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Solutions and alternatives to pricing grid complexity in Livestock Data Link (LDL)

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Abstract

Executive summary

Meat and Livestock Australia through the Integrity Systems Company (ISC) has created a platform for accessing and benchmarking carcase data and reporting on non-compliance rates for the Australian red meat industry. This program called Livestock Data Link (LDL) delivers carcase feedback to producers and processors that enable the prediction, understanding and manipulation of production and processing efficiency. LDL offers areas of feedback on carcase compliance, animal health information and breeder data.

One of the key functions in LDL is the ability for a user to create their own price grid(s) within LDL. This allows producers to analyse any consignment against created grids, enabling them to compare grid compliance, highlight sweet spots in a grid and calculate the cost of non-compliance. Currently in LDL, the creation of grids is complex, difficult to learn, requires computational and numeracy skills, and is extremely time consuming. The current system requires users to enter grid specifications as a discount $/kg where most of the grids are presented as a price $/kg. Without a grid, the functionality of LDL is limited to basic reporting.

Grid design varies significantly between processors with structural differences between different grids. There is no single methodology that is currently available to enable users to create grids from various processors in LDL. The grid implementation in LDL is simplistic and in a significant number of instances does not support the grid structures that processors use. The current grid structure in LDL makes provision for a primary two-dimensional grid where P8 fat depth in cattle and HSCW are used to calculate a discount. For sheep the primary dimensions of the two-dimensional grid are Fat Class and HSCW. A number of discounts for dentition, sex, meat colour etc. are available.

No provision exists for:

- Premiums paid if certain criteria are met (e.g. only cattle with minimum MSA index of 58 accepted, premium of $0.05/kg paid for MSA index > 65);
- Discounts and premiums paid using more than one criterion;
- Expanding the selection in the primary grid to more criteria than just fat depth or class.

Looking at the data provided to the project team, only 458 users have captured 1030 grids in LDL. With the current number of LDL users, it is expected that many more grids should exist if this feature was operating efficiently. This demonstrates that this functionality is not used by users and should be revised.

As a result, ISC have commissioned a review of the grid design in LDL with the following objectives:

- Review the existing processor grids that are available for capture in LDL;
- Evaluate the existing LDL grid mechanism, proposed grid options and explore other possible options.
- Consult with LDL advisory committee to ensure the recommend solutions are aligned with industry requirements.
- Provide a final report that outlines the key activities undertaken and recommend the solutions to enable the capture of processor grids in LDL.

In August 2019, the project team received an extract from the LDL database that included the tables currently used to define grids. Twenty-five sheep and thirty-five cattle grids were sourced from publicly available sources like processor websites and from contacts at processors. These grids were reviewed by documenting the components of each grid, including prices, discounts, premiums and compliance.

The existing LDL grid mechanism was evaluated and found to be inadequate to support the variation of grids used by processors. The existing interface is dated, difficult to understand with limited or no information on how to use the system. A Grid Wizard is available to guide users through the process of creating a new grid, but it doesn't offer any explanation on what is meant by the different questions within the Wizard. A Sheep and Cattle user manual is available for download, but it is not a substitute for interactive support.

User Interface Design and security issues were also identified as part of this project.

As a result, the following recommendations are made:

No.	Recommendation	Page
1	Build one, common and flexible grid interface that will cater for the current grids and grid options required in the foreseeable future (4.2).	10 – 17, 19
2	The capture of grids should be presented in a similar format as it is published.	10 - 17
3	Provision should be made to capture premiums with discounts.	10 - 17
4	Discounts and premiums should be expanded to make provision for multiple traits.	10 - 17
5	Provide processors with the ability to create their grids in LDL and share with some or all of the users in LDL (4.6).	19
6	User Interface Design issues identified should be fixed and the rest of the LDL system should be investigated for similar issues.	9 - 11
7	Data structure and processor feed to the LDL database should be expanded to include data needed to support grids set by processors. This could include merging the LDL database with other ISC/MLA databases that contain necessary data.	14
8	Security concerns identified should be addressed.	17

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1 Background to the Grid Complexity LDL project

Grid creation in Livestock Data Link (LDL) is one of the largest barriers to producer adoption within LDL. The process of taking a processor grid, identifying the appropriate market and entering it into the LDL grid template is complex, time consuming and in part confusing. Without a grid, the user can only generate basic benchmarking results from the LDL reports with no indication how well they have performed.

Currently entering a grid into LDL requires the user to enter the specifications for each carcase attribute individually. The ideal specification is given a 0c/kg discount. This is the inverse of what a producer would see on a grid supplied by a processor where the ideal specification is given the highest $/kg value. The need for a producer and/or processor to convert the $/kg into a discount $/kg further compounds what is already a complicated process.

Grid format and design also varies from processor to processor. The result of this is that there is not one set method for a producer to follow to interpret and enter the grid into LDL. Worse still, in some cases the format of the processor grid is not supported by the LDL template, meaning the grid cannot be added and performance cannot be calculated at all.

Recent announcements by processors have indicated that producers will be paid a premium where certain specifications have been met. The concept of a premium doesn't exist within the LDL template and adds more complexity where trying to report on both premiums and discounts at the same time.

In summary, grids are an important part in identifying non-compliance and driving behaviour and practice change, but they are also complex. For LDL to be a useful tool it needs simpler mechanisms to allow producers to understand and interpret them. ISC is seeking advice and examples on how to think through different and better ways for LDL to manage the cost of non-compliance calculations.

The purpose of this project is to provide recommendations around how to capture processors' grids in LDL.

2 Project objectives

The following project objectives were defined in the request for quotation (RFQ) that the Integrity Systems Company (ISC) provided for this project. Each of the objectives were achieved as part of this project:

2.1 Project Objectives

- Review and document the existing processor grids that are available for capture in LDL;
- Evaluate the existing LDL grid mechanism, proposed options and explore other possible solutions;
- Consult with LDL advisory committee to ensure the recommendations are aligned with industry requirements;
- Provide recommendations on possible solutions that can be considered to enable better utilisation of the grid functionality in LDL.

3 Methodology

3.1 Data provided

The project team was provided with a database of records from LDL by the ISC in August 2019. The database contains the following tables relevant to this project:

- SaleGrid – including the data of 1030 grids created in the LDL system (258 lamb and 772 beef);
- GridEntry – capturing the various discount structures for each grid;
- Discount – containing the value and amounts for each GridEntry;
- CarcaseAttribute – providing the descriptions and data entry structure for GridEntry records.

The data was loaded into a SQL database and current structure evaluated.

3.2 "Livestock Data Link Research Survey"

The current complexity in creating grids is evident from the results of the "Livestock Data Link Research Survey" only 12 of 31 respondents who use LDL have created a grid. Those that manage to create a grid found useful functionality with 11 out of 12 respondents noting that it was "somewhat useful", "very useful" or "extremely useful". One of the responses to a survey question "Why isn't the grid function useful?" read, "Doesn't reflect market specs".

3.3 Evaluating existing grid structures

3.3.1 Cattle

Thirty-four grids from five different processors were evaluated as part of this study. It is clear that the current grid implementation in LDL will not support the full implementation of most of the grids. Current limitations include the following:

- The primary grid in LDL makes provision only for fat and weight. All grids evaluated in this project were more complex than this. It would be much easier for data entry if more complex grid structures could be setup to match the structure processors specify. Additional fields identified include Dentition, Butt Shape, Sex, Feed Type, MSA Index, HGP Free, Bruising, Fat Colour and Meat Colour.
- Only two grids from one supplier are based on a discounted $ structure. The rest are all fixed price grids. It is complex to turn fixed prices into discounts. It will be far simpler for users to enter data in the format that it is specified without the need for conversion.
- Current grid HSCW start at zero kg with no option to change this. Some of the grids specify minimum weights making it impossible to determine if all animals in a batch will meet the requirements of the grid.
- The current discount system does not make provision for a combination of conditions or market specifications to be met to calculate a discount or reward e.g. combination of sex and dentition, a combination of fat and weight will trigger discounts or premiums.
- Discounts are only expressed as $/kg. In some instances, a % discount is specified. The current grid structure supports this but requires the user to calculate this by hand prior to grid entry. It would be more efficient if this could be calculated by the LDL system, which would simplify the setup of a grid.

Refer to Appendix “A” for a summary of grids evaluated.

3.3.2 Sheep

Twenty-six grids from four processors were evaluated. Two of the processors currently deliver data to LDL and their grids fit mostly within the current LDL grid structure. Adjustments will have to be made to fit the processors that do not currently supply data to LDL. It must be noted that sheep prices are currently high and maintaining supply is critical. As a result the current girds are basically flat with not a lot of discounts or discrimination. This could change if the supply of sheep meat exceeds the demand in future. Should this happen then grids potentially will become tighter, more discriminating and constraints added to grids that would make it difficult to represent in the current LDL grid structure. The current grid structure is limited and cannot easily be expanded as it only makes provision for a main grid of Fat Class and HSCW with potential discounts for Lean Meat Yield% and Dentition. It is not flexible enough for possible future changes, as it does not consider combinations of discounts and premiums that could be implemented.

Refer to Annexure ‘B’ for a list of grids analysed

3.4 Evaluating the current LDL Grid mechanism

3.4.1 Current User Interface and limitations

The current User Interface (UI) that is used to capture the data for the grids is dated, not intuitive, and difficult to translate grids and in some cases not fit for purpose. It only supports the simplest of grid examples and any new user would need guidance on how to set it up. The issues identified are:

- The layout and structure of the grid capture in LDL does not reflect what a user (producer) receives from a processor and a large amount of manual calculation needs to be done prior to the grid entry. This transformation could easily be implemented within the LDL system, greatly simplifying the system, reducing the likelihood of errors and significantly improving its useability.

