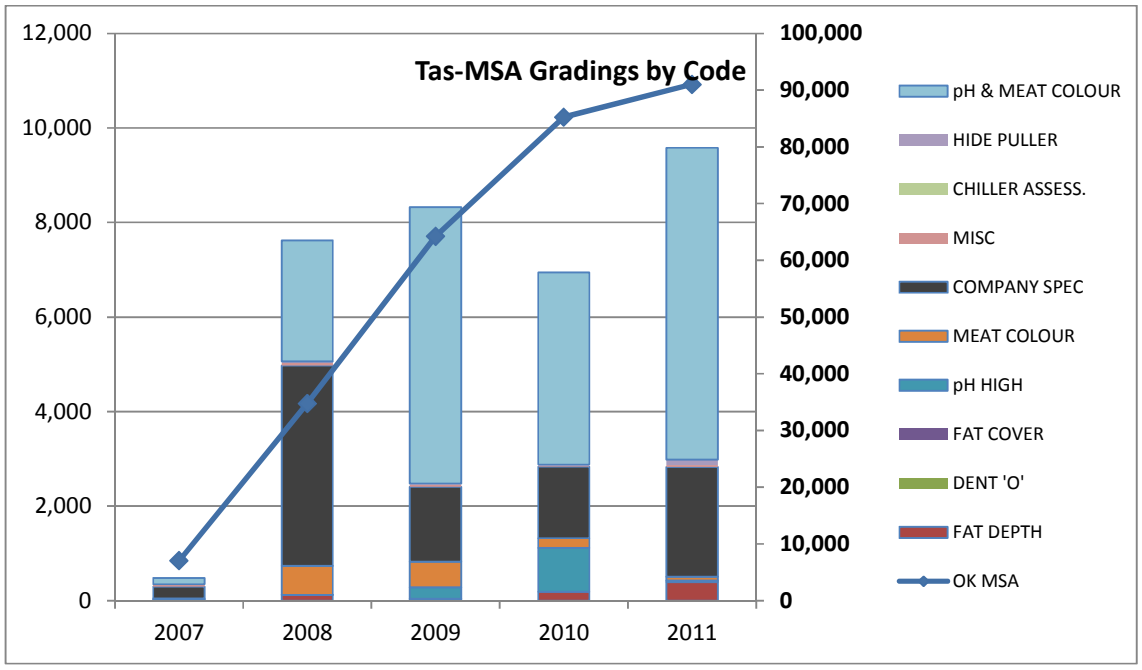
In South Australia, non-compliance issues are straightforward: the combined issues of high pH and wrong meat colour is the second biggest cause after incompatible company specifications. Meat colour and possibly bruising or other factors account for the other non-compliance issues.



The situation in Western Australia is more in line with that of Queensland, where high pH combined with wrong meat colour accounts as the main non-compliance factor. Wrong meat colour and incompatible company specifications also are significant. Like the Queensland results, failure due to fat depth measurements are also observed to be high.



Strong growth since 2007 in MSA compliant carcases is shown in the chart below for Tasmania. Non-compliance issues to date are more straightforward, with high pH in combination with wrong meat colour accounting for 70% of non-compliant carcases, followed by incompatible company specifications and poor fat depth results.



4.3.4 Level of Participation by Processors

The number of MSA-registered processing plants has grown from 33 in 2008 to 41 in 2011 as shown in Figure 14, however this growth has come from more plants in Queensland and NSW. This is partially explained by the relatively small number of plants in states such as Tasmania and South Australia and even WA however continued low representation in Vic is potentially related to the low uptake rate for MSA among producers in that state. Victoria has a smaller number of cattle per holding than other states and a greater concentration on dairy production than beef production.

