



# final report

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## Utilising MSA Feedback to Enhance MSA Compliance

### Producer Demonstration Site Charters Towers, north Queensland

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## **Abstract**

Compliance data for Trafalgar steers consigned Meat Standards Australia (MSA) (2008 to 2012) showed the percentage of steers meeting JBS Australia Pty Ltd (JBS) specifications for MSA grading was high (74%). Of the steers eligible for MSA grading 13% of the group received a premium (boning group 10 or better). Ossification was the main parameter preventing higher Eating Quality (EQ) scores, followed by combinations of hump height, Hot Standard Carcase Weight (HSCW) and Marbling. The ungrade percentage due to pH, meat colour was able to be reduced by not holding steers overnight in the yards prior to trucking.

The cost-benefit analysis of HGP vs no HGP showed that despite a difference of 23% in MSA compliance between treated and non-treated steers, higher carcase weights in treated animals offset extra revenue from MSA premiums obtained by non-treated animals.

## Executive summary

The principle site for the Producer Demonstration Site (PDS) was Trafalgar station, located 60km southwest of Charters Towers, Queensland. Meat Standards Australia (MSA) compliance data for steers consigned from 2008 to 2012 from the Trafalgar PDS was analysed. The percentage of steers meeting JBS Australia Pty Ltd (JBS) abattoir specifications in Townsville for MSA grading was high at 74%. Low fat cover and high dentition prevented higher compliance levels. The steers that were outside the JBS specifications for carcass weight were too heavy (average Hot Standard Carcass Weight (HSCW) was 305kg).

Of the steers eligible for MSA grading, on average 44% graded MSA (boning group 8 to 14) and 13% received a premium (boning group 10 or better). The project successfully demonstrated that the level of ungrades (boning group U) could be reduced by not holding steers overnight in the yards prior to transport. On all occasions where cattle were held over in the yards two nights prior to trucking, with one-night curfew, the level of ungrades were high (41-62%). Similar cattle that were loaded on the day of mustering with one night at JBS had the lowest percentage of ungrades (12% and 11%).

Overall, the better boning group (10 or less) carcasses tended to have lower ossification scores, lower hump heights, higher marbling scores and good HSCW (usually greater than 300kg). However as expected a very low hump height, a very low ossification score, a good marbling score or a HSCW over 300kg did not guarantee grading in boning group 10 or better.

The range in hump height for the Trafalgar steers consigned MSA 2008 to 2001 was 35mm to 260mm. The lower end of the range was the crossbred genotypes and the higher end the high-grade Brahms. The Trafalgar average hump height was 123mm.

Hormone Growth Promotants (HGP) are known to increase live-weight gains, but reduce MSA compliance. A cost benefit analysis was conducted on No 9 Steers from Trafalgar to determine the trade-off between revenue generated by MSA compliance, and carcass weight differences between treated and non HGP treated animals. A sensitivity analysis showed that the relative consignment compliance difference between the treatments would need to be an unrealistic 77% (87% for the treated animals and 10% for the non-treated animals) in order for the non HGP cattle to match or exceed the return generated by heavier treated cattle. Sensitivity analysis also showed that a rise in premiums to \$0.34/kg would be required in order for removal of HGPs to be economically sensible.

A sensitivity analysis to investigate the cost benefit of feeding molasses in the 30 days prior to slaughter showed that this strategy would be unprofitable. On basis of these results feeding of molasses pre slaughter to reduce the percentage ungrades was not carried out. The project demonstrated that management inputs to improve MSA compliance should be carefully calculated.

The final results of both the Charters Towers and the Burdekin MSA PDS were disseminated, along with results from another key MLA project plus relevant CRC outcomes at a MSA and Marketing Forum held at Dalrymple Stadium, Charters Towers, 22 June 2012. Participant evaluation (>100 attendees) of this day indicated that understanding of MSA was increased as a result of the presentations on the day. Over 100 people scored their current level of understanding of MSA prior to the forum, and again at the end of the day. The majority of participants improved their level of understanding of MSA from 2-3 to 6 out of 7.

This PDS clearly identified management practices that impacted MSA grading and profitability, as well as communicating findings to a large number of north Queensland producers.

## Table of Contents

Abstract.....	2
Executive summary.....	3
Table of Contents .....	4
1 Background .....	7
2 Project objectives .....	7
3 Methodology.....	8
3.1 Group formation and processes.....	8
3.2 Site selection and animal recording .....	8
3.3 JBS Townsville plant feedback carcass data .....	10
3.4 MSA feedback and benchmarking system data.....	10
3.5 Economic analyses.....	11
3.5.1 Molasses feeding prior to slaughter.....	11
3.5.2 Hormone Growth Promotants (HGP) .....	11
3.5.3 Regional impact.....	11
4 Results.....	11
4.1 Benchmarking results for 2008 collected and analysed for Townsville abattoir.....	11
4.2 Pre delivery management for steers consigned MSA .....	12
4.3 Background data, JBS compliance data and MSA data for Trafalgar steers.....	14
4.3.1 Background data for steers consigned MSA.....	14
4.3.2 JBS specifications for MSA grading eligibility.....	14
4.3.3 Compliance data for Trafalgar steers consigned MSA .....	16
4.4 Economic analyses.....	20
4.4.1 Molasses feeding to improve MSA grading .....	20
4.4.2 HGPs – is it economical not to use them when consigning steers MSA in NQ.....	20
4.4.3 Age of turnoff.....	22
4.4.4 Regional impact.....	22
4.5 Producer group training workshops/activities and the MSA and marketing forum .....	22
4.6 Evaluation of producer understanding and knowledge of MSA.....	23
5 Success in achieving objectives .....	23
5.1 In conjunction with JBS Townsville and Meat Standards Australia (MSA) will have assessed the prevalence of animals and producers that submitted for MSA grading in the fiscal year 2008 and established compliance rates .....	23
5.2 Improved the compliance rates from cattle marketed for MSA grading at JBS by reducing percentage ‘Ungrades’ by 50% and increasing boning room 10 grades by 25% .....	24
5.3 Improve skills and understanding of MSA grading, plus analysis and interpretation of MSA feedback. Benchmark knowledge and practice change .....	24

5.4	Provide opportunities for producers to be involved in and/or directly participate in ‘on property demonstrations’ of strategies to achieve improved MSA compliance .....	24
5.5	Provide annual opportunities for technical support and training activities for each group .....	25
5.6	Provide annual opportunities for producers to learn from other VIB project groups and relevant research outcomes.....	25
5.7	Demonstrate on property practices that improve MSA compliance to wider beef community ..	25
5.8	Improve awareness of the wider beef community of strategies to improve MSA compliance being undertaken by PDS groups.....	25
5.9	Benchmark knowledge and practice change that occurred as a result of the project over 3 years 27	
6	Conclusions and Recommendations .....	27
6.1	Conclusions from the MSA feedback data.....	27
6.1.1	Compliance with JBS specifications for MSA grading.....	27
6.1.2	Percentage ungrades.....	28
6.1.3	Boning groups and MSA parameters.....	28
6.1.4	Economic analysis on HGP usage .....	29
6.2	Recommendations.....	30
6.2.1	Improving eligibility for MSA grading .....	30
6.2.2	Reducing percentage ungrades.....	30
6.2.3	Improving ossification scores.....	31
6.2.4	Improving HSCW and weight for age .....	31
6.2.5	Improving marbling scores .....	31
6.2.6	Improving hump height .....	32
6.2.7	Using actual performance and targets to improve MSA compliance criteria .....	32
7	Acknowledgments .....	32
8	Appendices.....	33
8.1	Appendix 1. List of questions to trainers – MSA advanced training .....	33
8.2	Appendix 2. Example of participant feedback sheet.....	37
8.3	Appendix 3. Compliance with JBS specification for MSA grading.....	38
8.4	Appendix 4. Additional Trafalgar MSA results from MSA graded steers 2008-2011.....	40
8.5	Appendix 5. Economic analysis – information for methodology.....	42
8.5.1	Molasses feeding prior to slaughter.....	42
8.5.2	Hormonal growth promotants.....	42
8.5.3	Regional impact.....	44
8.6	Appendix 6. Producer workshop details and ‘usefulness’ scores .....	45

## List of Tables

Table 1. JBS (Townsville) MSA compliance data 2008 .....	10
Table 2. Consignment pre delivery management Trafalgar 2008 .....	11
Table 3. MSA consignment pre delivery management Trafalgar 2009. The first 2009 consignment (September 2009) were also trucked a day later than anticipated due to a late request by the abattoir to hold them over. This impacted on the number of ungrades, as the steers were held over at Trafalgar an extra night. The second consignment (November 2009) were mustered, drafted and trucked on the day prior to slaughter .....	12
Table 4. MSA consignment pre delivery management Trafalgar 2010. The consignment of No 8 steers were held in the yards two nights prior to trucking to JBS abattoir .....	12
Table 5. Key background data for the 2008 to 2012 consignments of Trafalgar steers .....	13
Table 6. Percent compliance JBS specs of Dentition, HSCW and P8 fat specifications and eligible for MSA grading.....	14
Table 7. Age (months) and HSCW (kg) for Trafalgar No 4 to No 9 steers .....	14
Table 8. Compliance data summary for steers consigned MSA 2008 to 2011, plus No 9 steers slaughtered in 2012 and not consigned MSA .....	15
Table 9. Weight differences between HGP treatments for 2009 weaner steers .....	19
Table 10. Lead of No 9 steers consigned 27 November 2012 – Comparison of key carcass and MSA data.....	20
Table 11. No 9 steers consigned to JBS Townsville in May 2012 (not consigned MSA) .....	20
Table 12. HGP cost benefit analysis.....	20
Table 13. Assumptions used in HGP analysis .....	20
Table 14. Herd gross margin of ABARE 313 Region.....	21
Table 15. Management improvement opportunities - (Traits under management control) .....	30
Table 16. Genetic improvement opportunities - performances indicators and targets for Trafalgar steers .....	31

## List of Figures

Figure 1. Percent of Trafalgar steers within P8 fat depth ranges (2008-2011).....	14
Figure 2. Boning groups of steers which met JBS specifications for MSA grading (2008- 2011) .....	17
Figure 3. Ossification scores for Trafalgar MSA graded steers 2008 to 2011 .....	17
Figure 4. MSA marbling scores for Trafalgar steers graded MSA 2008-2011 .....	18
Figure 5. Hump height distribution for Trafalgar (G698) steers graded MSA 2008 to 2011 compared to the region.....	18
Figure 6. Carcass weight ranges and percentage of Trafalgar MSA steers 2008 to 2011 .....	19
Figure 7. MSA and marketing forum - evaluation of participant’s knowledge of MSA both before and after the forum. Score 1 is low understanding, 7 is high understanding.....	22

## 1 Background

There were limited opportunities for beef producers in north Queensland to access premiums for Meat Standards Australia (MSA) graded carcasses, until April 2008 when MSA grading commenced at the Townsville JBS abattoir. The introduction of MSA grading provided an opportunity for producers to receive a 10c premium for 0-4 tooth cattle that grade 'boning room 10' or better. This premium had the potential to improve beef business gross margins where grading can be achieved.