Here is an example of a cattle grid:

Steer	Weight	dent	fat mm	f/c	m/c	bruising	420+	360+	340+	320+	300+	280+	260+	240+	220+	200+	180+	160+	140+	120+	100+	0+
MSA Index 60 + Vendor bred																						
VB AA		0-2	5/22	1-3	1a-3	0/0		6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.00	5.95	5.80					
MSA Index 58 + for all MSA lines except MSA4 which is 54 +																						
MSA AA		0-2	5/22	1-3	1a-3	0/0		6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.95	5.90	5.75					
MSA		0-2	5/22	1-3	1a-3	0/0		-	6.00	6.00	6.00	6.00	6.00	6.00	5.95	5.90	5.75					
MSA4		0-4	5/22	1-4	1a-4	0/0		-	6.00	6.00	6.00	6.00	6.00	6.00	5.95	5.90	5.75					
EU		0-4	5/22	1-4	1a-4	0/0		6.00	6.00	6.00	6.00	6.00	6.00	6.00								

All standard fat penalties apply

Female	Weight	dent	fat mm	f/c	m/c	bruising	420+	360+	340+	320+	300+	280+	260+	240+	220+	200+	180+	160+	140+	120+	100+	0+
MSA Index 60 + Vendor bred																						
VB AA		0-2	5/22	1-3	1a-3	0/0		6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.95	5.90	5.75					
MSA Index 58 + for all MSA lines except MSA4 which is 54 +																						
MSA AA		0-2	5/22	1-3	1a-3	0/0		5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.90	5.85	5.70					
MSA		0-2	5/22	1-3	1a-3	0/0		-	5.95	5.95	5.95	5.95	5.95	5.95	5.90	5.85	5.70					
MSA4		0-4	5/22	1-4	1a-4	0/0		-	5.95	5.95	5.95	5.95	5.95	5.95	5.90	5.85	5.70					
EU		0-4	5/22	1-4	1a-4	0/0		5.95	5.95	5.95	5.95	5.95	5.95	5.95								

All standard fat penalties apply

Fat Penalties

5 to 22mm	0c
23 to 32mm	3c
33 to 42mm	30c
43 to 49mm	50c
50 mm plus	80c

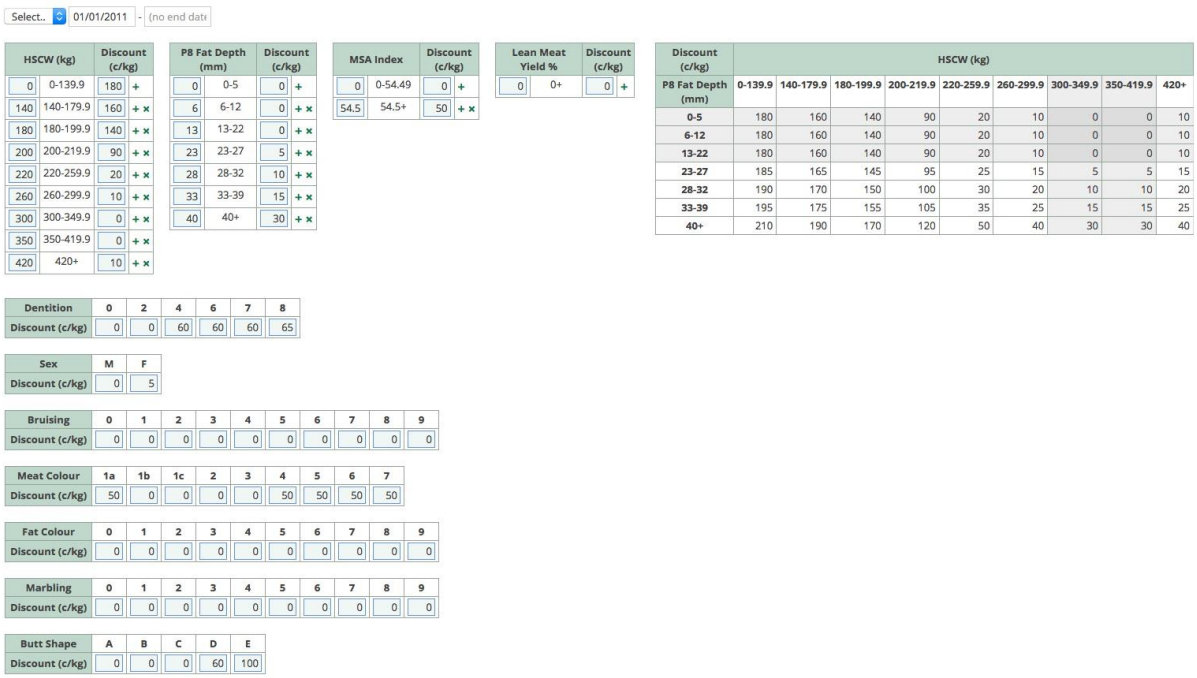
Dentition Penalties

6 Tooth Cattle (Flat Rate)	4.30/KG
8 Tooth Cattle (Flat Rate)	4.00/KG

Meat & Fat Colour Penalties

5 and Greater $4.30/Kg (Flat Rate)

This is the data a user has to capture to translate the grid:



Select.. 01/01/2011 - (no end date)

HSCW (kg)		Discount (c/kg)	
0	0-139.9	180	+
140	140-179.9	160	+ ×
180	180-199.9	140	+ ×
200	200-219.9	90	+ ×
220	220-259.9	20	+ ×
260	260-299.9	10	+ ×
300	300-349.9	0	+ ×
350	350-419.9	0	+ ×
420	420+	10	+ ×

P8 Fat Depth (mm)		Discount (c/kg)	
0	0-5	0	+
6	6-12	0	+ ×
13	13-22	0	+ ×
23	23-27	5	+ ×
28	28-32	10	+ ×
33	33-39	15	+ ×
40	40+	30	+ ×

MSA Index		Discount (c/kg)	
0	0-54.49	0	+
54.5	54.5+	50	+ ×

Lean Meat Yield %		Discount (c/kg)	
0	0+	0	+

Discount (c/kg)	HSCW (kg)								
P8 Fat Depth (mm)	0-139.9	140-179.9	180-199.9	200-219.9	220-259.9	260-299.9	300-349.9	350-419.9	420+
0-5	180	160	140	90	20	10	0	0	10
6-12	180	160	140	90	20	10	0	0	10
13-22	180	160	140	90	20	10	0	0	10
23-27	185	165	145	95	25	15	5	5	15
28-32	190	170	150	100	30	20	10	10	20
33-39	195	175	155	105	35	25	15	15	25
40+	210	190	170	120	50	40	30	30	40

Dentition	0	2	4	6	7	8
Discount (c/kg)	0	0	60	60	60	65

Sex	M	F
Discount (c/kg)	0	5

Bruising	0	1	2	3	4	5	6	7	8	9
Discount (c/kg)	0	0	0	0	0	0	0	0	0	0

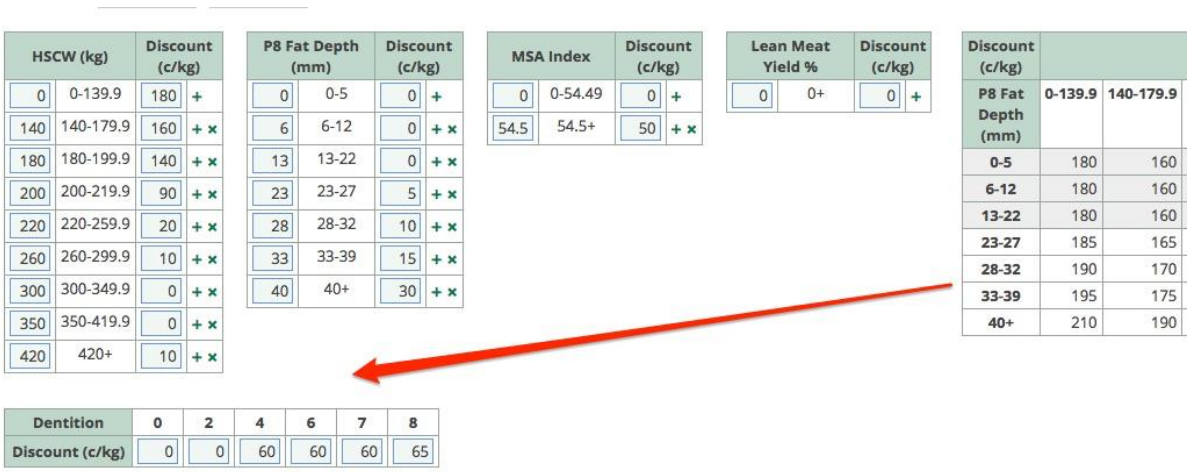
Meat Colour	1a	1b	1c	2	3	4	5	6	7
Discount (c/kg)	50	0	0	0	0	50	50	50	50

Fat Colour	0	1	2	3	4	5	6	7	8	9
Discount (c/kg)	0	0	0	0	0	0	0	0	0	0

Marbling	0	1	2	3	4	5	6	7	8	9
Discount (c/kg)	0	0	0	0	0	0	0	0	0	0

Butt Shape	A	B	C	D	E
Discount (c/kg)	0	0	0	60	100

- The current interface cannot handle complex discounts where two or more conditions that need to be matched before a discount apply. In two of the grids evaluated the discounts apply if both certain weight and fat conditions were not met.
- No provision is made for premiums if certain conditions are met. The current structure makes it almost impossible to capture these scenarios.
- The grid implementation is not using responsive web design. When the screen is resized, the visual elements should move themselves to fit in the screen. This is not currently happening.