FIGURE 14 - NUMBER OF MSA PLANTS

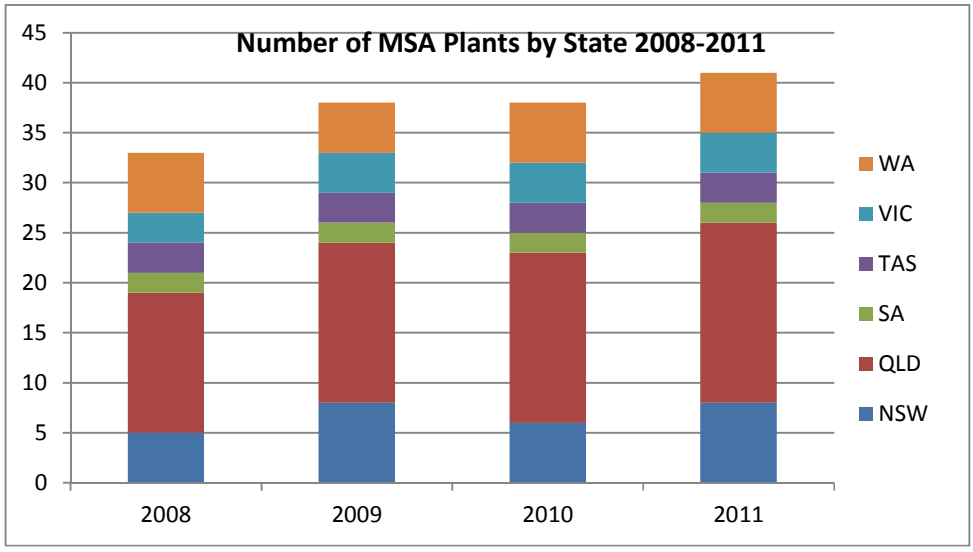
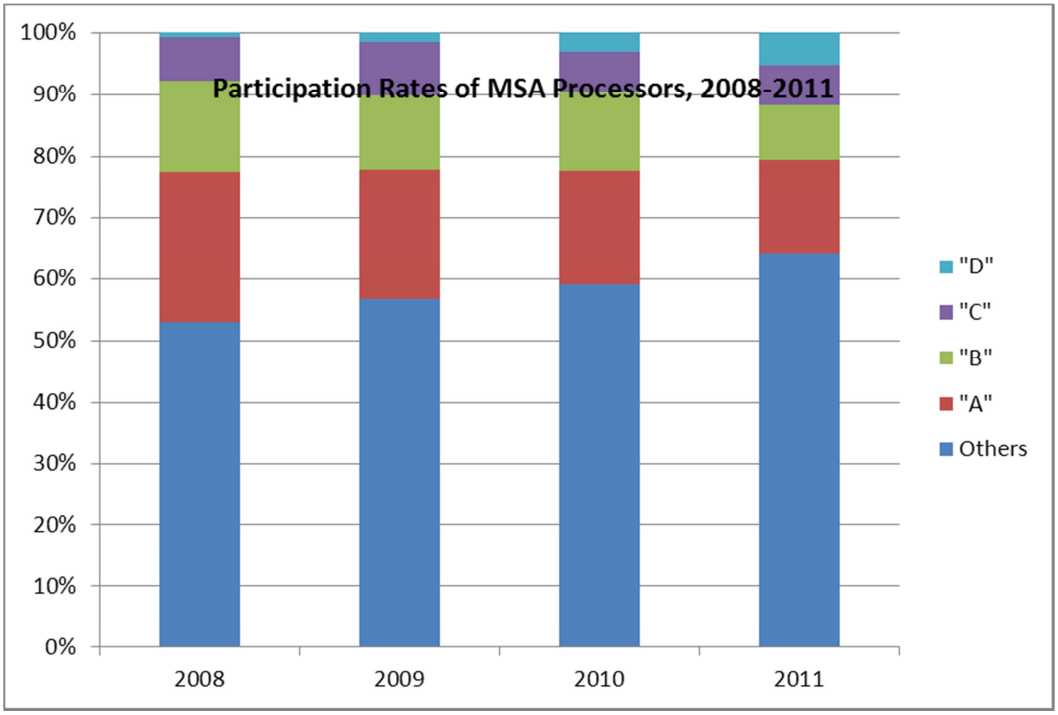


Figure 14 suggests more processing plants are now becoming actively involved in MSA processing, with higher volumes of MSA carcases overall, but in 2011 only four plants were responsible for around 35 % of gradings (down from almost 50 % through four plants in 2008).