It was expected that many producers may have difficulty achieving satisfactory MSA grading percentages, plus a high percentage would fail to grade MSA due to pH and meat colour. On property demonstrations and group action learning was seen as a way to increase the understanding of MSA in general and identify and demonstrate practical management inputs required to improve MSA compliance at the processing plant at JBS Townsville. Improved production and profitability outcomes for both JBS, as well as for producers, was seen as important to keeping MSA market options open to north Queensland producers.

Two MSA Producer Demonstration Sites (PDS) projects (Dalrymple B.NBP.0583 and Burdekin B.NBP.0582) were subsequently established in 2008 with a number of objectives aimed at increasing the awareness and adoption of MSA grading systems and increase the percentage of cattle meeting MSA compliance in north Queensland.

The MSA benchmarking system provides an opportunity for producers to download feedback data and producer reports. From this data producers are able to determine grading percentages, reasons why cattle did not grade and how cattle performed compared to the district averages. Through downloading this data along with electronic tag (RFID) numbers individual animal data can be linked back to paddock performance records. During the PDS this information was shared within the PDS groups, and across groups in MLA's broader Value in Beef (VIB) project.

Factors such as pre-slaughter handling and nutrition, genetic merit, breed, HGP programs, age, temperament, were some of the critical components explored to identify practical opportunities to address key MSA compliance parameters including: pH and meat colour, Hot Standard Carcase Weight (HSCW), ossification, hump height and MSA marbling.

The results were communicated to the wider industry through media activities and a major forum held at Dalrymple Stadium in Charters Towers on 22 June 2012.

## 2 Project objectives

By 31 December 2010 (extended to July 2012):

1. In conjunction with JBS Townsville and MSA, will have assessed the prevalence of animals and producers that submitted for MSA grading in the fiscal year 2008 and established compliance rates.
2. Improved the compliance rates from cattle marketed for MSA grading at JBS, by reducing percentage not grading by 50% and increasing boning room 10 grades by 25%.
3. Improve skills and understanding of MSA grading, plus analysis and interpretation of MSA feedback. Benchmark knowledge and practice change.
4. Provide opportunities for producers to be involved in and/or directly participate in 'on property demonstrations' of strategies to achieve improved MSA compliance.
5. Provide-annual opportunities for technical support and training activities for each PDS group.

6. Provide annual opportunities for producers to learn from other VIB groups and relevant research outcomes.
7. Demonstrate on property practices that improve MSA compliance to wider beef community.
8. Improve awareness of the wider beef community of strategies to improve MSA compliance being undertaken by PDS groups.
9. Benchmark knowledge and practice change that occurred as a result of the project over three years.

## 3 Methodology

### 3.1 Group formation and processes

The Dalrymple MSA PDS group was formed in Charters Towers in June 2008 and consisted of six businesses. Expressions of interest were sought from a group of people that had previously registered for a combined MLA and JBS MSA producer awareness workshop held at Charters Towers in 2008. In latter years, members of another VIB producer group joined together with the Dalrymple MSA group to form one larger group.

### 3.2 Site selection and animal recording

Trafalgar Station was selected as the key demonstration site, primarily due to:

- The owner had a keen interest in pursuing MSA grading;
- The high level of individual animal recording already being undertaken at the site provided pre slaughter paddock data on individual animals; and
- The mix of genotypes available for MSA grading, including crossbred cattle with lower hump heights and Brahman cattle with higher hump heights.

The individual animal data collected for steers consigned MSA included:

- Paddock data and background data (*Outcross* agribusiness consultant);
- Pre delivery management data;
- JBS Townsville plant feedback carcass data (see 3.3); and
- MSA feedback and benchmarking system data (see 3.4).

Paddock data and background data was collected during routine husbandry operations. Data collected on individual male cattle included:

- ID data – RFID no, origin, breed, sex, group (year drop)
- Production data and dates – weaning, re-weigh, and exit weights and associated ADG (spell out)
- Estimated data calculated – birth date, age, time on feed (days)
- Economic data calculated – value at induction, induction costs/head, agistment fee, total costs, profit, Return on Investment (ROI) and annualised ROI.

Pre delivery (consignment) management data for consignments of MSA cattle was collected to record and summarize mustering, handling, weighing, curfew, trucking, nutrition pre slaughter and any parameter deemed to have a potential impact on MSA grading from a perspective of correlating percentage 'ungrades' to pre delivery management.

Groups of slaughter cattle from Trafalgar were monitored through their final year of finishing, pre



B.NBP.0583 - CHARTERS TOWERS: Utilising MSA feedback to enhance MSA compliance

consignment management, and slaughter in each of the following years: 2008, 2009, 2010 and 2011. This information was correlated with carcass feedback and MSA compliance information to document compliance and opportunities to improve compliance and reduce ungrades.

### 3.3 JBS Townsville plant feedback carcass data

The JBS carcass feedback sheets (emailed to the owner in txt format) were converted to Excel and the following data was collated for individual IDs and body number of animals consigned MSA:

- Dentition (JBS requirements for MSA grading: 0-4 teeth)
- P8 Fat (JBS requirements for MSA grading: 5-32mm)
- HSCW (JBS requirements for MSA grading: 180-339.5kg HSCW.)
- Bruising
- Gross value (amended for MSA premiums where applicable).

### 3.4 MSA feedback and benchmarking system data

MSA data was retrieved from the MSA feedback and benchmarking system ([www.msagrading.com.au](http://www.msagrading.com.au)) and included:

- Compliance summary by lot;
- Grading analysis and grading analysis graphed;
- Producer feedback by lot; and
- Benchmarking reports.

The retrieval of this data enabled summarization of compliance data for each group of cattle consigned and also summarisation of key MSA parameters in each boning group.

#### Compliance Summary by Lot

The compliance summary by Lot sheet was used to determine numbers complying with each boning group. Also provided is the body number(s) of carcass falling into each boning group which can be cross checked against JBS Swift amended feedback sheets (i.e. price amended to account for MSA premium).

The boning group U section of the Compliance summary by Lot report lists 'grade codes' and thus enabled identification of bodies with pH > 5.7, meat colour 1A or > 3, or subcutaneous fat depth out of specification (e.g. < 3mm), or fat distribution out of specification, or a combination or part thereof these factors causing these carcasses to be 'ungrades' (boning group U).

#### Grading Analysis and Grading Analysis Graphed

The Grading Analysis sheet was used to determine the minimums, maximums, averages and standard deviations for each parameter critical to MSA grading e.g. OSS, HSCW, MSAMB, RFT and pH. A count is also given e.g. numbers of carcasses at 150, 200 and 250 ossification score.

The Grading Analysis Graphed sheets showed the above information in graphical format and this was used in PowerPoint presentations to demonstrate to producers the range within each MSA parameters (e.g. ossification) and visually show the proportion of animals that fell outside 'ideal' point or scores on the graphs. For example, ossification scores greater than 200 were unfavourable to MSA grading and marbling scores less than 300. The rib fat graphs clearly showed those animals that were ungrades i.e. rib fat less than 3mm.

#### Producer Feedback by Lot

The Producer Feedback by Lot sheets were downloaded in excel format. The sheets were used to determine which MSA parameters (e.g. OSS, HSCW, MSAMB, RFT and pH) that had a positive or negative contribution to EQ score or boning group for each individual steer and also boning groups. This assisted with explaining why certain carcasses fell into a particular boning group, or did not achieve a better boning group.

By downloading the producer Feedback by Lot into excel this allowed for the averaging of MSA data within a boning group for that particular consignment. These averages within boning groups were reported in milestone reports and often showed trends in data e.g. increasing average ossification scores with higher boning groups within a consignment.

#### Benchmarking reports

Benchmarking reports were used to determine how Trafalgar cattle compared to the Herbert and Lower Burdekin region for a particular MSA parameter e.g. ossification score. While each property needs to identify problem areas for their own cattle in relation to MSA grades, it can be useful to compare a parameter with a region to give a broader perspective.

### **3.5 Economic analyses**

Economic analyses to determine the cost benefit of HGPs and molasses feeding prior to slaughter on MSA compliance rates were conducted by Tim Moravek, DAFF economist Charters Towers. For further information on data used see Appendix 5.

#### **3.5.1 Molasses feeding prior to slaughter**

A sensitivity analysis was conducted to investigate the cost and potential production benefits, including MSA compliance rates, of feeding molasses in the 30 days prior to slaughter.

#### **3.5.2 Hormone Growth Promotants (HGP)**

A cost benefit analysis was conducted on No 9 Steers from Trafalgar to determine the trade-off between revenue generated by compliance and carcass weight differences between treated and non-treated animals.

#### **3.5.3 Regional impact**

Modelling was done using Breedcow & Dynama's Beef CRC templates for the 313 "C" ABARE regions (see [www.futurebeef.com.au](http://www.futurebeef.com.au)) to assess potential impact on the gross margin of the region's herd. This region reflects goldfields country, country to the eastern half and around the Charters Towers area representing the project area. The template was used as a base scenario and adapted to investigate the economic outcomes of these regions moving to an MSA production system over a HGP production system.

An assumption was made based on 33% of steers and heifers turned off receiving a MSA premium of \$0.10/kg. Other impacts on the herd were due to results of the Trafalgar and Lisgar PDS projects. This included a 13 KG dressed weight difference (24 KG LWT) in slaughter steers and a 9 kg dressed weight (16.67 KG LWT) in slaughter heifers. A reduction in age of turnoff was also used, with the 50% of the tail which previously was being turned off at 48–60 months, moving into the 36–47 month old turnoff category. The costs for HGP were also removed.

## **4 Results**

### **4.1 Benchmarking results for 2008 collected and analysed for Townsville abattoir**

Data from JBS Townsville abattoir detailing MSA compliance rates was presented by MLA's Mark Englis at an advanced MSA training workshop (April 2009). An abridged summary of the data is outlined (Table 1).

**Table 1. JBS (Townsville) MSA compliance data 2008**

Parameter	Compliance
No of cattle graded	7959
% in Boning room 10 or less	26%

The percent 'ungrades' has decreased since mid-2008. When the plant re-opened in 2009, the percent ungrades had halved. This was probably due to due improved pre slaughter nutrition and a higher percentages of coastal and Tableland cattle.

A large variation in Ossification scores in herds analysed was noted, even where control mating occurs and tight management of age groups. This is something that is not seen in southern areas of Australia, and has the greatest impact on EQ score and therefore boning room group.

## 4.2 Pre delivery management for steers consigned MSA

The results from seven groups of Trafalgar steers consigned MSA from 2008 to 2011, to JBS in Townsville, were recorded and interpreted.