HSCW (kg)		Discount (c/kg)	
0	0-139.9	180	+
140	140-179.9	160	+ ×
180	180-199.9	140	+ ×
200	200-219.9	90	+ ×
220	220-259.9	20	+ ×
260	260-299.9	10	+ ×
300	300-349.9	0	+ ×
350	350-419.9	0	+ ×
420	420+	10	+ ×

P8 Fat Depth (mm)		Discount (c/kg)	
0	0-5	0	+
6	6-12	0	+ ×
13	13-22	0	+ ×
23	23-27	5	+ ×
28	28-32	10	+ ×
33	33-39	15	+ ×
40	40+	30	+ ×

MSA Index		Discount (c/kg)	
0	0-54.49	0	+
54.5	54.5+	50	+ ×

Lean Meat Yield %		Discount (c/kg)	
0	0+	0	+

Discount (c/kg)	HSCW (kg)	
P8 Fat Depth (mm)	0-139.9	140-179.9
0-5	180	160
6-12	180	160
13-22	180	160
23-27	185	165
28-32	190	170
33-39	195	175
40+	210	190

Dentition	0	2	4	6	7	8
Discount (c/kg)	0	0	60	60	60	65

- With the current design, it is challenging and almost impossible to determine if some animals are completely excluded from the grid (i.e. NCV, no commercial value) or if they were just discounted. In some instances, animals are excluded if they are lighter than the lowest HSCW weight limit. The LDL system forces a user to start from a zero weight. The full discount can be applied to these animals, but they should be counted as animals not making or achieving the basic grid criteria. A similar situation exists for sex, dentition, fat depth, meat colour and fat colour where grids will completely exclude animals meeting these criteria.

- ❖ No “interactive help” exists where users can find information on the page where it is needed. Good UI design should ensure that information is available on the page where it is required.
- ❖ When errors or incomplete data are detected, the LDL grid system shows errors in red, but no indication is given of what is wrong or suggestions on how to fix the issue:

3.4.2 Current data structure

The data structure of the current grid is inflexible and only supports a two dimensional grid with fat and weight the only options with a number of additional discounts that can be applied. The grid is designed around a discount structure and only one of the processors evaluated was publishing fully discounted grids. Modern data structures make it possible to setup grids that are flexible and can cater for the variations of grid structures published by processors. Using dynamic data structures like JSON will make this possible. JavaScript Object Notation [*](JSON) is a lightweight format for storing and transferring complex data structures and can be used to define data with variable structures.

3.4.3 Method used to assign prices

Currently the only method to assign prices in LDL is using discounted $. The review of processor grids has revealed that only one processor used this methodology to fully calculate grid compliance. In addition to $ discounts, processors are using a mixture of $/kg prices as well as % discounts.

3.4.4 APIs (Application Programming Interface)

One existing API could be identified that is used internal in the system (ldl.mla.com.au/Grids). That API is used to serve up the Edit Grids page. APIs to expose the grid structure could be useful if a specific “use case” could be identified.

3.4.5 Current LDL architecture

The current LDL application is a web application using ASP.NET in the back end for server-side Hyper Text Mark-up Language (HTML) page serving. On the client browser (front end), the system is using Javascript.js supported by the Angular 1.4.3 as framework. The database used to store LDL data is MSSQL server. MSSQL server does not support JSON as well as some of the other databases like PostgreSQL but it should be adequate for the foreseeable future. Decisions to upgrade the architecture will need to consider the skill base of the development and maintenance team as well as data storage standards of the organisation. Upgrading this technology stack is not trivial and is not

[*] https://www.json.org

recommended although security improvements are recommended. This application stack is relatively modern and can be adapted to resolve the issues identified.

3.4.6 Possible enhancements to current grid functionality in LDL

The current grid system can be greatly enhanced to make it much more user friendly and reduce the complexity to capture and implement grids in LDL. Grids can be dynamically configured, expanding on the current two-dimensional grid, to capture grids in the same format as is published by processors. The primary grid can be expanded where each row can have one or more options to select from and is not limited to just fat measurements. A two-step grid creation is recommended where the first step will define the columns of the grid, the HSCW ranges as well as any discounts and premiums that may apply. To capture a cattle grid with the following structure:

Steer	Weight	dent	fat mm	f/c	m/c	bruising	420+	360+	340+	320+	300+	280+	260+	240+	220+	200+	180+	160+	140+	120+	100+	0+
MSA Index 60 + Vendor bred																						
VB AA		0-2	5/22	1-3	1a-3	0/0		6.05	6.05	6.05	6.05	6.05	6.05	6.05	6.00	5.95	5.80					
MSA Index 58 + for all MSA lines except MSA4 which is 54 +																						
MSA AA		0-2	5/22	1-3	1a-3	0/0		6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.95	5.90	5.75					
MSA		0-2	5/22	1-3	1a-3	0/0		-	6.00	6.00	6.00	6.00	6.00	6.00	5.95	5.90	5.75					
MSA4		0-4	5/22	1-4	1a-4	0/0		-	6.00	6.00	6.00	6.00	6.00	6.00	5.95	5.90	5.75					
EU		0-4	5/22	1-4	1a-4	0/0		6.00	6.00	6.00	6.00	6.00	6.00	6.00								

All standard fat penalties apply

Female	Weight	dent	fat mm	f/c	m/c	bruising	420+	360+	340+	320+	300+	280+	260+	240+	220+	200+	180+	160+	140+	120+	100+	0+
MSA Index 60 + Vendor bred																						
VB AA		0-2	5/22	1-3	1a-3	0/0		6.00	6.00	6.00	6.00	6.00	6.00	6.00	5.95	5.90	5.75					
MSA Index 58 + for all MSA lines except MSA4 which is 54 +																						
MSA AA		0-2	5/22	1-3	1a-3	0/0		5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.90	5.85	5.70					
MSA		0-2	5/22	1-3	1a-3	0/0		-	5.95	5.95	5.95	5.95	5.95	5.95	5.90	5.85	5.70					
MSA4		0-4	5/22	1-4	1a-4	0/0		-	5.95	5.95	5.95	5.95	5.95	5.95	5.90	5.85	5.70					
EU		0-4	5/22	1-4	1a-4	0/0		5.95	5.95	5.95	5.95	5.95	5.95	5.95								