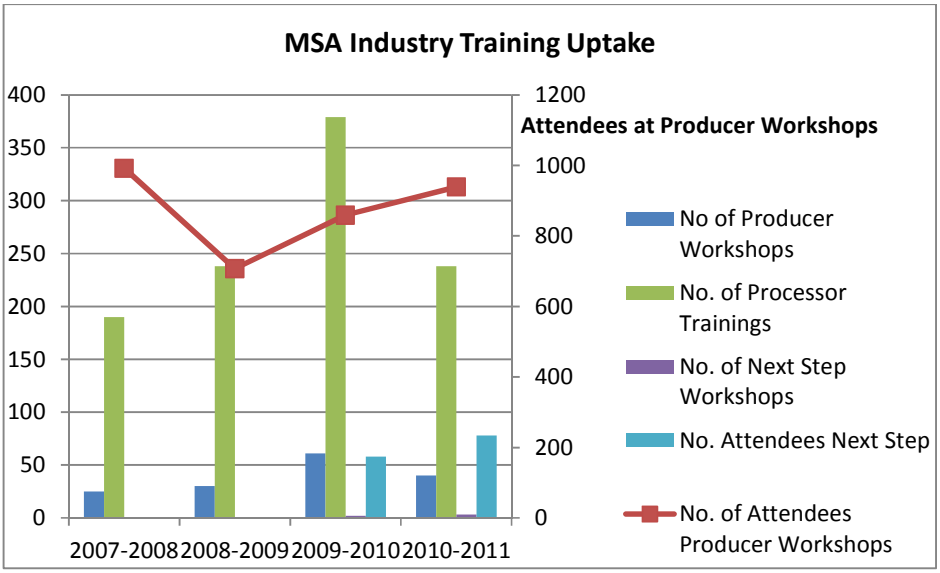
FIGURE 15 – MSA PROCESSORS 2008-2011



4.3.5 Uptake and Frequency of MSA Producer Training Programs

Increased interest in the MSA program has been underpinned by provision of training days and courses aimed at producers and processor representatives. Each group has its own requirements and demands for the MSA system, which are best addressed through separate education and information activities. The strong increase in producer participation was emphasised by high number of workshop attendances and processor training events. MSA's critical mass has been built on the back of this effort and suggests that LDL will require a similar approach.