Pre delivery management of steer consignments from Trafalgar to JBS involved in the demonstration is outlined in Tables 2-4. The August 2008 consignment was trucked a day later than anticipated due to a late request by JBS. This impacted on the percent 'ungrades' in that consignment, as the steers were held over in the yards an extra night.

**Table 2. Consignment pre delivery management Trafalgar 2008**

Class	Steers	Steers (mainly bought cattle)
<b>Date &amp; Day Slaughtered</b>	Monday 11 August 2008	12 October 2008
<b>Date Mustered</b>	Friday 8 August	11 October 2008, helicopter, yarded by smoko
<b>Drafting</b>	Friday 8 August (2 days prior to slaughter)	11 October, weighed by 4 pm
<b>Curfew</b>	Friday 8 August O/N	No curfew
<b>Weighing</b>	Sat 9 August	11 October
<b>Other Handling</b>	n/a	n/a
<b>Trucking</b>	Sun 10 August (on hay & water O/N); problems with door on truck loading took longer than usual (1 hour to load 6 decks; usually 30 mins, cattle fizzier than usual (1.3% bruising, normally 0.5%)	Trucked day of weighing
<b>Nights in yards</b>	2 at Trafalgar, 1 at JBS	1 at JBS
<b>Comments</b>	JBS delayed trucking due to lack of cattle to kill Sunday 10 August, therefore cattle had to spend 2 nights in yards instead of 1.	Cattle loaded well, no delays
<b>Nutrition</b>	Sliding plane 8 weeks prior; some rain produced green pick but only just picking up	Higher plane of nutrition in the 2 months prior to slaughter than August steers
<b>HGP</b>	At 12 mo, plus November 2007 (18mo)	At 12 mo, plus November 2007 (18 mo)

**Table 3. MSA consignment pre delivery management Trafalgar 2009.**

Class	Steers	Steers (tail of year group)
<b>Date &amp; Day Slaughtered</b>	Tuesday 15 September 2009	Wednesday 18 November 2009
<b>Trucking</b>	Monday 14 September am (on hay & water O/N);	Trucked day of mustering (17 November)
<b>Date Mustered</b>	12 September	17 November
<b>Drafting</b>	12 September ( 3 days prior to slaughter)	17 November, 1 day prior to slaughter.
<b>Curfew</b>	No	No
<b>Weighing</b>	No weighing	No weighing
<b>Other Handling</b>	-	-
<b>Nights in yards</b>	2 at Trafalgar, 1 at JBS	1 at JBS
<b>Comments</b>	JBS delayed trucking due to lack of cattle to kill on 14 Sept, therefore steers had to spend 2 nights in yards before trucking.	Very poor nutrition pre slaughter, however steers not held overnight in the yards prior to trucking
<b>Nutrition</b>	Declining plane of nutrition 8 weeks prior to slaughter	Very poor paddock nutrition prior to slaughter including. NPN supplementation
<b>HGP</b>	At 12 mo, plus November 2008 (18 mo)	At 12 mo, plus November 2008 (18 mo)

The first 2009 consignment (September 2009) were also trucked a day later than anticipated due to a late request by the abattoir to hold them over. This impacted on the number of ungrades, as the steers were held over at Trafalgar an extra night. The second consignment (November 2009) were mustered, drafted and trucked on the day prior to slaughter

**Table 4. MSA consignment pre delivery management Trafalgar 2010.**

Class	Steers
<b>Date &amp; Day Slaughtered</b>	12 May 2010 (Wednesday)
<b>Date Mustered</b>	9 May 2010 (Sunday)
<b>Drafting</b>	10 May (2 days prior to slaughter)
<b>Curfew</b>	O/N 9 May (day of mustering)
<b>Weighing</b>	10 May
<b>Other Handling</b>	-
<b>Trucking</b>	Tuesday 11 May (on hay & water previous night; (1.5 bodies bruising)
<b>Nights in yards</b>	2 nights prior to trucking to JBS, Townsville
<b>Comments</b>	1 <sup>st</sup> night in yards – curfew; 2 <sup>nd</sup> night steers on hay and water
<b>Nutrition</b>	Good paddock nutrition prior to slaughter
<b>HGP</b>	At 12 mo, plus November 2009 (18 mo)

The consignment of No 8 steers were held in the yards two nights prior to trucking to JBS abattoir

Two consignments of No 9 steers were held in the yards two nights prior to trucking to JBS abattoir. The first consignment consisted of “the lead” of the No 9 and they were consigned MSA in late

November 2011. The remainder of the No 9 steers were slaughtered in May 2012 (not consigned MSA).

### 4.3 Background data, JBS compliance data and MSA data for Trafalgar steers

Background data including paddock performance data, JBS Compliance data and MSA Compliance data was compiled and analysed for:

- 2 consignments of No 6 steers (August and October 2008)
- 2 consignments of No 7 steers (September and November 2009)
- 1 consignment of No 8 steers (May 2012)
- 1 consignment of No 9 steers (November 2011) – the “lead” of the No 9s.

#### 4.3.1 Background data for steers consigned MSA

Key background data for the 2008 to 2012 consignments of Trafalgar steers (Table 5). This includes Average Daily Gain data from weaning to exit.

**Table 5. Key background data for the 2008 to 2012 consignments of Trafalgar steers**

Consignment Month:	Aug 08	Oct 08	Sep 09	Nov 09	May 2010	Nov 2011*	May 2012 HGP Steers	May 2012 Non HGP
	No 6's	No 6's	No 7's	No 7's	No 8's	No 9s	No 9s	No 9s
<b>Background Data</b>								
<b>Av. Weaning Weight</b>	203 kg	N/A Bought cattle	163	N/A bought steers	216 kg	176 kg	159 kg	160kg
<b>Wt at end of year 2 (reweigh)</b>	393 kg	N/A Bought cattle	597kg July 2009	N/A	462 kg	379 kg	337 kg	319kg
<b>Exit weight</b>	577 kg	532 kg	N/A	N/A	549 kg	580 kg	634kg	613kg
<b>ADG reweigh to exit</b>	0.64 kg	N/A	N/A (not weighed)	N/A	0.41 kg	0.39	0.45	0.45
<b>Average age at Exit</b>	Not avail	N/A	34 months	N/A	34 months	38 months	37 months	37 months
			“lead of the No 8s”			“lead of the No 9s”	“remainder of the No 9 steers”	

\*A group of the lead of the #9 steers was consigned MSA in late November 2011. This consignment was also held in the yards for 2 nights prior to trucking to JBS.

The average age at exit stated above includes both bought steers and Trafalgar bred steers. (Note: May 2012 steers from Trafalgar were not consigned MSA.)

#### 4.3.2 JBS specifications for MSA grading eligibility

The JBS specifications for eligibility for MSA grading at the Townsville plant are:

- Dentition – 0 to 4 teeth
- HSCW – 180 to 339.5kg
- P8 Fat cover – 5 to 22mm.

Records of all Trafalgar No 4 to No 9 steers (including those not consigned MSA) were analysed to provide the overall percentage of steers which complied for dentition (0-4 teeth), HSCW (300kg plus) and P8 fat (5-22mm) specifications (Table 6) and which would have been eligible for MSA grading . These specifications would have placed these carcasses in the higher priced part of the price grid (particularly of 0-2 teeth), or enabled eligibility for MSA grading (provided the carcasses met JBS specifications). These percentages are shown in Table 6.

**Table 6. Percent compliance JBS specs of Dentition, HSCW and P8 fat specifications and eligible for MSA grading**

Trait	Specification	Percent Compliance
Dentition	0-4 teeth	69%
HSCW	300kg Plus	72%
P8 fat Depth	5-22mm	88%

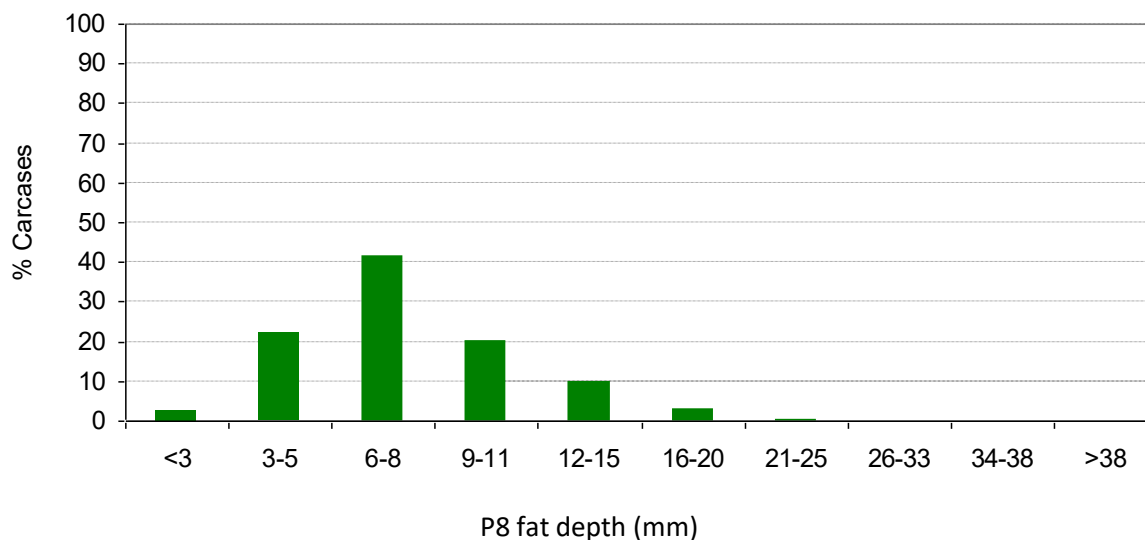
The records of Trafalgar No 4 to 9 steers (including bought cattle and those not consigned MSA) were averaged to show weight for age (Table 7) i.e. months of age and corresponding HSCW (kg).

**Table 7. Age (months) and HSCW (kg) for Trafalgar No 4 to No 9 steers**

	Age (months)	HSCW (kg)
No 4 steers	37.3	304
No 5 steers	38.5	326
No 6 steers	38.2	325
No 7 steers	34.8	311
No 8 steers	34.0	300

The results in the above table include both home-bred and bought steers. The results for the home bred cattle showed steers averaged 34 months of age at slaughter.

The average P8 fat cover of Trafalgar steers consigned MSA, but not necessarily graded MSA, over the duration of PDS was 7.9mm. The graph shows the majority of animals had 6-8mm fat. The next highest group of steers is the 3 to 5mm range (22%) (Figure 1).



**Figure 1. Percent of Trafalgar steers within P8 fat depth ranges (2008-2011)**

The majority of steers had 6-8mm fat. The next highest group of steers is the 3 to 5mm range (22%). 5mm of P8 fat is at the bottom of the specification range for MSA grading eligibility. Many animals with only 5mm fat have poor fat distribution (and then become ineligible for grading).