All standard fat penalties apply

Fat Penalties

5 to 22mm	0c
23 to 32mm	5c
33 to 42mm	30c
43 to 49mm	50c
50 mm plus	80c

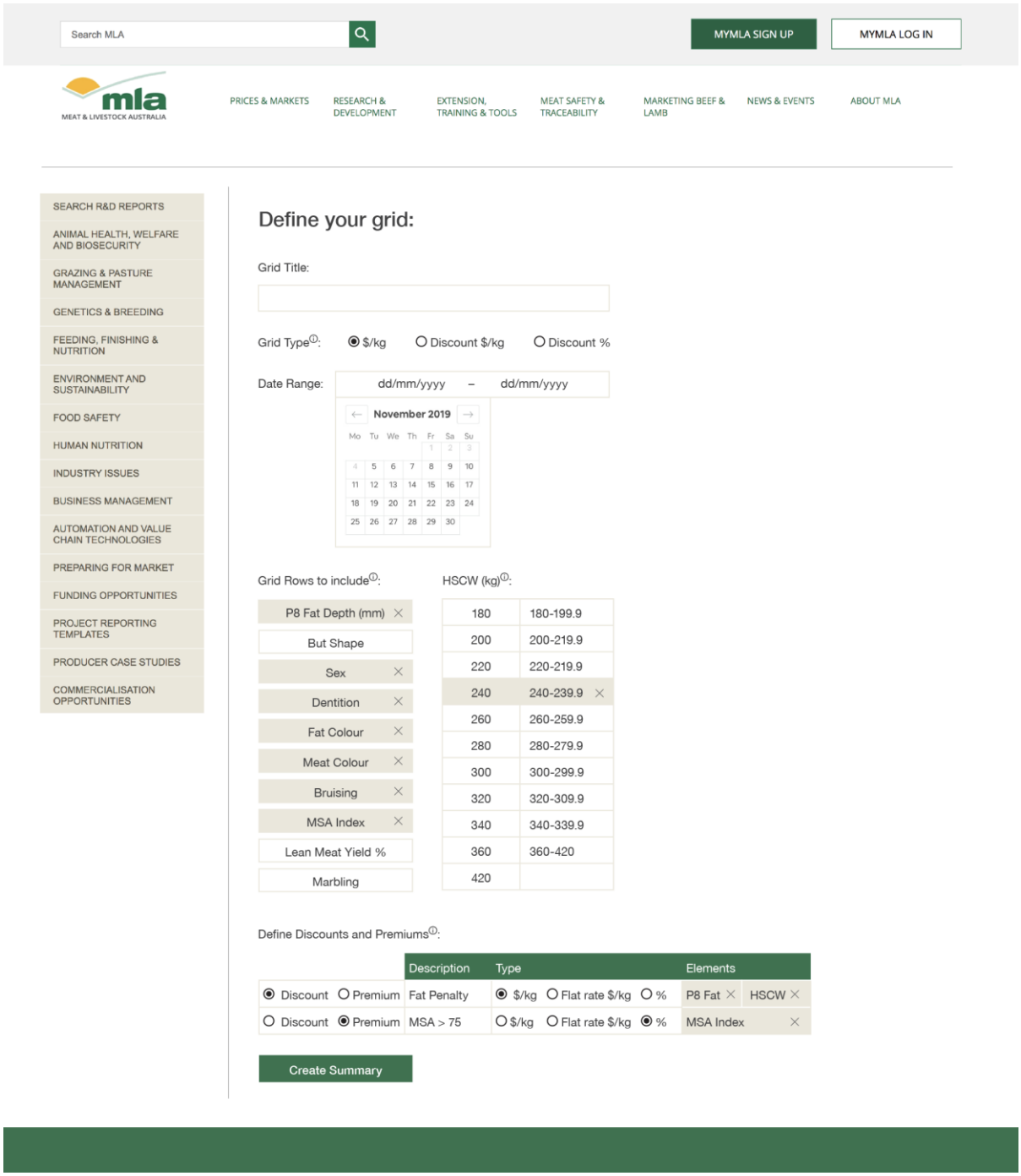
Dentition Penalties

6 Tooth Cattle (Flat Rate)	4.30/KG
8 Tooth Cattle (Flat Rate)	4.00/KG

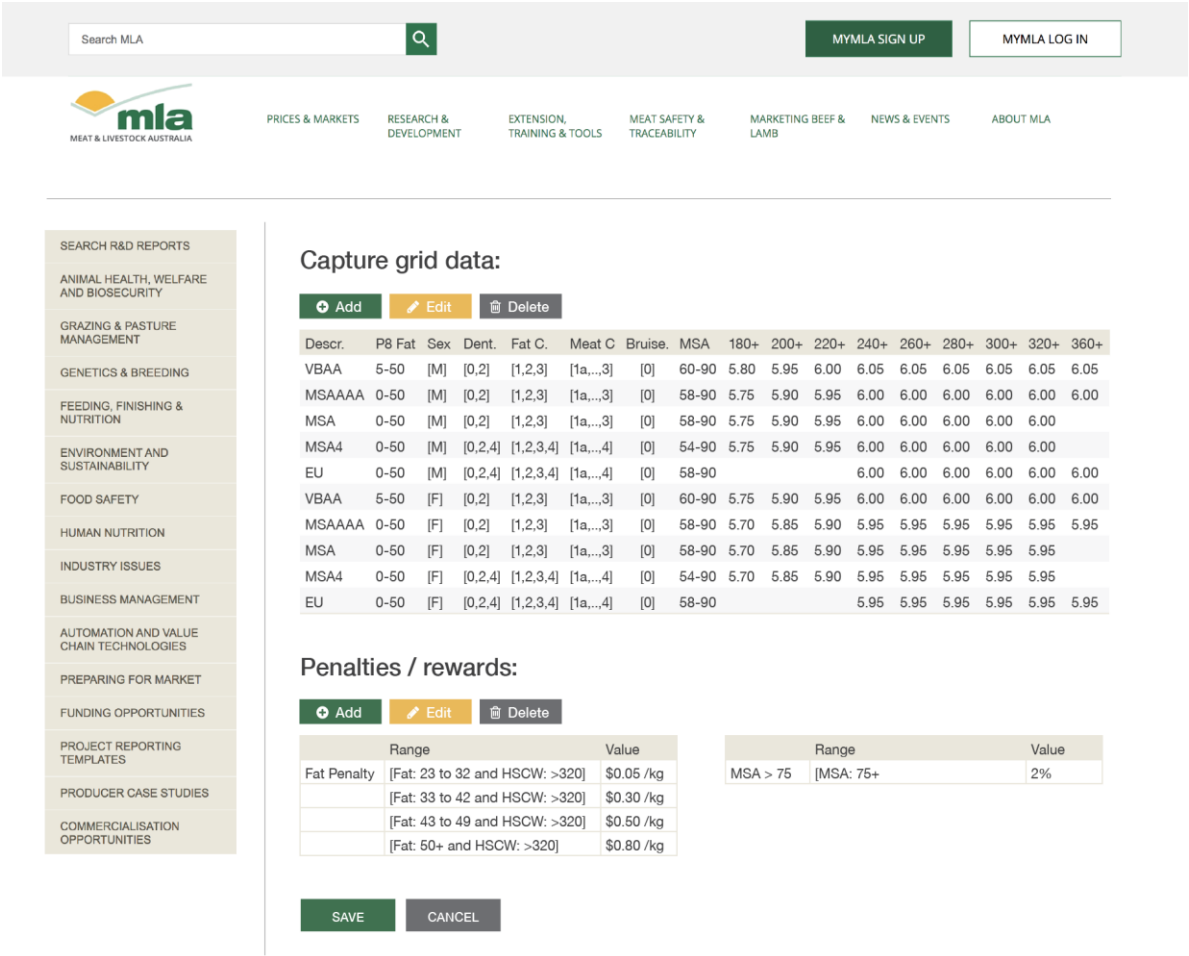
Meat & Fat Colour Penalties

5 and Greater $4.30/KG (Flat Rate)

Step 1 – Define the structure:



Step 2 – capture grid specific data:



Step 3: Compare consignment against grid

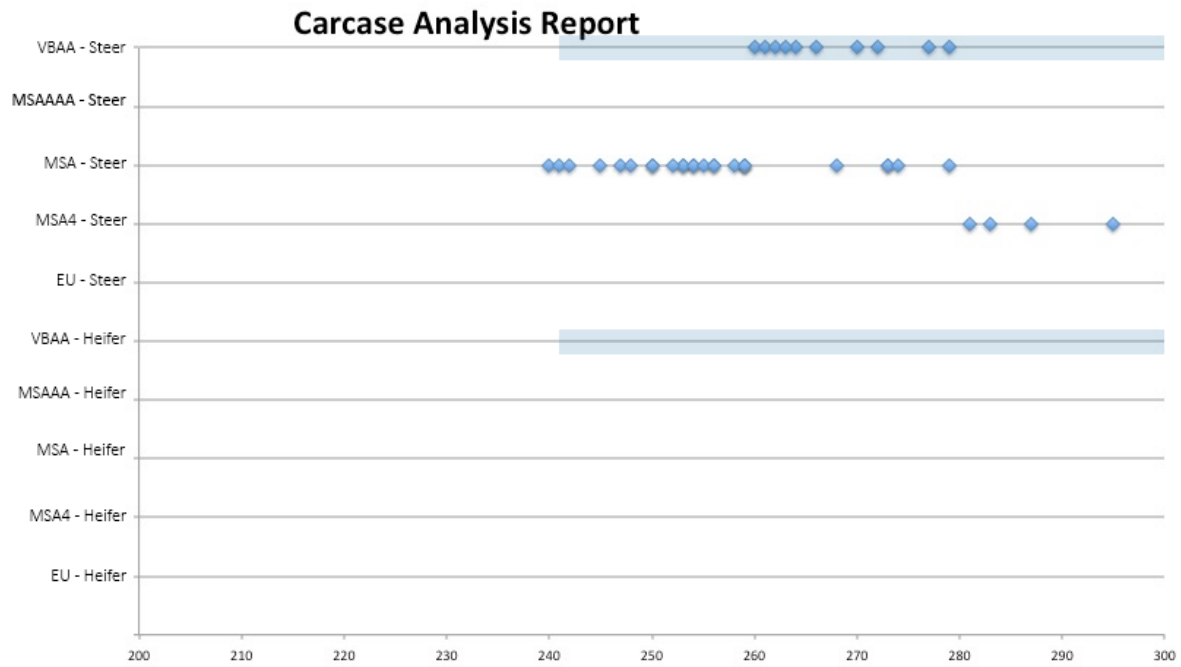
The current grid implementation in LDL focuses mainly on compliance and the cost on non-compliance. The suggested change to the grid structure does allow the system to expand this functionality to display numerous sweet spots on a grid, but also allow for the calculation of consignment income, discounts and premiums. This provides the producer with a complete picture of the livestock transaction that could allow them to compare different grids using the same criteria. Focussing on non-compliance only provides a part of the information that will allow producers to make future decisions on management or genetic interventions.

Here is an example of how a calculation could be done using the available information:

Descr.	P8 Fat	Sex	Dent.	Fat C.	Meat C	Bruise.	MSA	180+	200+	220+	240+	260+	280+	300+	320+	360+	Qty fully compliant	Qty partial compliant	Qty 100% non-compliant	Cost of non compliance	Total Income
VBAA - Steer	5-50	[M]	[0,2]	[1,2,3]	[1a,..,3]	[0]	60-90	$5.80	$5.95	$6.00	6.05	**10 @ $6.05**	$6.05	$6.05	$6.05	$6.05	10			$0.00	$15,730.00
MSAAAA - Steer	0-50	[M]	[0,2]	[1,2,3]	[1a,..,3]	[0]	58-90	$5.75	$5.90	$5.95	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00					
MSA - Steer	0-50	[M]	[0,2]	[1,2,3]	[1a,..,3]	[0]	58-90	$5.75	$5.90	$5.95	**20 @ $6.00**	**5@ $6.00**	$6.00	$6.00	$6.00			25		$312.50	$39,000.00
MSA4 - Steer	0-50	[M]	[0,2,4]	[1,2,3,4]	[1a,..,4]	[0]	54-90	$5.75	$5.90	$5.95	$6.00	$6.00	**5 @ $6.00**	$6.00	$6.00			5		$62.50	$7,800.00
EU - Steer	0-50	[M]	[0,2,4]	[1,2,3,4]	[1a,..,4]	[0]	58-90				$6.00	$6.00	$6.00	$6.00	$6.00	$6.00					
VBAA - Heifer	5-50	[F]	[0,2]	[1,2,3]	[1a,..,3]	[0]	60-90	$5.75	$5.90	$5.95	$6.05	$6.05	$6.05	$6.05	$6.05	$6.05					
MSAAAA - Heifer	0-50	[F]	[0,2]	[1,2,3]	[1a,..,3]	[0]	58-90	$5.70	$5.85	$5.90	$5.95	$5.95	$5.95	$5.95	$5.95	$5.95					
MSA - Heifer	0-50	[F]	[0,2]	[1,2,3]	[1a,..,3]	[0]	58-90	$5.70	$5.85	$5.90	$5.95	$5.95	$5.95	$5.95	$5.95						
MSA4 - Heifer	0-50	[F]	[0,2,4]	[1,2,3,4]	[1a,..,4]	[0]	54-90	$5.70	$5.85	$5.90	$5.95	$5.95	$5.95	$5.95	$5.95						
EU - Heifer	0-50	[F]	[0,2,4]	[1,2,3,4]	[1a,..,4]	[0]	58-90				$5.95	$5.95	$5.95	$5.95	$5.95	$5.95					
														2 carcasses 100% non-compliant					2	$3,025.00	$0.00
																Totals	**10**	**30**	**2**	**$3,400.00**	**$62,530.00**

Description	Range	Value	Type	Qty Premium	Qty Discounted	$
Fat Penalty	[Fat: 23 to 32 and HSCW: >320]	$0.05 /kg	Discount		2	-$25.00
Fat Penalty	[Fat: 33 to 42 and HSCW: >320]	$0.30 /kg	Discount		4	-$300.00
Fat Penalty	[Fat: 43 to 49 and HSCW: >320]	$0.50 /kg	Discount			
Fat Penalty	[Fat: 50+ and HSCW: >320]	$0.80 /kg	Discount			
MSA > 75	[MSA: 75+	2%	Premium	2		$60.50
			Sub Totals	**2**	**6**	**-$264.50**
			Add: Grid Income			**$62,530.00**
					Total Income	**$62,265.50**