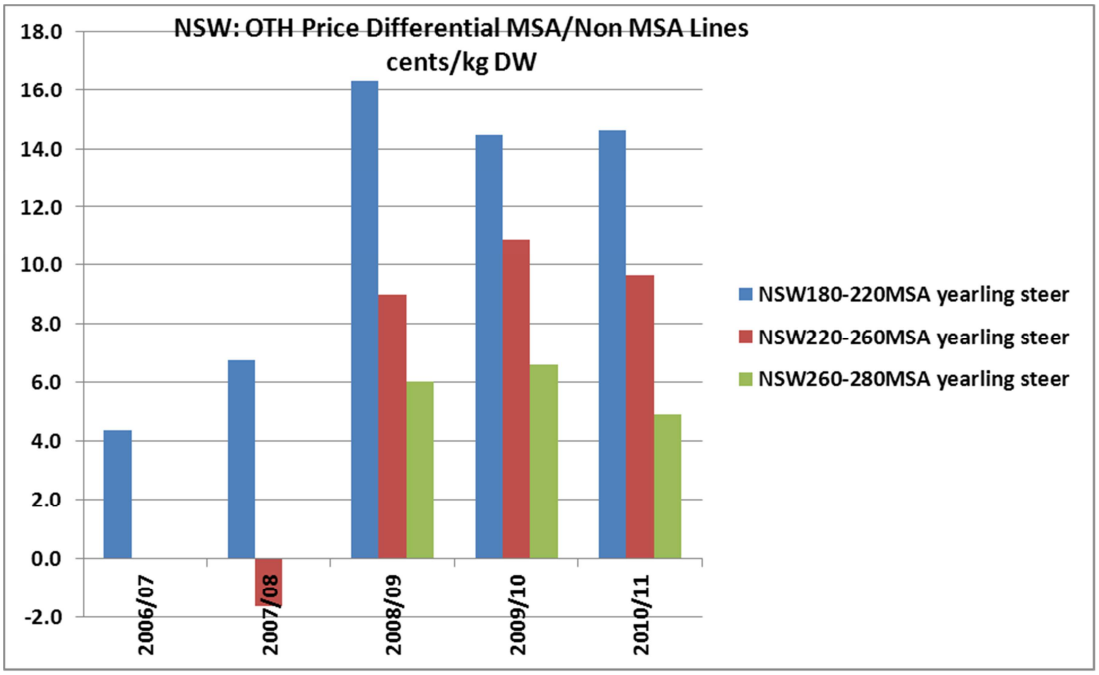
FIGURE 16 – UPTAKE IN PRODUCER AND PROCESSORS TRAINING OPPORTUNITIES



4.4 Price Premiums

The charts at Figure 17 indicate the healthy price premiums being obtained for MSA-graded livestock over non-MSA lines in NSW and QLD during the past four years. Now that higher volumes of MSA-graded carcases are moving through the pathways, some interesting trends are starting to emerge about the size and consistency of premiums normally observed between MSA and non-MSA lines, particularly across different carcase weight ranges and also between the different states' markets. Queensland is a strong market for MSA cattle; moreover, the price premium for MSA steers is now becoming apparent for heavier grades of heifers as well in that state, as evidenced in the chart at Figure 18.