### 4.3.3 Compliance data for Trafalgar steers consigned MSA

Summaries for key slaughter and MSA data are provided for the 2008, 2009 2010, 2011 and 2012 consignments are shown in Table 8. This includes both compliance for meeting local JBS specifications for MSA grading eligibility, and the resulting MSA compliance.

**Table 8. Compliance data summary for steers consigned MSA 2008 to 2011, plus No 9 steers slaughtered in 2012 and not consigned MSA**

<u>Compliance Data</u>	Aug 08	Oct 08	Sept 09	Nov 09	May 2010	Nov 2011
<b>Compliance with local JBS specifications</b>						
<i>n</i> = animals consigned	120	120	238	122	160	121
<b>Compliance with JBS specifications</b>	81%	69%	83%	23%	74%	35%
<b>Dentition compliance</b>	90%	78%	96%	93%	89%	84%
<b>Fat cover compliance</b>	98%	89%	97%	48%	82%	50%
<b>HSCW compliance</b>	90%	98%	87%	99%	83%	93%
<b>HSCW average</b>	322 kg	299 kg	311 kg	286 kg	303 kg	315 kg
<b>Dressing %</b>	55.7%	53.6%	N/A	N/A	55.2%	54.4%
<b>P8 Fat depth Av</b>	8.9 mm	9.6 mm	8.4 mm	4.7mm	6.4 mm	5.3 mm
<b>Bruising</b>	1.4%	nil	0.6%	0.4%	0.9%	0.4%
<b>MSA compliance</b>						
<i>n</i> = carcasses eligible for grading	100	83	197	28	118	42
<b>% MSA graded</b>	59%	88%	48%	89%	44%	38%
<b>% Ungrades (pH &amp;/or colour)</b>	41%	12%	52%*	11%	56%	(62%)*
<b>Boning gp 6 &amp; 7</b>	nil	nil	4/197	nil	1/118	3/42 (no HGP)
<b>Boning gp 8</b>	nil	nil	14/197	-	-	1/42 (no HGP)
<b>Boning gp 9</b>	1/100	1/83	2/197	1/28	3/118	-
<b>Boning gp 10</b>	1/100	2/83	23/197	-	5/118	2/42
<b>Boning gp 11/12</b>	38/100	31/83	37/197	16/28	18/18	1/42
<b>Boning gp 13,14,&amp; 15,16</b>	19/100	39/83	13/197	8/28	24/18	4/42
<b>Received premium</b>	2%	4%	22%	3.5%	3.4%	5%
<b>Av. Ossification score</b>	252	294	216	203	219	196
<b>Av. Marbling score</b>	284	284	298	276	269	293
<b>Av. Rib Fat (MSA)</b>	6 mm	5 mm	5 mm	6 mm	4 mm	4 mm
<b>HSCW (MSA)</b>	325 kg	298kg	316 kg	293 kg	300 kg	317 kg

Detailed compliance information for each draft of steers is included in Appendix 3.

#### Percentage Ungrades

Carcasses can become ungrades if: meat pH is greater than 5.7; meat colour too dark (4,5,6); rib fat <3mm and/or fat distribution is poor. If meat pH is greater than 5.7 and or meat colour too dark this is a result of low muscle glycogen (glycogen bucket) at slaughter. Glycogen is burned to lactic acid and this is what pushes pH down. Optimum pH is 5.3-5.7 and it is a measurement of lactic acid in muscle, however it is driven by glycogen in live animal prior to slaughter.

The majority of the 256 ungrades from Trafalgar were due to a combination of pH greater than 5.7 and meat colour too dark (4, 5 or 6). However there were also some ungrades due to low rib fat and poor fat distribution.



The percentage ungrades per consignment ranged from 11% through to 62%. The percentage of ungrades was high in the August 2008 (41%), September 2009 (52%), May 2010 (56%) and November 2011 (62%) steer consignments. This resulted from consignments being held over in the yards an extra night before trucking, resulting in two nights spent in the yards at Trafalgar and one night at the meatworks. In 2008 and 2009 this delay was requested by JBS. The consignments were not weighed and should have only been held for 1 night. The November 2009 consignment had very poor pasture conditions leading up to slaughter, compared to previous consignments, yet had the lowest percentage of ungrades (11%). These November 2009 steers were not weighed prior to slaughter and spent no nights in the yards (at JBS).

At the Trafalgar site the biggest impact on percent ungrades, was the number of nights spent in the yards prior to trucking. The percentage of ungrades was reduced by trucking the steers the day of mustering, as opposed to holding the steers over in the yards for two nights for curfewing and weighing.

% Ungrades and No of nights in the Trafalgar yards prior to trucking

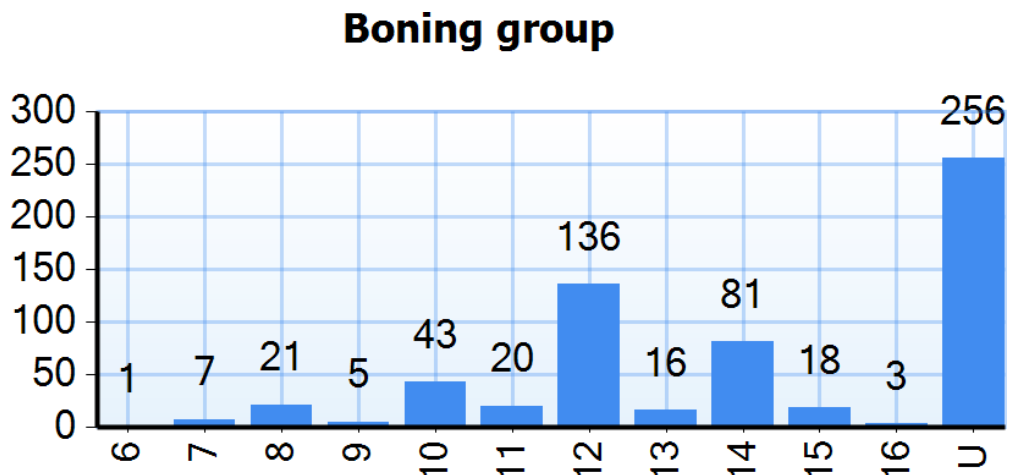
2 nights:	41 to 62% ungrades
0 nights:	11 to 12% ungrades

Two nights in the Trafalgar yards meant the steers were mustered and walked to the yards one day (an 8-10 hour event), curfewed overnight, drafted and weighed the next day, and trucked the following morning. No nights in the Trafalgar yards meant that steers were mustered one day and trucked that day to the meatworks. No weighing was undertaken when mustering and trucking occurred on the same day.

**Boning Group Compliance**

Compliance with boning group 10 or better ranged from 3% to 22%. This latter group (22%) was a standout out group (as the next lowest group was 5%) and they were the lead of the number 7's. Unfortunately, 48% were ungrades due to spending extra time in yards prior to slaughter. Further comment on individual MSA parameters is provided in the next section (4.4).

Figure 2 shows the boning groups of steers which met JBS specifications for MSA grading from 2008 to 2011. Of the steers that that were within JBS specifications and therefore MSA graded, 13% graded Boning Group 10 or better. The majority of carcasses which graded a boning group were in boning group 12. The majority of the 256 ungrades from Trafalgar were due to a combination of pH greater than 5.7 and meat colour too dark (4, 5 or 6).



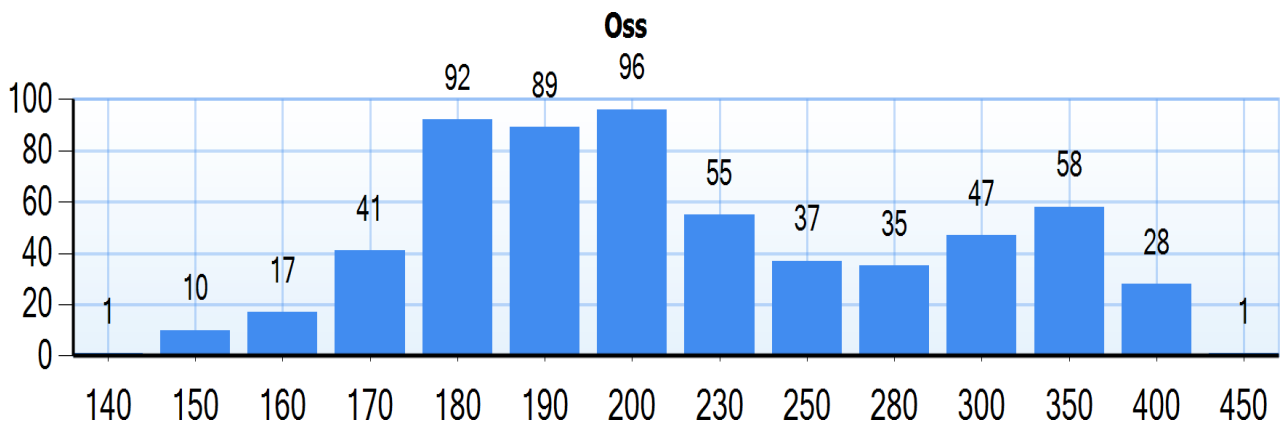
**Figure 2. Boning groups of steers which met JBS specifications for MSA grading (2008-2011)**

Overall, the lower or better boning groups tended to have the following trends:

- Lower ossification scores. This trend was most evident in the 2009 consignment where average ossification increased from 168 in boning groups 6 and 7 through to an average of 237 in boning groups 13, 14, and 15.
- Lower hump heights. For the 2010 consignment for boning group 10 through to 14, average hump height increased from 98 to 151.
- Higher marbling scores. Boning groups 10 or better tended to have average scores greater than 300, whereas the higher boning groups tended to have scores less than 300.
- Good HSCW (usually greater than 300kg).

**Ossification scores**

High ossification scores in the consigned cattle was the main parameter preventing MSA grading with higher EQ scores and improved boning groups. The ossification range was very broad (see Figure 3); despite the majority of steers having been weaned from control mated cow herds and then managed in a similar manner following weaning. This is typical of harsher environments in north Queensland. The target for ossification is a score less than 200. The Trafalgar average ossification score was 233. Benchmarked against region 2008-2011 Trafalgar steers had 5-7% higher ossification scores.



**Figure 3. Ossification scores for Trafalgar MSA graded steers 2008 to 2011**

**MSA marbling scores**

Average marbling score of 288 for Trafalgar steers is lower than the target of 300. A very large range in marbling scores were recorded (see Figure 4). When benchmarked against region 2008-2011, Trafalgar had 2-5% higher scores than the region.