Existing charts can be adjusted to display multiple sweet spots on the grid:



The advantages of the suggested change to the grid definition are:

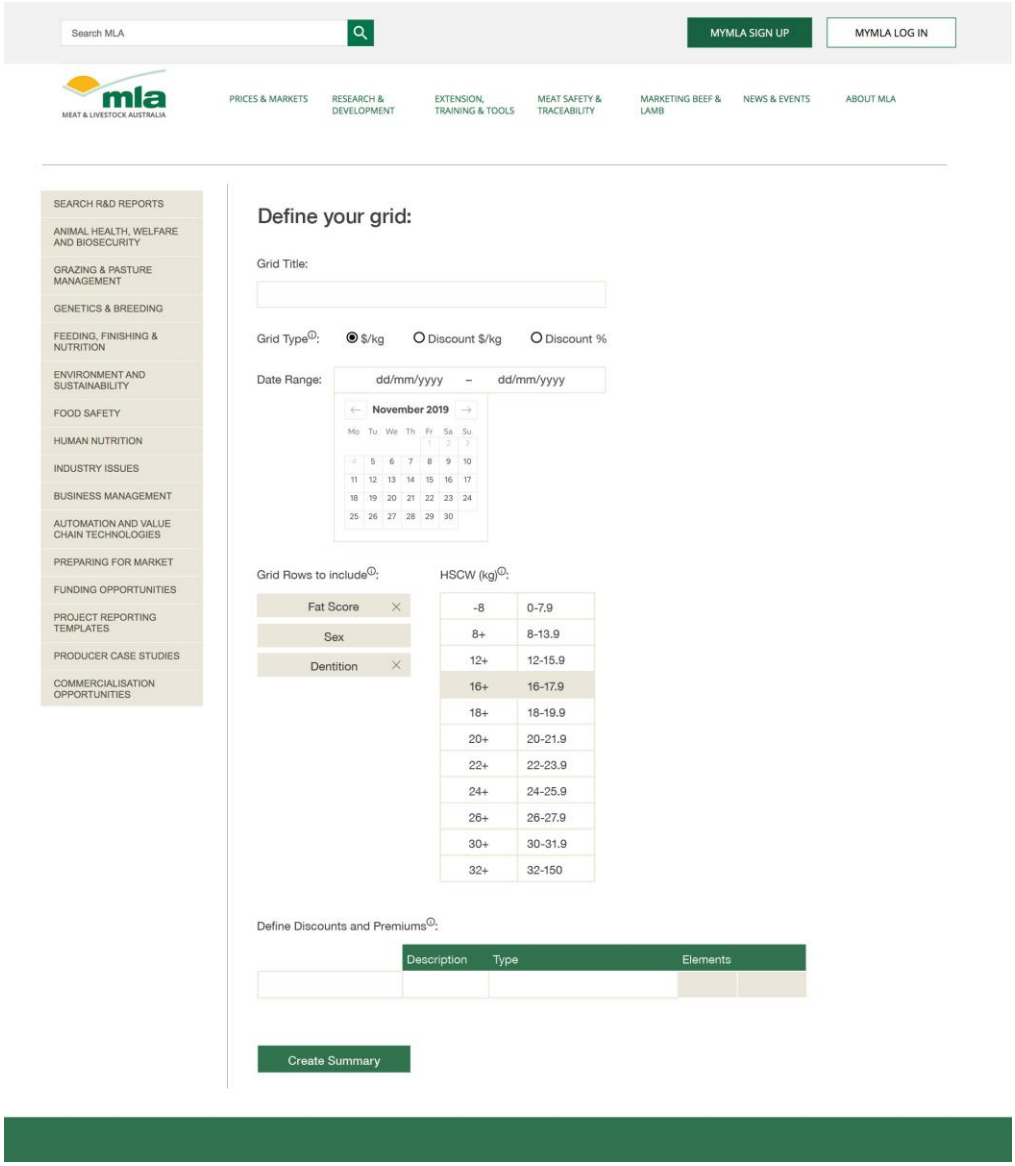
- The user will be entering the grid in the same format as is published.
- Simple interface with no calculations needed, the system will determine optimal points in the grid.
- Existing grids can be accommodated and will be easy to transfer to new format as the grid type can be specified as $ Discount / kg and the only grid row to include is Fat Depth / Class.
- Premiums can be defined as easily as discounts.
- A discount and premium of the same type can be defined e.g. premium for 5 – 10 mm fat and discount for where fat > 40 mm can be applied in the same grid.
- Complex discounts and premiums can be defined where more than one parameter is taken into account when a determination is made.
- Animals can be completely excluded if none of the grid criteria is met. This is an important step if true costs of non-compliance for the animal and the consignment are to be calculated.
- Information or help buttons should enable users to deal with complex concepts.
- Flexible design can meet future grid specifications of processors. If more effective systems architecture is implemented, new parameters can be added to the grid if the LDL data definition is expanded.
- As the design is dynamic, different grid parameters can be applied for cattle and sheep grids.

Selection criteria can be stored in JSON arrays in the database and applied when calculating grid compliance. As an example the grid definition in the above example can be stored as the following JSON arrays in the “SaleGrid” table:

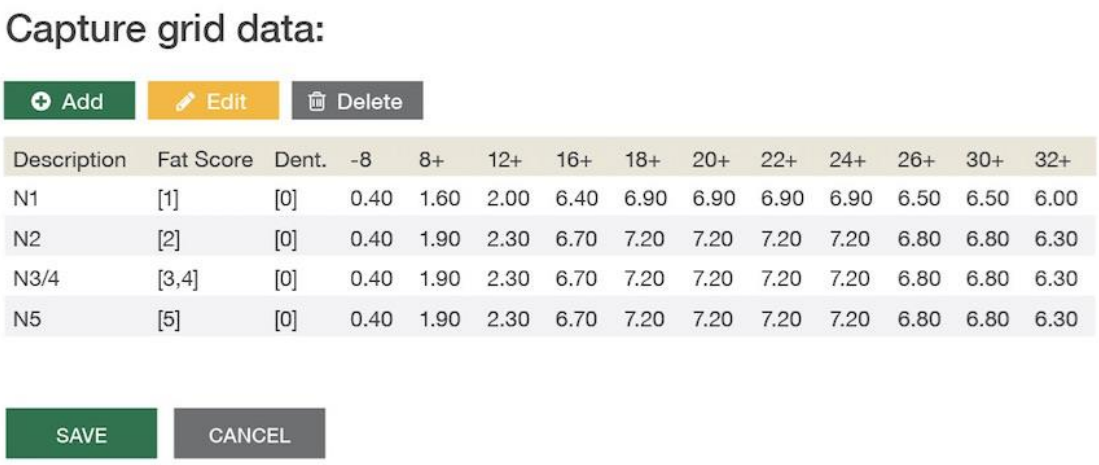
- Selected grid rows to include - [**"FatDepth"**, **"Sex"**, **"Dentition"**, **"FatColour"**, **"MeatColour"**, **"Bruising"**, **"MsaIndex"**]
- JSON array to store the weight ranges in the grid columns - [180, 200, 220, 240, 260, 280, 300, 320, 340, 360, 420]
- Discounts and premiums can be stored in the following structure: [{**"type"**: **"Discount"**, **"description"**: **"Fat Penalty"**, **"method"** : **"$kg"**, **"elements"**: [**"FatDepth"**, **"HSCW"**]},{**"type"**: **"Premium"**, **"description"**: **"MSA > 75%"**, **"method"** : **"Perc"**, **"elements"**: [**"MsaIndex"**]}]

This suggested approach would need additional data that may not currently be available in LDL. It is recommended that the available data in LDL gets expanded to make provision for data needed to do a complete grid representation; or that the LDL and MSA databases be merged to have a single source of carcase data. This combined database should include all fields processors are using to reward or discount livestock that they purchase.

Here is an example of how a current sheep grid can be represented by the suggested change:

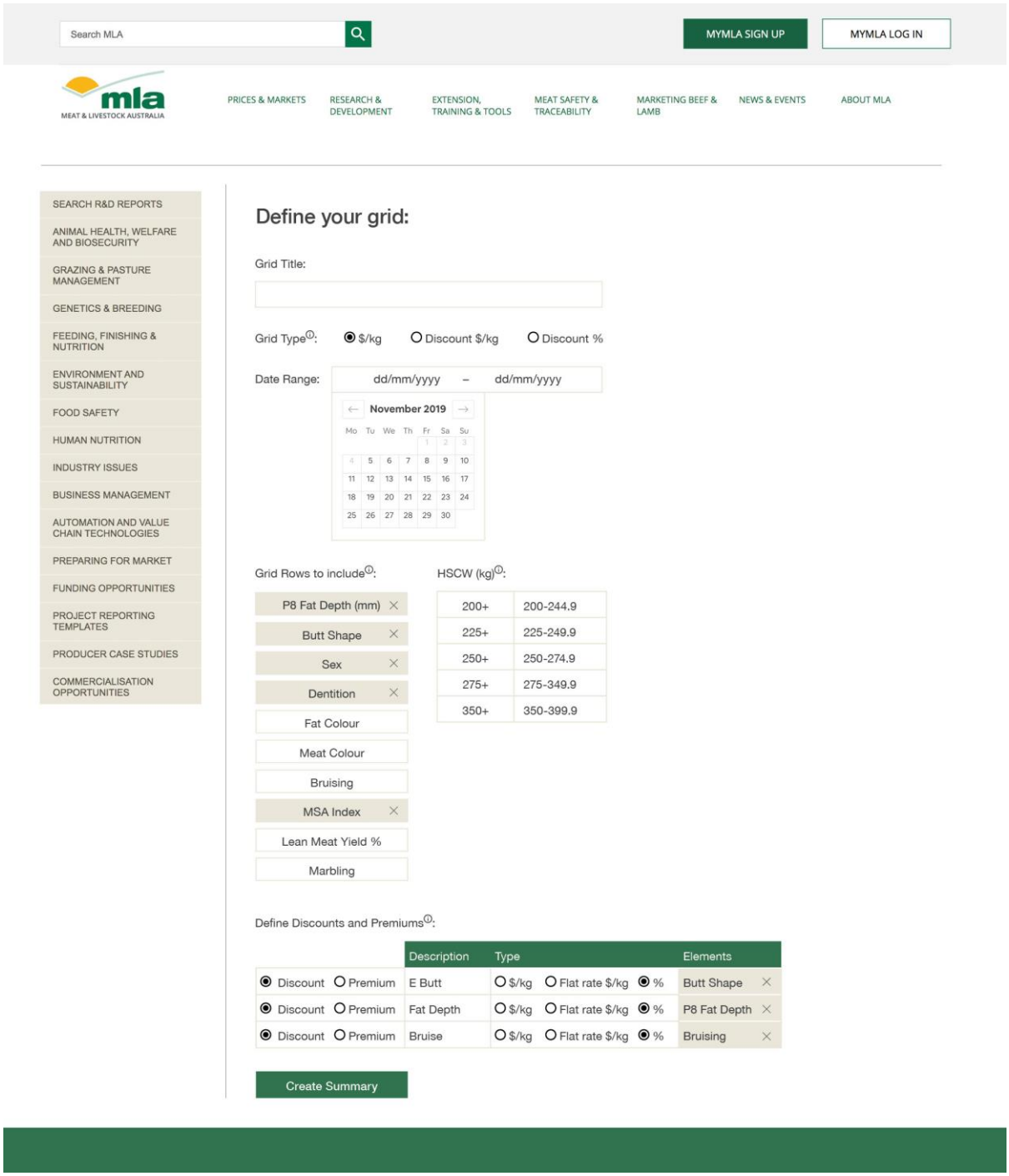


A user will then be able to capture the following data for the example:

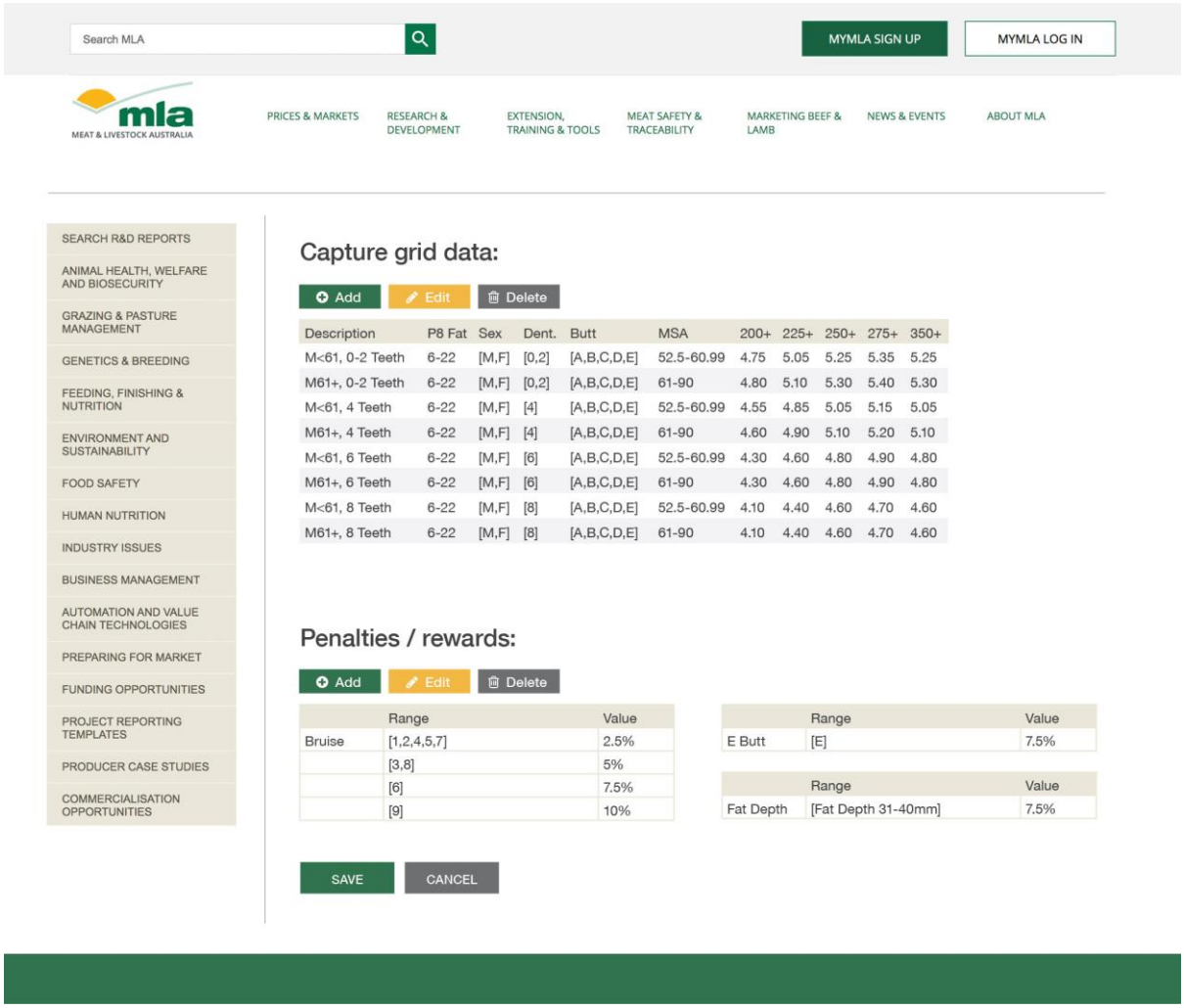


Description	Fat Score	Dent.	-8	8+	12+	16+	18+	20+	22+	24+	26+	30+	32+
N1	[1]	[0]	0.40	1.60	2.00	6.40	6.90	6.90	6.90	6.90	6.50	6.50	6.00
N2	[2]	[0]	0.40	1.90	2.30	6.70	7.20	7.20	7.20	7.20	6.80	6.80	6.30
N3/4	[3,4]	[0]	0.40	1.90	2.30	6.70	7.20	7.20	7.20	7.20	6.80	6.80	6.30
N5	[5]	[0]	0.40	1.90	2.30	6.70	7.20	7.20	7.20	7.20	6.80	6.80	6.30

Here is an example of how an additional beef grid can be captured:



Data for the additional beef grid example can be captured as:



Security risks identified

In evaluating the LDL system it was noted that a number of security risks exist in the current implementation of LDL. JavaScript is an interpreted language and is sent to the web browser for implementation. Standard practice is to use minification or obfuscation to make the code extremely difficult for humans to interpret. This has not been done and the code is in clear format and can easily be read, providing detailed insights in how the system is structured and communication with the back end. This makes it easy for hackers to exploit and break into the system. Here is an example of the detailed code available:

```
    $scope.tooLarge = false;
    $scope.waiting = true;
    $scope.compliancecolspan = 0;
    $scope.csvPath = 'legacy/supplierranking/msaIndexCsv?' + $.param($stateParams);
    $scope.noData = true;


    $http.get('legacy/supplierranking/MsaIndexRankingData?' + $.param($stateParams)).success(fun


        if (status !== 200 || headers('content-type').indexOf('json') === -1) {
            console.log('invalid data received.');
            return;
        }
        $scope.waiting = false;


        if (data === '"TooLarge"') {
```

4 Results and Discussion

A number of potential solutions detailed in Appendix 1 of the Terms of Reference document have been considered and evaluated on the following criteria: cost over the next 5 years, initial effort, effort to get data updated, time constraints, end user complexity, complexity to implement, scalability, ability to handle multiple dimensions, antagonistic relationships between traits. Each of the options is weighted as part of the recommendation.

4.1 Option 1: Continue with existing grid structure

Proposed solution: Work closer with processors to break down their existing grids to fit within the current LDL grid templates. In the case of the Western Australian (WA) plants where the discount is paid on a combination of weight and fat, LDL needs to identify the ratio of discount for weight and fat to allow a discount for the individual attributes to be entered into the grid template. In other cases where premiums are paid on top of the base, or discounted as a percentage, premiums are factored into the current grid sweet spot and discounts represented as a c/kg.

Cost: This solution will require ongoing commercial input from ISC as well as producers and it will largely be hidden as part of day-to-day operations. An assumption is made that 20 such cases will need to be resolved over the next 5 years. It is estimated that a total of 4 days of effort will be spent to resolve each. So direct cost will amount to $1200 of effort per day x 20 cases x 4 days = $96k. There is indirect cost to this option that will be difficult to quantify but is probably at least double this current estimate. This approach can lead to a loss of confidence by some producers and processors using the LDL system that it cannot cater for the method used to calculate and implement their customized grid. This could lead to some processors withdrawing from LDL or others simply not joining. The risk of this is substantial and is estimated to be $500k over 5 years.

Initial effort: Substantial to resolve the initial cases.

Longer-term effort: On-going effort required resolving cases as it emerge.

Effort to get data updated: Substantial as this will involve a number of manual calculations to determine discounted percentage for each component.

Time constraints: Can be started immediately.

End user complexity: This solution is not going to resolve the same issue for end users that would like to capture their own grids. Processors can offer different discount structures to individual producers, meaning that this work will have to be repeated for each special case.

Complexity to implement: No effort from the development team required but substantial complexities to navigate from LDL support personnel, processors and producers.

Scalability: Low as the same amount of work will need to be done for each unique scenario.

Ability to handle multiple dimensions: Poor as discount structure can change over time with the availability of supply and work will have to be repeated for each case.

Antagonistic relationships between traits: Not resolved.