FIGURE 17 - OVER-THE-HOOKS PRICE PREMIUMS FOR MSA



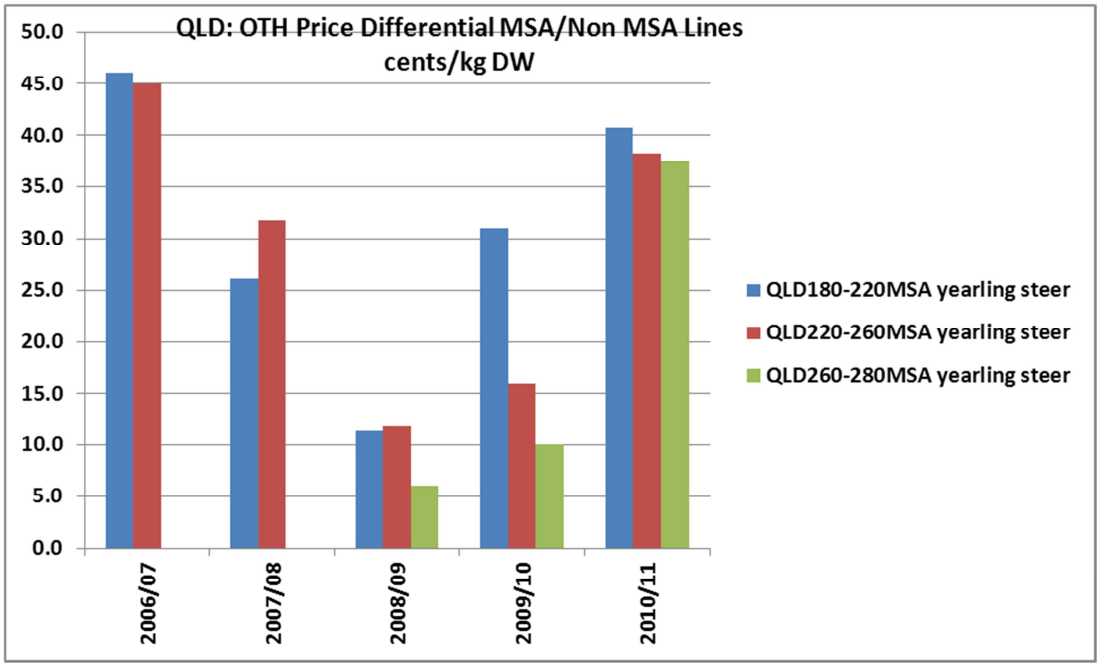
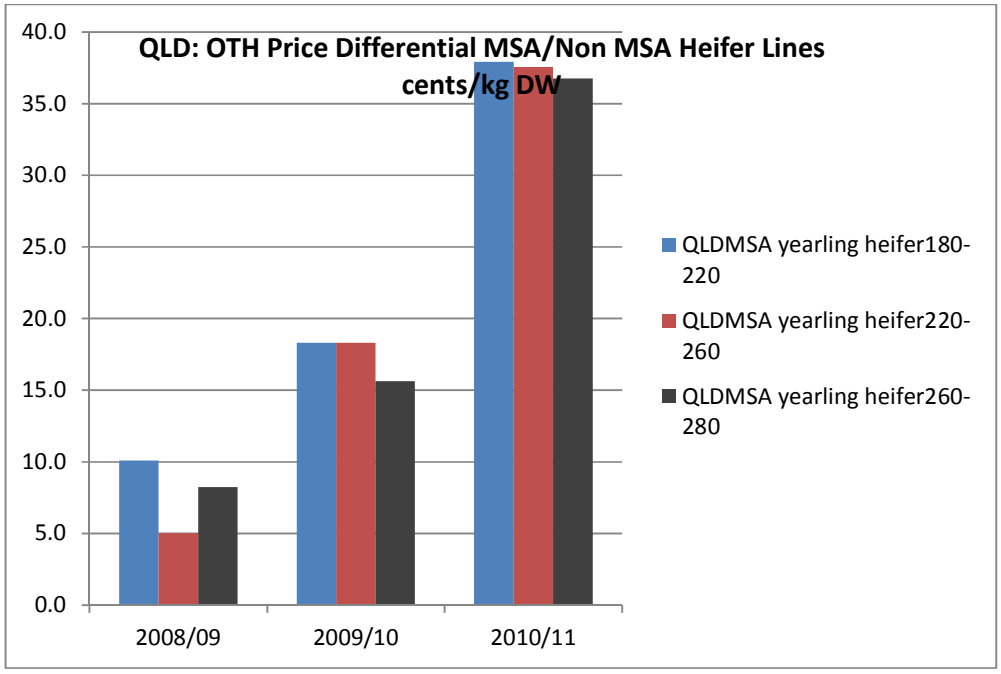
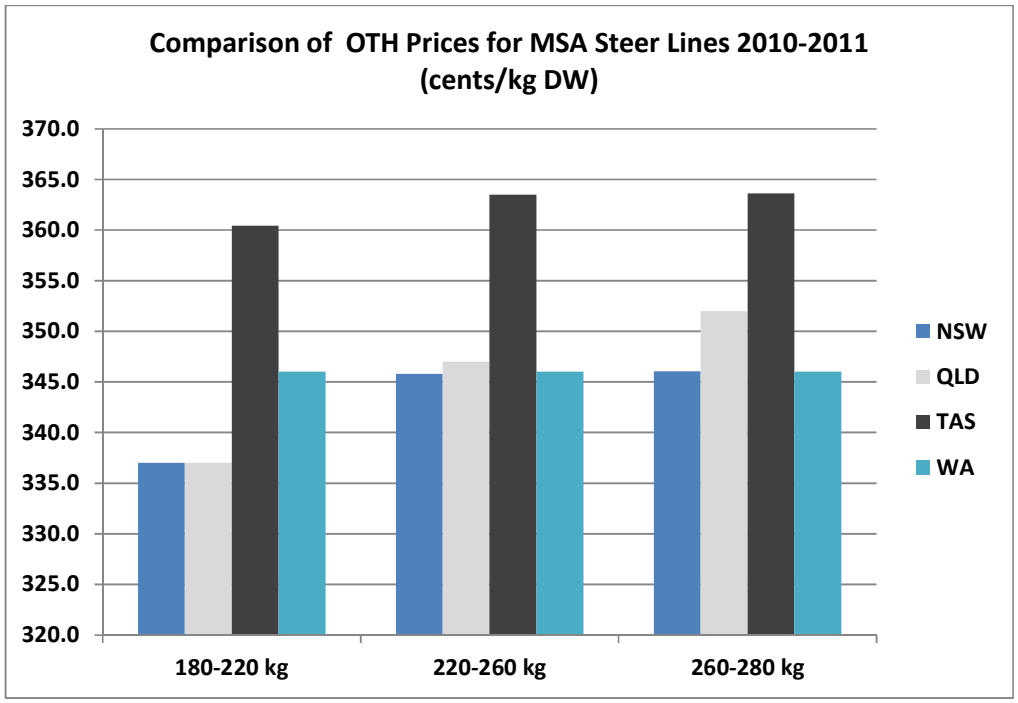


FIGURE 18 - OVER-THE-HOOKS PRICE PREMIUMS FOR MSA HEIFERS, QLD



Increased activity in the MSA marketplace in Tasmania is also evident, not just through growth in numbers graded but through the level of returns across three weight range categories (see Figure 19).