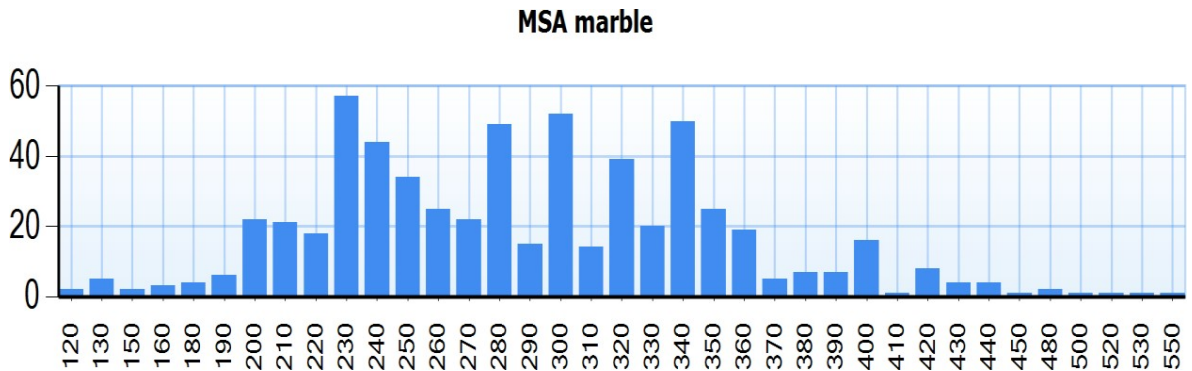


Figure 4. MSA marbling scores for Trafalgar steers graded MSA 2008-2011

**Hump Height**

The range in hump height for the Trafalgar steers consigned MSA 2008 to 2011 was 35mm to 260mm as shown in Figure 5. The lower end of the range was the crossbred genotypes and the higher end the high-grade Brahmans, although large ranges in hump heights were found within genotypes. The Trafalgar average was 123mm.

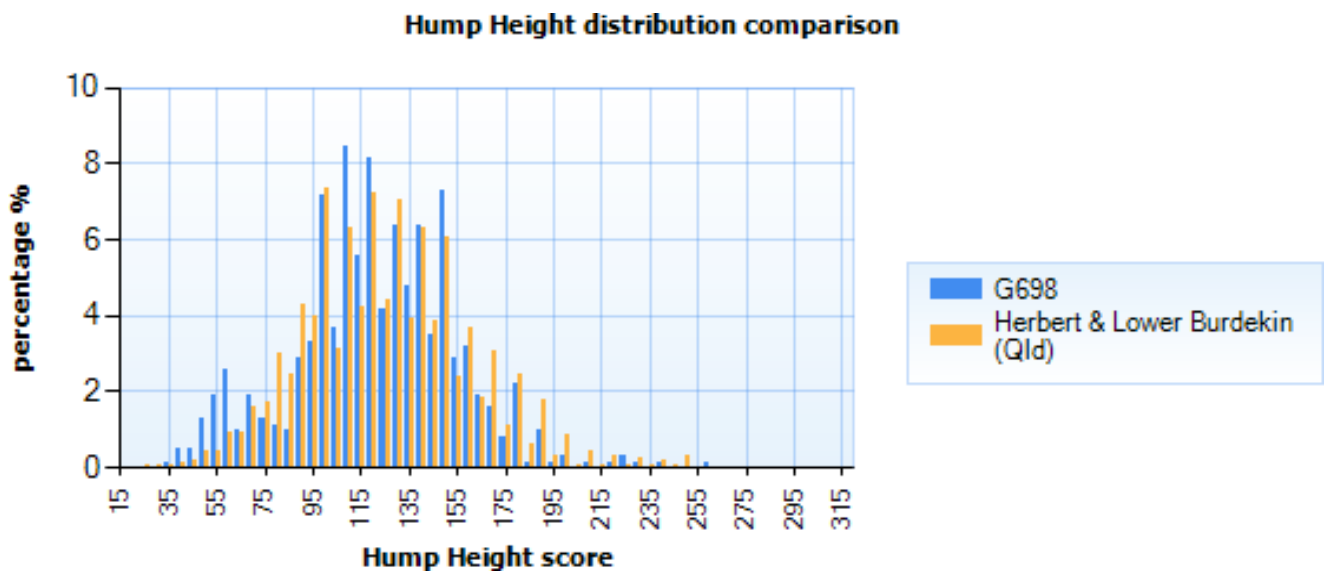


Figure 5. Hump height distribution for Trafalgar (G698) steers graded MSA 2008 to 2011 compared to the Region

**HSCW**

Figure 6 shows the percent of carcasses falling into 20kg weight ranges. Carcasses over 339.5kg are normally outside the range of the JBS MSA grading eligibility specifications. The majority of steers which were outside the JBS specifications were too heavy.

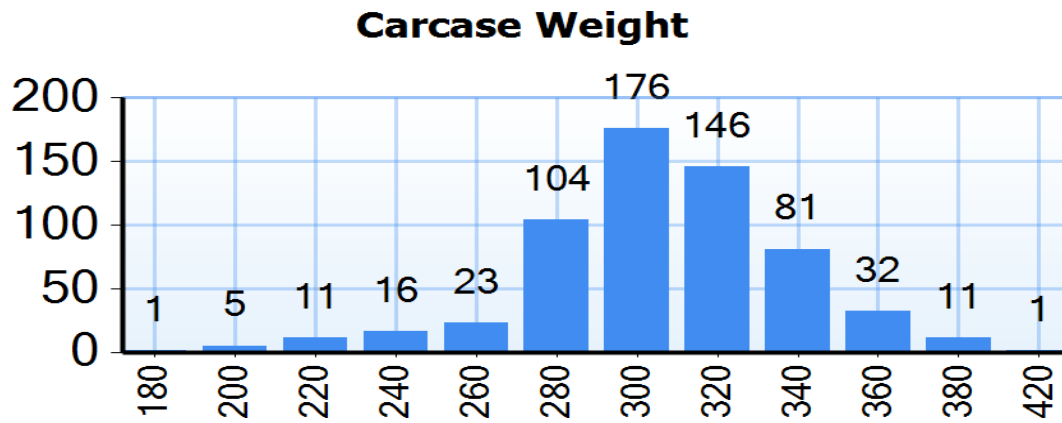


Figure 6. Carcase weight ranges and percentage of Trafalgar MSA steers 2008 to 2011

Additional MSA results can be found in Appendix 4.

#### 4.4 Economic analyses

##### 4.4.1 Molasses feeding to improve MSA grading

A desktop analysis investigated the cost and potential production benefits to improve muscle glycogen at slaughter and thus reduce the percentage ungrades by feeding molasses in the 30 days prior to slaughter. Additionally molasses feeding could improve live weight gain.

A sensitivity analysis was conducted to investigate the cost benefit of feeding molasses in the 30 days prior to slaughter showed that this strategy would be unprofitable. On basis of these results feeding of molasses pre slaughter to reduce the percentage ungrades was not carried out.

The sensitivity analysis showed an additional 2596.55kg of carcase weight would be directly attributed to M3U feeding. Combined benefits of extra carcase weight and likely increased MSA compliance was expected to be \$11,371.17. Total M3U cost was \$12,293.04 (\$262.00/tonne), resulting in a net loss of \$921.87 or a -7.5% loss over 30 days (i.e. an annual rate of return of -61.27%). For information refer to Appendix 5.

The sensitivity analysis showed that compliance rates would need to increase by 40.81% over what was normally achievable, molasses prices be less than \$242.00/tonne or MSA premiums be 12.3c/kg. Under this scenario, if any one of these conditions were met, molasses feeding would have been economically viable.

##### 4.4.2 HGPs – is it economical not to use them when consigning steers MSA in NQ

No 9 steers weaned in 2009 where split into two HGP treatments. One group was implanted with Compudose 400® and the other group was not implanted with a HGP. As of July 2010 the implanted group had a weight advantage of 17kg (Table 9).

Table 9. Weight differences between HGP treatments for 2009 weaner steers

HGP Treatment - 2009 Weaner steers	Number of steers	Weight (kg) 22 November 2009	Weight (kg) 6 July 2010
HGP Comp 400	310	181	350
No HGP	64	179	333
<b>Wt Advantage (kg)</b>			17

The 'lead' of No 9 steers, including both HGP implanted and non HGP steers, were consigned MSA in November 2011. Only nine head of non HGP steers were consigned. All nine head were eligible for MSA grading and as expected, a greater percentage graded boning group 10 or less. The only boning group 6 animal recorded during the course of the project was in this non HGP group.

**Table 10. Lead of No 9 steers consigned 27 November 2012 – Comparison of key carcass and MSA data**

	Exit Wt	Carcass Wt	P8 Fat	BG 10 or less
HGP	579	315	5.0	3/31 - 10%
No HGP	583	321	6.8	3/9 - 33%

The rest of the No 9 steers were sold in May 2012, and the results are shown in Table 11 below. These steers were not consigned MSA as they were too heavy and/or had 6 teeth. However the carcass weight difference from this group of HGP and non HGP was used in the economic analysis, as the higher non HGP carcass weight (321kg) of the non HGP group versus HGP group (315kg) from the November 2011 consignment was considered an aberration (see table 10 above).

**Table 11. No 9 steers consigned to JBS Townsville in May 2012 (not consigned MSA)**

	Exit Wt	Carcass Wt	P8 Fat	% 4 tooth or less
HGP		352	11.3	48%
No HGP		339	11.1	75%

The cost-benefit analysis showed that despite a difference of 23% in MSA compliance between treated and non-treated steers, higher carcass weights overall in treated animals would offset extra revenue from premiums obtained for non-treated animals. Each animal in the HGP treated group achieved an extra \$17.83, after accounting for extra input costs.

Sensitivity analysis was conducted to determine thresholds where non-treated cattle outperformed HGP treated cattle economically. The analysis showed that the consignment difference between the two groups of animals would need to be 77.0% (i.e. 87.0% for the treated animals and 10% for the non-treated animals) in order for the non-treated cattle to match or exceed the return generated by HGP treated cattle. Sensitivity analysis also showed that a rise in premiums to \$0.34/kg would justify the removal of HGPs, economically.

**Table 12. HGP cost benefit analysis**

Treatment	\$/Head
Non-Treated	\$960.39
Treated	\$978.22

**Table 13. Assumptions used in HGP analysis**

	Non-Treated	Treated
Price	\$2.80/kg	\$2.80/kg
Average HSCW	339.00kg	352.00kg
Compliance (Boning Group 10 or less)	33%	9.67%
Premium	\$0.10/kg	\$0.10/kg
HGP Cost	\$0.00	\$10.80/Head

#### 4.4.3 Age of turnoff

Breedcow and Dynama modelling was undertaken under taken as per methodology to show the effect of reducing age of turnoff by 6 months i.e. from 38 months to 32 months. Turn-off weight remained the same. Gross Margin increased to \$202.89, before interest, from \$182.93. This represented an increase of \$19.96/AE resulting from the reduction in age of turnoff alone. This result became \$24.75/AE after interest on herd capital was factored in at 6.15%. Refer to Appendix 8.6.2 for Trafalgar Age of Turnoff Analysis – Breedcow and Dynama modelling Summary Sheets for further detail.