Discussion: **This is a poor, temporary or band-aid solution** that is not recommended as it does not resolve the main structurally deficient issues identified in the current grid implementation wizard. It will not reduce or resolve the complexities for end users; in fact, it will increase complexity. In the long term it is predicted that this will reduce the uptake and use by end users, processors and lead to increased frustration with the LDL system with substantial risks of eroding processor and end-user confidence.

4.2 Option 2: Build one common grid interface

Proposed solution: Work with every processor and come up with one grid interface that accommodates every possible option. If Option 1 does not accommodate all conditions that exist on current grids, then we expand the current grid template to accommodate the new conditions or rules.

Cost: It is estimated that this solution will take between 70 to 100 days of developer effort dependent on the familiarity of the developer team with the code base and their skill level. Developer days are cost at $1500 per day will amount to $105k to $150k.

Initial effort: Estimated at 70 to 100 developer days that will take 6 to 9 months of procurement, development, testing and implementation. This is complex to implement and not all developer teams may have the necessary skills and experience to implement such a system.

Longer-term effort: Low - with a solid, flexible design developer maintenance could be minimized. Processor and end user support will be low as such a system can support a large number of use cases.

Effort to get data updated: Low – approximately one to two days of effort as this methodology will support the existing way grids are captured. A database script can be developed to transfer the existing data requiring little or no end user or support effort.

Time constraints: Six to nine months including procurement, development, testing and implementation before the solution will be available.

End user complexity: Low if implemented correctly.

Complexity to implement: High for the development team as flexible data structures will have to be used.

Scalability: Excellent.

Ability to handle multiple dimensions: Excellent as more row selections are possible and temporal changes can involve structural changes to the grid.

Antagonistic relationships between traits: Implemented correctly, this system can cater for antagonistic relationships and even the same trait can be used to penalise or reward producers.

Discussion: **This is the recommended solution** and it is described in detail in 3.3.6. It is expected to resolve complexity issues users currently experience as well as providing a long term, flexible solution that caters for multiple variations of grid implementation. Benefits described in detail previously.

4.3 Option 3: Accommodate individual processor grids

Proposed solution: Canvas all publicly available grids that exist and create a unique grid template for each grid variation. This would require a significant amount of upfront work, but if the design of grids does not change rapidly, changes to the grid template would infrequent.

Cost: Very high, as development cost will have to be replicated for each processor in the LDL system. The complexity of each grid will have to be accounted for with a cost for each implementation estimated at slightly less than option 4.2 but will have to be repeated for each individual grid that processors delivering data to LDL have. This can easily amount to over $50k per grid implementation and could cost more than $750k over 5 years. The ongoing cost will be high, as structural software changes will have to be made for every change in grid implementation over time.

Initial effort: Extreme.

Longer-term effort: High as changes in processor grids will require ongoing development effort. Some changes will have to be outsourced leading to delayed responses in implemented changes.

Effort to get data updated: High as some changes to grids will require structural changes.

Time constraints: Years to complete development for all current grids.

End user complexity: Low, as each grid implementation will be tailored to specifications.

Complexity to implement: Low to medium. Complexity to maintain will be extremely high as each gird will be different and different structures will have to be kept to make provision for temporal changes.

Scalability: Extremely low as a lot of effort will be required to keep this solution up to date and relevant.

Ability to handle multiple dimensions: Temporal changes will be difficult to implement, as previous grid structures will have to be kept. This will lead to increased complexity in the base code.

Antagonistic relationships between traits: Could be handled, but with some difficulty.

Discussion: **This option is not recommended** due to the high cost to implement and maintain, increasing complexity over time and slow response time to grid changes. The only benefit is that it will be slightly less complex to cater for individual grids than a common grid interface.

4.4 Option 4: Define the premium spot or price paid

Proposed solution: Rather than try to represent each discount range within a grid, identify just the sweet spot(s) for each attribute and the c/kg for consigning a carcase that hits the sweet spot for all attributes. In addition, include the price paid for a carcase. When calculating compliance, bodies will either be compliant or not. The system can still indicate which attributes have contributed to the lack of compliance but only a total cost of non-compliance would be able to be calculated, as the system only knows the c/kg for a compliant carcase.

Cost: Estimated at 40 to 60 developer days depending on team familiarity with the base code amounting to $60k to $90k of direct cost.

Initial effort: Medium.

Longer-term effort: Low.

Effort to get data updated: One to two days of developer time as existing data could be converted with a script.

Time constraints: Four to six months taking into account the procurement, development, testing and deployment.

End user complexity: High as reduced functionality can lead to confusion.

Complexity to implement: Low.

Scalability: High.

Ability to handle multiple dimensions: Low as this a partial implementation of a grid system.

Antagonistic relationships between traits: Low.

Discussion: **This is another band-aid solution that is not recommended**. Rather than fixing the structural problem in the LDL grid system, a solution with limited functionality is proposed. Not recommended as much more robust solutions can be developed for a small increase in cost.

4.5 Option 5: Try to determine non-compliance using grade data

Proposed solution: Rather than define the grids within LDL, leverage off the grade codes that are currently being used by processors to determine the quality of the carcase. Grades are ranked from best to worst and LDL would use visualisations to show how each carcase was graded for each attribute, highlighting where carcases that sat with the best graded carcase for one attribute (i.e. within a 250-300kg weight range) sits as an outlier for another (i.e. 1mm P8).

Cost: Not estimated.

Initial effort: Not estimated.

Longer-term effort: Not estimated.

Effort to get data updated: Not estimated.

Time constraints: Not estimated.

End user complexity: Not estimated.

Complexity to implement: Not estimated.

Scalability: Not estimated.

Ability to handle multiple dimensions: Not estimated.

Antagonistic relationships between traits: Not estimated.

Recommendation: **Not a viable solution and therefore this is not recommended**. In the dataset provided, 87.2% of beef records have no grading data stored (only minimum AUSMEAT carcase assessment.

4.6 Option 6: Automatic grid release by the processor

Proposed solution: Due to the complexity of building livestock grids, Processers could initially build all of their grids into LDL which are then identified with a specific version number indicating what grid a producer consigned too. Producers could then simply save the relevant grid in their LDL account to begin carcase analysis immediately without the need to first enter a grid.

Cost: Low estimated at 5 to 10 developer days estimated at $7.5k to $15k.

Initial effort: Low.

Longer-term effort: Low – little maintenance required.

Effort to get data updated: Low.

Time constraints: Very little additional overhead if implemented with 4.2. On its own it can take 3 to 5 months if a procurement and external development process will have to be followed.

End user complexity: Low, as it will reduce complexity for users to setup grids.

Complexity to implement: Low.

Scalability: Excellent, as processors can create multiple grids.

Ability to handle multiple dimensions: Low.

Antagonistic relationships between traits: Low.

Discussion: **This is an excellent solution if implemented in conjunction with 4.2**. Processors can have the option to make their grids available to selected producers or all producers. On it's own it will not resolve any of the structural issues identified.

4.7 Option 7: Integration with Processor system

Proposed solution: Allow Processor systems to integrate directly with LDL to show the actual dollars paid to the producer for each individual carcase in a consignment lot, without ISC/MLA being able to see the actual amount paid. Based on Target Market the lost opportunity cost could potentially be calculated based on what was actually paid for a carcase and what it could have made based on the attributes assigned to the sweet spot in a grid.

Cost: High as APIs will have to be developed for each processor to get data on demand. As it is difficult to estimate and implement and could it could cost more than option 4.2. It is difficult to estimate a cost for this option.

Initial effort: High as an API will have to be developed for LDL and then a similar API be build for each of the processor systems.

Longer-term effort: Low to medium, as APIs will have to be maintained taking into account changes in operating environment.

Effort to get data updated: High, what would be needed to make this solution useful is the maximum price paid for each batch at the time it was processed. For historic kills this could be problematic to source this data.

Time constraints: Estimated for between one to three years, as there are external dependencies on processor systems being changed.

End user complexity: Low, as grids will not have to be setup, only the maximum price for each kill needed.

Complexity to implement: High as APIs on both processor and LDL will have to developed.

Scalability: Low as each new processor will need development done to make it work. This solution will work but it will provide greatly reduced functionality.

Ability to handle multiple dimensions: None, comparisons between different grids cannot be done.

Antagonistic relationships between traits: Not applicable

Discussion: **Not a robust solution and not recommended**, as this will reduce functionality and not allow for any grid comparison. Likely meet with resistance from processors (and maybe some producers).

4.8 Other solutions investigated

Dynamic, non-linear solutions have been investigated as part of this project. These will only provide approximations of costs for processors that publish stepped grids and will require significant efforts by skilled mathematicians for each grid implementation. More importantly a number of the processors consulted are not convinced that non-linear grids represent market specifications, which are often threshold in nature. This review could not identify any grid that currently uses a non-linear approach to calculate discounts or premiums. If processors adopt non-linear solutions in future to define grids, then additional changes will have to be made to LDL to support this. As there could be a lot of variation using non-linear grids, it is not feasible to implement a universal change that will support all of the options. **This is currently not a feasible option, but provision should be made to adapt LDL in future if processors adopt this approach**.

5 Conclusions/recommendations

The current grid implementation is structurally deficient and not fit for purpose. Grids are difficult to capture and maintain, requiring substantial numeracy skills. The current discounted price per kg implementation is only useful for a small number of grids investigated. The current implementation does not support a $/kg or discounted % structure. No support is available to capture rewards in the system. The current system does not cater for combinations of traits to calculate discounts or rewards. The current grid implementation does not exclude some animals completely when they don't comply, as they are still counted as partly compliant. Users cannot share grids with others, limiting the ability for processors to capture their grids in LDL and share it with some or all users.

The user interface is limited, somewhat awkward to navigate and use, dated and not responsive. The User Interface design is limited with very little guidance and online help available. No explanation is provided in cases where information has been incomplete or incorrectly captured. Only the UI design of grids was investigated as part of this project. Similar issues may exist in the rest of the LDL system and should be investigated.