FIGURE 19 - OVER-THE-HOOKS PRICE PREMIUMS FOR MSA – STEERS IN SEVERAL STATES



4.5 Benefits of Improved Compliance under MSA

MSA provides a case study of what is possible when appropriate feedback on quality and related outcomes of beef carcases post-slaughter are provided back to producers, within an integrated program based on extensive research and supported by education, training, marketing and information materials for all sectors of the supply chain (not simply producers). Over time MSA products have developed a premium over non-MSA products in most livestock, wholesale and retail markets. The OTH premium in 2010-2011 was estimated at $0.15/kg carcase weight, up from $0.08/kg two years prior. In conjunction with higher numbers graded through MSA, the program is now developing a level of critical mass. The benefit of MSA to industry can be expressed simply on the following basis:

In 2007 there were 810,000 head of slaughter cattle graded under MSA, a compliance rate of 90.3%. The average price premium received by cattle producers on an over-the-hooks basis for MSA grade cattle in the period 2007 – 2011 was $0.115/kg. A national average carcase weight of 280 kg is consistently observed for this period.

In 2011 a total of 1,340,000 head of slaughter cattle graded under MSA, a compliance rate of 94.1%. Average price premium and carcase weight are assumed to have remained the same. The economic benefit to industry of the MSA premium and additional MSA throughput is shown in Figure 20. Using these data a substantial benefit of approximately $40.6 million or $30.30 per head of cattle has been generated, and an estimated benefit from increased compliance of almost $8 per head over this period.

FIGURE 20 - ECONOMIC BENEFIT OF MSA

	2007	2011	Incremental Additional Benefit
Number of cattle graded MSA (head)	810,000	1,340,000	
Current percentage of carcases that grade MSA (%)	90.3%	94.1%	
Average price premium available for grading MSA ($/kg)	0.115	0.115	
Average weight of cattle (kg HSCW)	280	280	
Total MSA benefit	**$23,552,046**	**$40,602,268**	**$17,050,222**

It must be said that increases in compliance rates from this point could start to become marginal, however, the integral structure of the MSA program structure will likely help secure ongoing producer participation, grading numbers and processor involvement.

4.6 Summary of Case Study

MSA was chosen for a case study because it represents the roll-out of a system which must span producer, feedlot and processor expectations, much the same as will be required of LDL. Further, MSA is based upon the concepts of compliance against many of the criteria included in the LDL appraisal tool. MSA represented a step change for industry, just as LDL will be for supply chain participants. Although MSA is a product description system and LDL an analysis tool, they both present the user with the ability to plug an information set into a wider array of information and to determine differences in product quality and impact on revenue results.

In the ten years since MSA's introduction, it has achieved strong acceptance from producers and more recently from processors, with several new plants joining the program over the past

two years. Increases in the number of MSA abattoirs helps to fuel producer participation because there are more pathways for their livestock. It also moves MSA product from being in a niche position to being a mainstream option. More than 25% of all carcases are MSA graded which means a substantial increase in the level of compliance or uniformity across the board. This type of result can also be achieved within specific market categories through the use of LDL by enabling processors to measure compliance against specific criteria for an individual market and to identify areas of low performance or even failure. It will also enable processors to build their own product grids which could represent specifications for an particular export buyer to ensure the carcases being used to fill the order are consistent with the expectations for the finished cuts.

Rolling out LDL will be assisted if specific processors can be taken on-board which are keen about the software's capabilities and can demonstrate its potential to improve consistency of carcase selection across the board. Ease of checking compliance is one of the main features of the software and this should also spark interest among processors. The need for an integrated education and information program to support LDL introduction is borne out by the success of the MSA education components which reached out to producers, feedlotters, livestock agents and, importantly, processors, to ensure all parties worked from the same principles and expectations to achieve improved consistency in carcase attributes. Participation of NSW and Qld processors is particularly important to achieve, as exemplified in the MSA program, where number of works using MSA has grown; also, these two states dominate the total number of MSA graded carcases.