#### 4.4.4 Regional impact

The results of the regional impact assessment outlined in section 3.5.3 are shown in Table 14 below. Specifically, the Burdekin region could add \$1.49 million in additional gross product.

**Table 14. Herd gross margin of ABARE 313 region**

Region	Before	After	Difference
313 C	\$50,992,695	\$52,480,419	\$1,487,724

### 4.5 Producer group training workshops/activities and the MSA and marketing forum

Over the course of the PDS project eight group activities and two forums were held (agenda and topic details in Appendix 6). Group members attended two field days at the Burdekin MSA PDS site (B.NBP.0582). Advanced MSA training for staff was also held in 2009 (see Appendix 1).

These activities were scored on 'usefulness' (7 being 'extremely useful'). Satisfaction ratings from all producer group activities ranged between 6 and 6.5. These scores are outlined in Appendix 6.

No workshops were held in 2011 as the Townsville MSA multi group Forum in mid-December 2010 covered all the PDS results until that point and there were no Trafalgar PDS site cattle consigned MSA until the end of 2011.

A major MSA and Marketing Forum was held at Dalrymple Stadium, Charters Towers on 22 June 2012 targeting a broader audience to disseminate the results from both Dalrymple and Burdekin PDS. In addition, results from 'Optimising growth paths' project (Stu McLennan) and relevant Beef CRC outcomes (John Bertram) were presented.

The program included the following presentations:

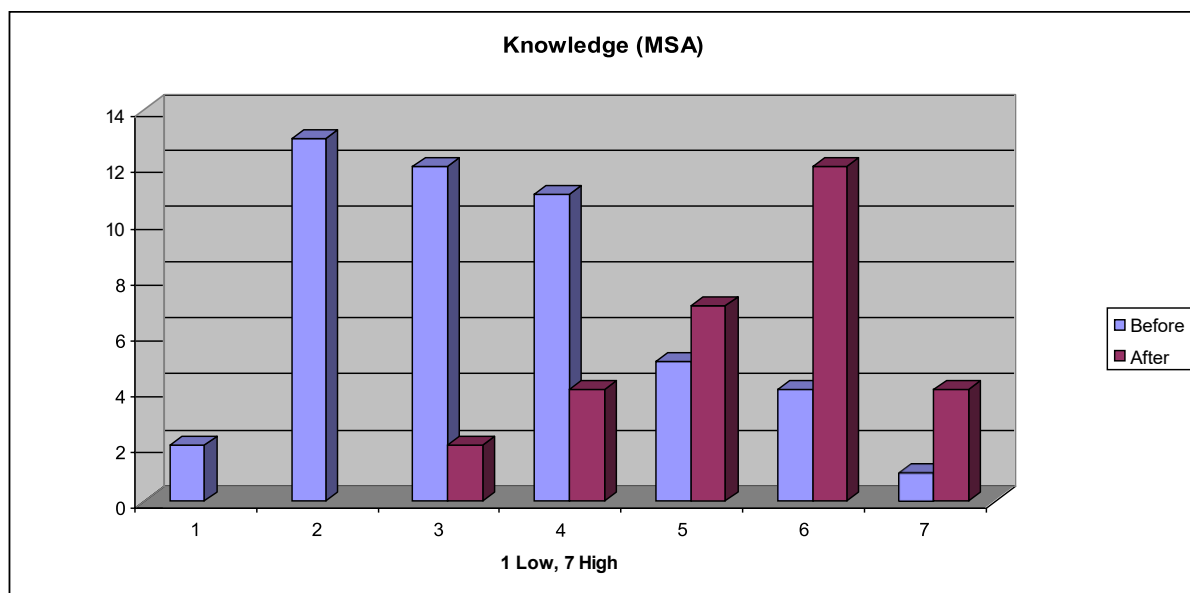
- Industry perspective on MSA - reasons for non-compliance and the future – Jake Phillips, MSA
- Linking grading back to the producer – Brett Campbell, JBS
- Producer production systems – Robert Rea and Roger Landsberg (PDS Site producers for Burdekin and Dalrymple)
- Lisgar & Trafalgar results, live cattle scan – Alan Laing & Felicity Hamlyn-Hill, DAFF
- Economics of producing MSA cattle – Tim Moravek, DAFF
- Producer case study – Rodger Jefferis
- Meeting market specs without compromising reproduction – John Bertram, TBTS
- Nutrition pathways for higher paying carcasses – Stu McLennan, QAAFI
- Genetics for carcase performance – Alan Laing, DAFF.

Approximately 120 people attended this forum, travelling from as far as western and central Queensland. The formal and informal feedback on the day was highly favourable. Attendants were also benchmarked for their “current level of understanding of MSA” at the start of the day, and at the end of the day. The results showed a large improvement in understanding of MSA as a result of the forum (see section 4.6).

#### 4.6 Evaluation of producer understanding and knowledge of MSA

At the initial PDS group meeting in July 2008 producer members of the PDS group scored their then ‘current level of understanding of MSA’ at 3.3 out of 7 (with 7 being ‘extremely high’). At the April 2009 workshop group members scored their ‘current level of understanding of MSA’ at 5.0 out of 7 (with 7 being ‘extremely high’). This parameter was benchmarked again at the final forum. Producer group member’s scores averaged 6 out of 7.

At the MSA and Marketing Forum held at Dalrymple Stadium, 22 June 2012, over 100 people were asked to score their current level of understanding of MSA prior to the forum (i.e. at the registration desk) and again on their feedback forms at the end of the day. The results showed the forum was very successful in improving the audience’s knowledge of MSA as demonstrated in Figure 7. The blue columns represent participant’s knowledge of MSA prior to the forum, and the purple columns represent participant’s knowledge of MSA after the forum. (A score of 1 is low and score of



7 is high).

**Figure 7. MSA and marketing forum - evaluation of participant’s knowledge of MSA both before and after the forum. Score 1 is low understanding, 7 is high understanding**

### 5 Success in achieving objectives

#### 5.1 In conjunction with JBS Townsville and Meat Standards Australia (MSA) will have assessed the prevalence of animals and producers that submitted for MSA grading in the fiscal year 2008 and established compliance rates

JBS Townsville data for all cattle submitted for MSA grading in 2008 was analysed and reported. The percent ungrades had decreased since mid-2008. When the plant re-opened in 2009, the percent ungrades had halved. This was probably due to improved pre slaughter nutrition (season) and a higher percentage of coastal and Tableland cattle being consigned.

## **5.2 Improved the compliance rates from cattle marketed for MSA grading at JBS by reducing percentage 'Ungrades' by 50% and increasing boning room 10 grades by 25%**

The PDS project successfully demonstrated that the level of ungrades could be reduced by not holding steers in the yards prior to transport. On all occasions where cattle were held over in the yards 2 nights prior to trucking, with 1-night curfew, the level of ungrades were high (41-62%). Similar cattle that were loaded on the day of mustering with 1 night at JBS and had the lowest percentage of ungrades (12% and 11%). However, this meant exit weights were then unavailable.

The only on ground management strategy that showed an improvement in compliance was demonstration of *not* using HGPs with a group of No 9 steers and the subsequent impact on growth rates, average HSCW and boning group 10 compliance. However, an economic analysis showed that this strategy was uneconomical. For the Trafalgar MSA PDS it was shown that steers consigned MSA would need to achieve an unrealistic 77% level of compliance with Boning Group 10, or better, to break even by not using HGPs.

Due to the cost of supplements, extra nutritional inputs over and above existing property management (weaner management and dry season supplementation) were not demonstrated.

## **5.3 Improve skills and understanding of MSA grading, plus analysis and interpretation of MSA feedback. Benchmark knowledge and practice change**

The PDS project was successful in improving skills and understanding of MSA grading and interpretation of MSA feedback. At the initial PDS group meeting in July 2008 producer members of the PDS group scored their then "current level of understanding of MSA" at 3.3 out of 7 (with 7 being 'extremely high'). At the April 2009 workshop group members scored their "current level of understanding of MSA" at 5.0 out of 7.

At the MSA and Marketing Forum was held at Dalrymple Stadium, 22 June 2012, over 100 people were asked to score their current level of understanding of MSA prior to the forum (i.e. at the registration desk) and again on their feedback forms at the end of the day. Prior to the forum the majority of participants scored their level of understanding of MSA at 2-3 out of 7, and after the forum the majority score was 6 out of 7.

## **5.4 Provide opportunities for producers to be involved in and/or directly participate in 'on property demonstrations' of strategies to achieve improved MSA compliance**

Members of the MSA PDS producer group had the opportunity to be involved in following the progress of the key site 'Trafalgar' and the data collected and analysed. The group were able to attend quarterly updates which provided detailed consignment and MSA feedback information and summaries similar to reported in the results section of this report. They were also informed of management strategies investigated, some implemented and some not, and the reasons why. The producers were able to observe the benefits of individual animal recording and its benefits in following the performance of cattle from paddock to plate.

Members of the producer group had the opportunity to present their own MSA feedback and cattle performance results. There was some disappointment from group members in terms of MSA grading results. Mostly this occurred with high grade Brahman herds which used HGPs.



All producer group members recorded, and discussed openly, management changes necessary on their own properties for improving overall market compliance including MSA compliance. Some producer members were able to discuss how they had implemented some these strategies.

## **5.5 Provide-annual opportunities for technical support and training activities for each group**

During the course of the demonstration there were 10 formal learning opportunities/activities held for producer group members. Most of these were workshops covering a broad range of relevant topics, but three were field days and one a large forum which the wider public also attended. The satisfaction rating for these activities was 6 to 6.5/7.

## **5.6 Provide annual opportunities for producers to learn from other VIB project groups and relevant research outcomes**

The PDS group followed the results of the other projects which collected and analysed carcass and MSA data:

- Stu McLennan's research project: 'Optimising Growth Paths of Cattle for Increased Profitability in north Queensland'
- Flinders Beef Challenge (2008 and 2010) – growth, carcass and MSA results
- Burdekin (Lisgar) MSA PDS – growth, carcass and MSA results.

This information was useful for producers in the group to identify strategies to improve MSA grading on their own properties, as well as improving general market compliance. The group investigated and discussed general genetic improvement opportunities at group workshops, the Lisgar field days and at the final MSA forum (2012).

## **5.7 Demonstrate on property practices that improve MSA compliance to wider beef community**

The final activity, the MSA and marketing Forum was held at Dalrymple Stadium, 22 June 2012, targeted a much broader audience (120 people) to disseminate the results from both Dalrymple and Burdekin PDS's, as well as the 'optimising growth paths' project, which both groups had been following.

## **5.8 Improve awareness of the wider beef community of strategies to improve MSA compliance being undertaken by PDS groups**

Achieved as per 5.1.7 and the following media activities.