The technology stack used to develop LDL is relatively modern and should be able to support proposed changes to the system.

Security issues in the current implementation of LDL have been identified.

Eight recommendations have been made and these are tabulated below.

Table of recommendations

No.	Recommendation	Page

1	Build one, common and flexible grid interface that will cater for the current grids and grid options required in the foreseeable future (4.2).	10 – 17, 19
2	The capture of grids should be presented in a similar format as it is published.	10 - 17
3	Provision should be made to capture rewards with discounts.	10 - 17
4	Penalties and rewards should be expanded to make provision for multiple traits.	10 - 17
5	Provide processors with the ability to create their grids in LDL and share with some or all of the users in LDL (4.6).	19
6	User Interface Design issues identified should be fixed and the rest of the LDL system should be investigated for similar issues.	9 - 11
7	Data structure and processor feed to the LDL database should be expanded to include data needed to support grids set by processors. This could include merging the LDL database with other ISC/MLA databases that contain necessary data.	14
8	Security concerns identified should be addressed.	13

6 Annexure ‘A’ – Cattle grids investigated

			Row Selection										Colum Selection	Additional Penalties / Rewards											
Company	Description	Grid Type	Fat (mm)	Dent.	Butt Shape	Sex	Feed Type	MSA Index	HGP Free	Bruise	Fat Colour	Meat Colour	Weight	MSA Index	Dentition	Batch size	Fat Depth	Bruising	Meat Colour	Fat Colour	Weight	Butt Shape	Comb.	Breed	Sex
JBS	Melbourne - EU Steer, Grain Fed EU Eligible Steers	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd						Ltd												
JBS	Melbourne - EU Steer, Grass Trade Yearling Steers	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd						Ltd												
JBS	Melbourne - EU Steer, Grass fed EU Eligible Steers	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd						Ltd												
JBS	Melbourne - EU Steer, Ox	Fixed price	Ltd	Ltd	Ltd	Ltd							All												
JBS	Melbourne, Grass Trade Yearling Steer	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd						Ltd												
JBS	Melbourne - Ox	Fixed price	Ltd	Ltd	Ltd	Ltd							All												
JBS	Melbourne - Bull	Fixed price	Ltd	Ltd	Ltd	Ltd							All												
JBS	Melbourne - MSA Grass Trade Yearling Steer	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd	Ltd					Ltd						Y	Y					
JBS	Melbourne - MSA Grass Trade Yearling Heifer	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd	Ltd					Ltd						Y	Y					
JBS	Melbourne - MSA Ox	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd	Ltd					All						Y	Y					
JBS	Melbourne - MSA Grass Fed Jap Heifer	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd	Ltd					All						Y	Y					
JBS	Melbourne - Grass Trade Yearling Steer	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd						Ltd												
JBS	Melbourne - Grass Trade Yearling Heifer	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd						Ltd												
JBS	Melbourne - Grass Fed Jap Heifer	Fixed price	Ltd	Ltd	Ltd	Ltd	Ltd						All												
JBS	Melbourne - Ox	Fixed price	Ltd	Ltd	Ltd	Ltd							All												
JBS	Melbourne - Heifer	Fixed price	Ltd	Ltd	Ltd	Ltd							All												
JBS	Melbourne - Cow	Fixed price	Ltd	Ltd	Ltd	Ltd							All												
Bindaree Beef	HGP Free - Steer - Heifer Grid - MSA	Fixed price	Ltd	Ltd	Ltd	Ltd		Ltd	Y				Ltd				31-40mm -7.5%	Less x%				E Butt - 7.5%		Angus $.10/kg	

Bindaree Beef	HGP Free - Steer - Heifer Grid -Non MSA	Fixed price	Ltd	Ltd	Ltd	Ltd			Y				Ltd						Less x%									Angus $.10/kg
Bindaree Beef	HGP Free - Bulls	Fixed price		Ltd	Ltd				Y				Ltd						Less x%									
TFI	MSA Steer Vendor bred	Fixed price	Ltd	Ltd					Y	Ltd			Ltd		6, 8 tooth $/kg	-$0.3 < 50	Y $/kg range			-$/kg$	-$/kg$							
TFI	MSA Female Vendor Bred	Fixed price	Ltd	Ltd					Y	Ltd			Ltd		6, 8 tooth $/kg	-$0.3 < 50	Y $/kg range			-$/kg$	-$/kg$							
TFI	Iranda Feedlot - EU Vendor Bred 100% Angus Steer	Fixed price		Ltd		Ltd			Y		Ltd	Ltd	All			-$0.1 < 50												
TFI	Iranda Feedlot - EU Vendor Bred 75% Angus / Big Baldy Steer	Fixed price		Ltd		Ltd			Y		Ltd	Ltd	All			-$0.1 < 50												
TFI	Iranda Feedlot - EU Vendor Bred British x & Euro X Steer	Fixed price		Ltd		Ltd			Y		Ltd	Ltd	All			-$0.1 < 50												
TFI	Iranda Feedlot - EU Vendor Bred Angus Min 75% / Black Baldy Heifer	Fixed price		Ltd		Ltd			Y		Ltd	Ltd	All			-$0.1 < 50												
TFI	Iranda Feedlot - EU Vendor Bred British X & Euro X Heifer	Fixed price		Ltd		Ltd			Y				All			-$0.1 < 50												
DBC	Boning Beef	Discount $											All	$.4/kg all non MSA	$/kg		$/kig various					Sliding scale		Fat & Weight				
DBC	Butcher Body Beef	Discount $											All	$.4/kg all non MSA	$/kg		$/kig various					Sliding scale		Fat & Weight				
Wingham Beef Exports	Manning Valley Naturally MSA (HGP Free, Grass Fed Only & Antibiotic Free)	Fixed price		Ltd	Ltd	Ltd	Ltd	Ltd	Y				Ltd				$/kig various											-$ heifers
Wingham Beef Exports	Manning Valley Naturally MSA	Fixed price		Ltd	Ltd	Ltd		Ltd	Y				Ltd				$/kig various											-$ heifers
Wingham Beef Exports	Wingham Blue MSA Product	Fixed price		Ltd	Ltd	Ltd		Ltd	Y				All				$/kig various							Sex & Dentition				-$ heifers
Wingham	Wingham Beef Exports Grass Premium	Fixed price		Ltd	Ltd	Ltd	Ltd						All				$/kig various											-$ heifers
Wingham	Wingham Beef Exports Grass Trade	Fixed price		Ltd	Ltd	Ltd	Ltd						All				$/kig various											-$ heifers
Wingham	Wingham Beef Exports Grass Export	Fixed price		Ltd	Ltd	Ltd	Ltd				Ltd	Ltd	All				$/kig various						E Butt less $					-$ heifers

Wingham	Wingham Beef Exports Grass Export	Fixed price	Ltd	Ltd	Ltd	Ltd		Ltd	Ltd	All	$/kig various		E Butt less $	-$ heifers

7 Annexure 'B' – Sheep Grids investigated

					Rows			Column	Deductions
Company	**Description**	**Grid Type**	**Fat Score**	**Dentition**	**Breed**	**Fat Depth**	**Sex**	**Weight**	**Fat Score**
JBS	Bordertown - New Season Lambs	Fixed Price	Limited	Limited	Batch			All Weights	
JBS	Bordertown - Second Cross Lambs	Fixed Price	Limited	Limited	Batch			All Weights	
JBS	Bordertown - First Cross Lambs	Fixed Price	Limited	Limited	Batch			All Weights	
JBS	Dorper Lambs	Fixed Price	Limited	Limited	Batch			All Weights	
JBS	Dohne / Samm Lambs	Fixed Price	Limited	Limited	Batch			All Weights	
JBS	Merino Lambs	Fixed Price	Limited	Limited	Batch			All Weights	
TFI	Tamworth XB/Dorper Lambs	Fixed Price		Limited	Batch	Limited		All Weights	
TFI	Tamworth Merino / Dohne / SAMM Lambs	Fixed Price		Limited	Batch	Limited		All Weights	
TFI	Tamworth Cross Bred Sheep	Fixed Price		Limited	Batch	Limited		All Weights	
TFI	Tamworth Merino Wethers	Fixed Price		Limited	Batch	Limited		All Weights	
TFI	Tamworth Merino Ewes	Fixed Price		Limited	Batch	Limited	Limited	All Weights	
TFI	Tamworth Cross Bred Sheep	Fixed Price		Limited	Batch	Limited		All Weights	
TFI	Lobethal XB/Dorper Lambs	Fixed Price		Limited	Batch	Limited		All Weights	
TFI	Lobethal Merino / Dohne / SAMM Lambs	Fixed Price		Limited	Batch	Limited		All Weights	
TFI	Lobethal Hoggets	Fixed Price		Limited		Limited	Limited	All Weights	
TFI	Lobethal Merino Wethers	Fixed Price		Limited	Batch	Limited	Limited	All Weights	
TFI	Lobethal Merino Ewes	Fixed Price		Limited	Batch	Limited		All Weights	
TFI	Lobethal Cross Bred Sheep	Fixed Price		Limited	Batch	Limited	Limited	All Weights	
TFI	Lobethal Merino Rams	Fixed Price		Limited	Batch	Limited		All Weights	
Baufort River Meats	New Season / XB Trade Lamb	Fixed Price		Limited	Batch			Limited	FS1 -$1
Baufort River Meats	Ram	Fixed Price	Limited	Limited				Limited	FS1 -$1
Baufort River Meats	Hogget	Fixed Price		Limited	Batch		Limited	Limited	FS1 -$1
Baufort River Meats	Merino Mutton	Fixed Price		Limited	Batch		Limited	Limited	FS1 -$1
Wamco	All recognised XB Lamb	Fixed Price	Limited	Limited	Batch			Limited	

Wamco	Merino, Mixed Lines & Other Lamb	Fixed Price	Limited	Limited	Batch	Limited
Wamco	Wether & Ewe mutton	Fixed Price	Limited	Limited		Limited