5 CONCLUSIONS AND RECOMMENDATIONS

The Livestock Data Link offers processors a powerful and robust tool for assessing non-compliance on livestock processed through their plants. Non-compliance (supply of livestock outside the agreed specification on crucial criteria such as weight range, fat cover, fat depth, meat colour and marble score) was estimated to cost the Australian industry up to $47.1 million per annum on the basis of four key target markets utilizing around 5 million carcases. Extended further across the total kill, (but excluding cull/cow kill), this is estimated to cost up to $51 million. These costs are calculated on penalties charged by processors for non-compliance.

Processors in the consultation phase of the project identified LDL as being of potential commercial benefit to them in assessing suitability of different carcases for different markets. Currently non-compliant carcases cost processors in terms of production time and potentially replacement livestock, against the risk of negative customer reaction to a consignment. LDL can be used as a flexible and fast means of quickly assessing non-compliance of a given animal or group.

The main features of the software which would be of particular benefit to them are as follows. The interface is simple, graphics-based and functions off the NLIS framework for each animal. There is no need for a separate tracking and collection system in the plant.

Second, the kill data locates each carcase or group of carcases in terms of compliance for specific quality parameters (weight range, fat depth and fat coverage etc) that are relevant for pre-defined market grids. Processors can easily build their own grid for a given market and then change the grid as market conditions and customer requirements change.

Third, LDL would assist processors in evaluating suitability of different carcases/groups of carcases for different grids and assessing the consequences in terms of overall compliance and penalties for overs/unders with their own customers

Using LDL, processors can examine what-if scenarios and potentially see where they are exceeding compliance to their customers. LDL-generated reports on specific consignments' compliance against a target market can be easily provided to producers in a more detailed format, which producers seem to increasingly request.

Finally, livestock over time can be benchmarked by source and by compliance level to determine trends and problem issues which may be able to be rectified.

The option to include in the LDL interface a function that reports on animal disease and subsequent losses in product yield is also potentially beneficial. A literature survey done as part of the project indicated the dearth of information about volume and value lost to disease in the beef processing sector. Preliminary estimates provided in the report indicate that this costs the processing sector $64 million in condemned carcases and a minimum of $11.8 million and possibly as much as $50 million per annum in offal and meat condemns.

Currently there is little feedback to producers about incident or extent of sub-clinical disease detected at processing stage, yet several of these diseases have potential consequences for human health at the on-farm and feedlot stage. Including this feature in LDL would enable plants to easily compile records about frequency and volume, which can be analysed against wider industry data series.

A minority of processors expressed no interest in, or opposition to, the LDL concept. Some processors have already made their own investments in monitoring livestock compliance in

their businesses through IT systems of their own design. It could be argued that some of these entities would be reluctant to see competitors obtain an analytical tool of this kind without significant investment. It is also conceivable that some firms prefer less transparency in the calculation of penalty deductions and provision of feedback than the LDL system currently offers. LDL is primarily intended to enable companies to analyse their own data and is not designed for the purpose of being an industry monitoring device.

A case study of Meat Standards Australia (MSA) identified some of the challenges and benefits likely to flow from rolling out LDL. Although MSA is a product description system, not a business tool, synergies definitely exist between the two concepts which will enable LDL's potential to be better realised. These are addressed in the recommendations in the report. The case study suggests a modest but steady buildup in participating numbers is the best way to build lasting improvement and benefit from the system. Moreover, as processors take up the LDL offering, the quality of feedback they are able to provide to growers will strengthen the producer-processor relationship and enhance the standing of those plants that use LDL.

Importantly, LDL, like MSA, will appeal to and can be leveraged off the many pro-active livestock suppliers (producers and feedlotters) and processors which are now adept at using business software in improving enterprise competitiveness. On the supply side, this group is growing conversant with the philosophy behind compliance standards and with using objective feedback reports to improve their production criteria, feeding and finishing regimes and other parameters. MSA and the introduction of NLIS is partly to account for that. On the processor side, businesses are keen to find a competitive advantage which can be used for their own circumstances. The fact that other processors may have access to the same tool does not necessarily dull its effectiveness and usefulness; rather, LDL provides them with flexibility to assess their own supply chain characteristics, level of compliance and other factors to arrive at an improved understanding of where the carcases they process can be most gainfully marketed.