The Trafalgar and Lisgar MSA PDS projects were also the focus of a number of extension and media articles that achieved this milestone, including:

- Northern Muster September 2008 – A Snapshot of Value in Beef Projects Underway
- Northern Muster November 2008 - Working with Producers to Achieve MSA premiums
- Northern Muster April 2010 - Using MSA Feedback to Improve MSA Compliance
- Feedback magazine March 2009 - Producer groups target MSA premiums
- Qld Country Life August 2009 – MSA Grading Changes Tested in the North
- Northern Muster December 2011 – Understanding the MSA Grading System; Making the MSA Grade
- North Q Register June 2012 – Increasing Returns Drives Forum
- North Q Register July 2012 - Hormones still play role in high quality beef for northern producers

B.NBP.0583 - CHARTERS TOWERS: Utilising MSA feedback to enhance MSA compliance

- Feedback magazine August 2012 – The Economics of Molasses.

## 5.9 Benchmark knowledge and practice change that occurred as a result of the project over 3 years

The PDS project was successful in improving skills and understanding of MSA grading and analysis and interpretation of MSA feedback. At the initial PDS group meeting in July 2008 producer members of the PDS group scored their then 'current level of understanding of MSA' at 3.3 out of 7 (with 7 being 'extremely high'). At the April 2009 workshop group members scored their 'current level of understanding of MSA' at 5.0 out of 7 (with 7 being 'extremely high'). This parameter was benchmarked again at the final forum. Producer group member's scores averaged 6/7.

At the MSA and Marketing Forum was held at Dalrymple Stadium, 22 June 2012, over 100 people were asked to score their current level of understanding of MSA prior to the forum (i.e. at the registration desk) and again on their feedback forms at the end of the day where approximately one third returned an evaluation form. Prior to the forum the majority of participants scored their level of understanding of MSA at 2-3 out of 7, and after the forum the majority score was 6 out of 7.

Practice changes observed within the group included:

- Improved bull selection methods to target specific traits (e.g. growth and fat cover) and improve the genetics of the herd for these traits;
- Nutritional strategies to improve weight for age, and facilitate a continuous upward growth path, particularly post weaning; and
- Improved infrastructure improvements allowing improved capacity to record steer performance in the paddock.

## 6 Conclusions and Recommendations

### 6.1 Conclusions from the MSA feedback data

Conclusions from the MSA Feedback data are summarised within three key areas:

- compliance with JBS specifications for MSA grading;
- percentage ungrades, and reasons for ungrades; and
- boning group results and MSA parameters.

#### 6.1.1 Compliance with JBS specifications for MSA grading

The JBS specifications for dentition eligibility for MSA grading at the Townsville abattoir are 0 to 4 teeth. Of the groups of steers consigned MSA from 2008 to 2011 the dentition compliance ranged from 78% to 96%. An older heavier group of steers slaughtered in May 2012 and not consigned MSA achieved only 48% dentition compliance. As expected, the younger age groups consigned had higher levels of dentition compliance, as did the lead of the age groups.

Aside from JBS specifications for MSA eligibility "the better money" on the price grids is for 0-2 teeth steers at 300kg plus. A target for heavy slaughter steers is 300kg HSCW at 30 months of age, highlighting the importance of selecting for weight for age, which also addresses the dentition issue and also has indirect positive impacts on MSA grading through ossification score.

The JBS specifications for P8 fat cover compliance for MSA eligibility at Townsville are 5-22mm. The levels of fat cover compliance for Trafalgar steers ranged from 48% to 98%. Seasonal conditions impacted on P8 fat cover as it tended to be lower in the end of year consignments. Genetics also impacted on fat cover with Limousin X Angus steers and Brahman X Limousin X Brangus composite steers tending to have less fat cover (5.3 and 4.9mm on average), while Brahmans averaged 8.3mm and Brangus 7.1mm. However the

range in genetics within a breed can be as large as the differences between breeds, and this can be utilised by selecting bulls objectively for fat cover.

Older, heavier and more mature animals are more likely to have P8 fat cover within the specifications. Yet, these animals are more likely to not comply on dentition (i.e. be 6 teeth) and be too heavy for MSA eligibility. The challenge is to achieve weight for age as well as adequate fat cover. Outcross data (Figure 1) shows the majority of Trafalgar steers had 6-8mm fat, with the next highest number of steers in the 3 to 5mm range (22%). Note 5mm of P8 fat is at the bottom of the specification range for MSA grading eligibility. Many animals with only 5mm fat have poor fat distribution (and then become ineligible for grading) or have less than 3mm rib fat (and become MSA ungrades).

The JBS specifications for HSCW compliance for MSA grading at the Townsville abattoir plant are 180-339.5kg. HSCW compliance for Trafalgar steers consigned MSA ranged from 83%-99%. In all cases the steers that did not comply were too heavy. HSCW was not an issue of concern with the Trafalgar steers, however the tension between weight, dentition and P8 fat is again evident as heavier steers are more likely to have the required P8 fat depth, but are less likely to meet dentition requirements.

### 6.1.2 Percentage ungrades

Under normal mustering and handling protocols the level of ungrades at Trafalgar was high. The majority of ungrades were due to high pH (>5.7) and dark meat colour. Steers which would have otherwise achieved a boning group, possibly 10 or less, represent a missed opportunity simply because high pH or dark meat colour.

On all occasions where cattle were held over in the yards two nights prior to trucking, with one-night curfew, the level of ungrades was high (41-62%). The November 2008 and November 2009 consignments were not weighed prior to slaughter and spent only one night in yards (at JBS) and had the lowest percentage of ungrades (12% and 11%). This was despite having had poor pasture conditions leading up to slaughter compared to other consignments.

If the Trafalgar steers could be mustered and weighed in advance, at least two weeks prior, and held close in a smaller holding paddock then potentially they could be mustered and trucked with only having to spend one night in the yards, plus they would be walked to the yards over a much shorter distance. The issue at Trafalgar is that all the smaller paddocks close to the main trucking yards are stud paddocks. Many properties would not have such issues but would be a similar situation. Technology that enables paddock weighing of steers prior to entering a water point may be a possible option for producers wishing to consign steers MSA (although not of use where there is permanent water).

### 6.1.3 Boning groups and MSA parameters

Of the steers that were within JBS specifications and therefore MSA graded, 13% graded Boning Group 10 or better and achieved a 10c/kg premium. The majority of carcasses which graded were in boning group 12. To advance at least two boning groups, improvements in ossification, hump height, marbling and carcase weight are required as discussed below. Progress in reducing ossification scores was considered to have the greatest impact on increasing the percentage of cattle grading boning group 10 or below.

Boning group 11 and 12 have the opportunity to make boning group 10 if ossification is lowered, hump lowered slightly, and carcase weights increased slightly as well as marbling scores. Boning group 13, 14 & 15 have the opportunity to make boning group 10 if ossification is lowered, hump lowered, and HSCW increased and higher marbling scores achieved.

For the Trafalgar steers, high ossification is the main factor preventing MSA grading with higher EQ scores and improved boning groups when benchmarked against region from 2008-2011, Trafalgar steers had 5-7% higher ossification scores. The average ossification score for Trafalgar was 233 (target is 200). Reducing ossification scores as a short-term objective would require nutritional inputs which may prove too costly. More research is required to determine the best use of nutritional inputs in relation to improving ossification score.

HGP implants will be a key factor contributing to higher ossification scores. Theoretically an improvement in 2 boning groups can be achieved if HGPs are not used. Apart from a group of 64 No 9 Trafalgar steers, all the steers were implanted with Compudose® at 12 months and 18 months of age, impacting negatively on ossification score and possibly carcass fatness. At this stage HGP usage will continue based on demonstrated growth and economic advantages.

Low MSA marbling (MSAMB) scores can negatively impact on overall EQ score. However, a high MSA marbling score can mean the difference between an MSA premium or not, provided other parameters are average or better. The Trafalgar average MSA Marbling score of 288 is lower than the target of 300, and this would have impacted on EQ score, yet, when benchmarked against the region 2008-2011, Trafalgar had scores 2-5% higher than the regional average. This means that scope for marbling score improvements exists across the region. Selection pressure should be maintained on marbling for those producers committed to targeting better MSA grading results. There also appears to be a seasonal affect on marbling as MSAMB scores tending to be lower in end of year consignments, as does HSCW.

Hump height influences EQ score but doesn't seem to be the main issue with the cattle from the Trafalgar demonstration site. The Trafalgar average hump height was 123 mm; the lowest hump height recorded was 35mm and the range was quite large. Hump height should be no more than 100mm. Reducing hump height further through reducing *Bos indicus* content may not be a practical management option for this business, or other north Queensland businesses. Hump height does vary between bulls and within genotypes. This will continue to be used as a selection criteria and over time the average hump height may reduce further.

The average HSCW of Trafalgar steers consigned MSA (2008-2011) was 305kg. The majority of steers consigned were 300-320kg; carcass weight was not of concern for the Trafalgar herd in achieving MSA grades. Selection pressure does need to be maintained on growth and weight for age, however, due the impact of weight for age and its relationship with number of teeth (a JBS specification) and ossification score.

#### **6.1.4 Economic analysis on HGP usage**

HGPs are known to increase live-weight gains but reduce MSA compliance. A cost benefit analysis was conducted on No 9 Steers from Trafalgar to determine the trade-off between revenue generated by MSA compliance and carcass weight differences between treated and non HGP treated animals. A sensitivity analysis showed that the relative consignment difference between the treatments would need to be an unrealistic 77% (87% for the treated animals and 10% for the non-treated animals) in order for the non HGP cattle to match or exceed the return generated by treated cattle. Sensitivity analysis also showed that a rise in premiums to \$0.34/kg would be required in order for removal of HGPs to be economically sensible.

## 6.2 Recommendations

### 6.2.1 Improving eligibility for MSA grading

Producers should aim for a target weight of 300kg HSCW at 30 months of age for steers slaughtered. Not only will this potentially place steers in the higher priced part of the grid (particularly if dentition is <2 teeth but also improve the percentage of carcasses eligible for MSA grading. A problem with carcass fatness can arise if weight for age has been improved through breeding and cattle are slaughtered at heavier weight and at a younger age and have yet to reach maturity. This problem is more likely to occur with later maturing genotypes or their crosses.

It is important to review carcass feedback data to determine if inadequate fat cover is resulting in downgrading of carcasses (or carcasses missing out on eligibility to grade MSA). Eligibility for MSA grading includes the P8 fat depth which has to be between 5 and 22mm. While 5mm will mean a carcass will be eligible, at the lower P8 fat levels (5-7mm) fat distribution and rib fat levels may be inadequate causing carcasses to then become ungrades.

Genetic improvement can address desired levels of carcass fatness in order to better meet specifications for fat cover and marbling; however, attention should also be paid to management, including HGP programs. If the current HGP program involves repeat implantation, and if the last implant in the program contains oestradiol and an androgen, then the likelihood of the HGP contributing to reduced fat content of the carcass is also increased.