The report makes the following recommendations:

1. The Livestock Data Link initiative should be developed as an analysis and benchmarking tool for processors to assess levels of compliance and to provide improved feedback on carcase attributes to their suppliers.

2. The value of an LDL application for the sheep meat industry should be considered, as there are considerably fewer resources and materials currently available to help processors manage the compliance levels of lambs and young sheep coming through their businesses.

3. LDL should include a feature for reporting and management of production and yield loss to sub-clinical disease in offal and carcase parts.

4. Discussions should occur to enable producers/feedlots to be advised when a sub-clinical disease is detected which could have implications for human health further back in the supply chain e.g. hydatids.

5. LDL should be promoted as a complementary tool with the MSA program for processors and producers as it provides an insightful way of assessing overall compliance levels by individual carcase and over time as part of a continuous improvement strategy.

6. Investigate improved access to the NLIS database (and hence the LDL dataset) for parties other than the current and immediate prior owner of the livestock. In the Australian industry livestock typically change ownership 3-4 times before being slaughtered: therefore several parties could potentially be interested in the carcase performance outcomes, particularly those linked to breeding and genetic selection factors.

7. Contact should be made with the four companies that indicated interest in becoming a test site for LDL. Early interaction with these companies could have several benefits, such as enabling details of the interface to be further improved; obtaining a range of data to populate the LDL; and providing strong endorsement for the LDL concept for other processors.

8. Opposition to the LDL concept by a small number of strategic companies should be assessed and better understood.

9. The LDL interface currently has a few superficial snags which could be addressed to enable faster navigation and use of the software. This will result in improved access to the report and comparison functions.

10. There is clear interest in enabling LDL to include in its interface other emerging criteria such as animal welfare factors and carbon/ETS position.

11. Product grids should be kept current with changing market conditions and specifications.

12. Lessons learnt from the MSA Case Study which will give the introduction of LDL a headstart include:

    a. Development of education and training programs similar to the Beefing Up Performance forums and training courses will underpin usage and interest in the scheme.
    b. Selecting suitable 'champions' from the processing sector who are interested, motivated and empathetic to LDL's potential.
    c. It is considered crucial to find buy-in from a Queensland processing plant in order to achieve maximum leverage from the growth of the MSA system there.

REFERENCES

Cao, K, and Johnson, R., 2006. The costs and benefits of introducing mandatory hygiene regulations, Paper presented at the New Zealand Agricultural and Resource Economics Society Conference, August 2006.

DAFF (2012), Red Meat Export Statistics, 57 Destination Report, March.

GHD, 2009. Report for Animal Health Australia Report quantifying the benefits and costs of E-Surveillance Sheep and goats.

MAF Biosecurity, 2010. Review of the National Bovine Tuberculosis Pest Management Strategy: Regulatory Impact statement, November 2010.

MIA, 2011. Meat Industry Association 2011 Annual Report.

Nimmo-Bell, 2009. Economic costs of pests to New Zealand, A report prepared for MAF Biosecurity New Zealand, September 2009.

NSW Agriculture (2003) Liver fluke disease in sheep and cattle. Primefact 446 (Revised by Dr GW Hutchinson and Stephen Love, March 2007).

Ollinger, M. and Mueller, V., 2003. Managing for Safer Food: The Economics of Sanitation and Process Controls in Meat and Poultry Plants, Agricultural Economic Report, USDA-ERS, April 2003.

Paton M (1994) Utilization of meat inspection findings to improve livestock production. Research Project DAW.034 Report to the Meat Research Corporation.

Pritchett, J., Thilmany, D., and Johnson, K., 2005. Animal disease economic impacts: A survey of literature and typology of research approaches, International Food and Agribusiness and Management Review, Volume 8, Issue 1, 2005.

Stapp, I, 2011. Reporting diseases and defects, AsureQuality, Presentation during the Meat Inspection and Quality Assurance Conference, Sydney, September 2011.