The challenge for producers is to use both genetics and management to achieve these targets. Attention to objective selection methods in bull selection is critical, remembering the bulls selected will determine the performance of the herd well into the future. If crossbreeding, it is important to remember that there is as much variation within breeds as between breeds. If using late maturing breed, then extra attention should be given to fat cover.

Continued education in the area of breeding and genetics is important. It is recommended producers attend detailed and well-structured workshops (with follow-up days) to achieve a level of understanding in the tools and strategies available, in order to make informed and educated choices and effectively implement change with positive results.

### 6.2.2 Reducing percentage ungrades

It is recommended producers committed to consigning cattle MSA do not hold cattle overnight in the yards, or if this is not possible only hold cattle over one night in the yards.

In addition to limiting the number of nights spent in yards, best practice cattle handling techniques need to be implemented to reduce the loss of glycogen due to stress and exertion. Modifications to yard design may be beneficial, and also strategies to reduce mustering time. Cattle can lose 30% glycogen bucket from mustering alone.

It is recommended that bull selection criteria include objective methods of selection for temperament, and breeding females of poor temperament be culled from the herd. Cattle with poor temperament should be segregated and sold separately from cattle consigned MSA.

Strategies implemented prior to slaughter, with the goal of improving nutrition and glycogen levels, need to be carefully analysed prior to implementation to determine if

there will be an economic benefit. In the Trafalgar scenario feeding a protein and energy (molasses) supplement proved to be uneconomical and would have cost the business if undertaken. In other cases, such a strategy may be economical. Producers are advised to seek professional help in making such decisions and undertaking cost benefit analyses.

### **6.2.3 Improving ossification scores**

The issue of ossification needs further research for the northern Queensland environment, particularly as it is the parameter which has the greatest impact on EQ score and therefore boning group. There is potential for work to be conducted on the impact of cost-effective management inputs and strategies to reduce ossification scores in steers, through examining different management and growth pathway combinations. Research will advance the understanding of extension officers and consultants and enable more targeted and informed advice to beef producers in reducing ossification scores.

Beef producers consigning cattle MSA may wish to review their HGP program if it involves multiple implants and use of a terminal combination implant. The continued use of HGPs in a less aggressive program, including avoiding early life implanting, is possibly an economical option. While MSA does not directly distinguish between single or multiple implant strategies, or type of implant, a less aggressive program may result in improved ossification, fat cover and marbling scores. In north Queensland pasture systems this issue still needs to be further researched and investigated.

Selecting for growth objectively (i.e. using Breedplan EBVs) means animals are slaughtered younger and this positively impacts indirectly on ossification score. In terms of a genetic strategy this is the only option available to producers, as there is little genetic variation between animals for ossification score therefore it cannot be selected directly.

### **6.2.4 Improving HSCW and weight for age**

Selecting for growth objectively (i.e. using Breedplan EBVs) will lead to improvements in weight for age. Improved steer weight for age performance will not only improve MSA grades and eligibility but will give producers more marketing options and potentially mean more cattle grade in the highest priced sections of the price grid (i.e. with 0-2 teeth). The target weight for age for steers in north Queensland should be 300kg carcass weight at 30 months of age.

Numerous studies have shown selection for Breedplan EBV e.g. 400-day weight will result in progeny with improved growth rates. However, it is important not to select for extremes and also to select in combination with a balanced selection of traits, including fertility traits. It is important to select for fast early growth as opposed to growth which results in a large mature size, which may genetically increase mature cow size. Consequently, producers should also seek information on mature cow size EBVs in the bulls they select.

### **6.2.5 Improving marbling scores**

Marbling is moderately to highly heritable trait and can be improved by selecting bulls with better than breed average IMF EBVs. Selection pressure needs to be improved or maintained on marbling if producers are committed to targeting better MSA grading results. Marbling is positively correlated with fat cover, so selecting for improved fat cover may also indirectly improve marbling and will also benefit rib fat cover which is included in the EQ score, although to a lesser extent than marbling score.

A sensitivity analysis should always be done first to determine if the feeding molasses, or molasses plus grain, is cost effective. Marbling is adversely affected by early life growth restriction so attention should be paid to weaner management and dry season management which impact on early life growth paths.

Nutritional stress pre slaughter can rapidly reduce marbling score (and also impact on glycogen stores)

so cost-effective management pre slaughter and during lairage should be investigated and implemented where viable.

### 6.2.6 Improving hump height

For producers with high grade Brahman herds that wish to improve MSA compliance through lowering hump height the fastest way to achieve this is through implementing crossbreeding programs. Such programs need firstly to be designed to cost effectively result in other production benefits, such as growth rates and fertility, The programs need to be carefully planned and managed. The biggest gains will come from utilising hybrid vigour as well as complementarity of traits. Producers should be wary of using breeds where little or no objective information is provided on the genetic merit of bulls for key performance traits.

### 6.2.7 Using actual performance and targets to improve MSA compliance criteria

Producers can use information collected from property data, meatworks feedback sheets and MSA Feedback and Benchmarking systems to determine current herd performance in order to make informed decisions and implement management strategies to improve herd performance, market and MSA compliance.

Table 15 shows opportunities for *management improvement*.

Table 16 shows opportunities for *genetic improvement*.

**Table 15. Management improvement opportunities - (Traits under management control)**

Traits for Management Improvement:	Result	MSA Targets	Comment
Ossification	Av 237	< 200	<ul style="list-style-type: none"> <li>• very lowly heritable</li> <li>• HGP effect, especially early life implant</li> <li>• Accelerated by nutritional stress, especially at weaning</li> </ul>
pH	Av 5.6	5.3 - 5.7	<ul style="list-style-type: none"> <li>• handling and nutrition pre slaughter</li> </ul>
Meat Colour	MSA Av 3	1b - 3	<ul style="list-style-type: none"> <li>• handling and nutrition pre slaughter</li> </ul>
Traits to Monitor:			
Dentition	4	(JBS Specifications: 0-4 for MSA grading eligibility)	<ul style="list-style-type: none"> <li>• Correlated with early sexual maturity (age of puberty) i.e. cattle with early sexual maturity have teeth eruption at a younger age</li> <li>• Higher planes of nutrition lead to early eruption</li> </ul>
Fat colour	2.54		<ul style="list-style-type: none"> <li>• Difficult to manage</li> </ul>



**Table 16. Genetic improvement opportunities - performances indicators and targets for Trafalgar steers**

Traits for Genetic Improvement:	Performance Indicator	Trait Correlated with	Comment	Target
P8 Fat	Average 7.9mm 16% at 3-5mm 26% Failure Jap Ox <u>410/1571 Under Fat</u>	Rib fat Fat depth in female siblings HSCW (negative 0.3)	<ul style="list-style-type: none"> <li>P8 fat also key reason for MSA grading non compliance (i.e. outside JBS specifications of &gt;5mm)</li> <li>- fat depth in females genetically correlated with AGECL (age of puberty)</li> </ul>	10mm
Rib Fat	Average 6mm Mostly 3-8mm	P8 fat (positive) 400 day wt (slightly negative) HSCW (negative 0,3)	<ul style="list-style-type: none"> <li>good rib fats &gt; 10mm help MSA carcasses into BG 10</li> <li>aim for majority &gt;5mm</li> <li>maintain emphasis on 400day weight</li> </ul>	7mm
Marbling (re MSAMB)	Average 288 (MSA target 300)	P8 and rib fat (+) EMA and HSCW (-)	<ul style="list-style-type: none"> <li>maintain emphasis on HSCW and EMA</li> <li>HGP effect on carcass fatness, especially "combination implants"</li> <li>early life growth restriction has a negative effect</li> </ul>	320
<b>maintain emphasis:</b>				
HSCW	Average 308.4 (MSA HSCW av 303)	400 day weight (+0.7)	<ul style="list-style-type: none"> <li>Early growth (200 and 400 day weight) <u>not</u> antagonistic with reproduction (<i>Johnson pers comm. Oct 2011</i>)</li> <li>Avoid large mature cow size EBVs (0.75 + correlation), which is a separate trait to growth.</li> </ul>	EBV > breed av, Moderate MCS
Hump height	Average 122 (MSA)	Tropical breed content	<ul style="list-style-type: none"> <li>Genetic variation within a breed</li> <li>Aim for average &lt;120</li> </ul>	100
EMA	Average 73	Age of Puberty in TComp and Bra Retail Beef yield (+0.3)	<ul style="list-style-type: none"> <li>EMA in turn positively correlated with weight in TComp</li> <li>Need to maintain emphasis on rib fat and P8 fat</li> </ul>	
(Temperament)	na	MSA MQ4 score (+0.47)	<ul style="list-style-type: none"> <li>expected positive correlation between temperament and MSA MQ4 score</li> </ul>	

## **7 Acknowledgments**

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## 8 Appendices

### 8.1 Appendix 1. List of questions to trainers – MSA advanced training

#### MSA Advanced Training - Questions

##### MSA Model Questions

What is the relative “sensitivity” of parameters in the model? Can this be quantified? e.g. hump height before HSCW, marbling before fat cover...and by how much?

##### *Rib Fat*

- what is the weighting on rib fat compared to marbling in the model. Can we quantify this?
- what are the threshold or trigger point values for fat cover?
- can we quantify the impact of rib fat say 3mm vs. 7mm?

##### *Marbling*

- can we quantify the relationship between rib fat and marbling?
- what are the trigger point scores in the model for marbling, and is there more than one?
- is there a marbling score that means animals are automatically excluded from boning group 10?
- is there a marbling score in conjunction with hump height that overrides ossification?

##### *Ossification*

- what are the trigger point scores for ossification. Is there more than one?
- what is the expected range in ossification values in a group of cattle that have had the same treatment, nutrition, etc from birth. How much does this blow out with increasing age i.e. at 24 months when near a trigger point??
- What is the heritability value for ossification?
- Have any genetic correlations been established?
- HGP's are said to cost 2 boning room groups – can we quantify this? Is it an automatic penalty in the model or is in combination with ossification score?
- What marbling, HSCW and hump height thresholds (scores) will compensate for poor ossification scores e.g. 280, 250 and 220?

##### *HSCW*

- what are the trigger point values for HSCW?
- Would it be true to say a 50kg increase in HSCW equates to a 10mm reduction in hump height?
- Quantify the effect of carcass weight change from say, 180kg to 360kg

##### *Hump height*

- Quantify the effect of hump height in relation to the other parameters
- Is there a hump height score where it is virtually impossible to

B.NBP.0583 - CHARTERS TOWERS: Utilising MSA feedback to enhance MSA compliance

achieve boning group 10?

- Is there a hump height score whereby ossification and marbling need to be above a certain level to get into boning group 10?

#### MSA Calculator

Can we quantify the key differences between the MSA calculator and the real model?

How is Tropical Breed Content (TBC) used in the calculator? We understand it does it is not used to determine boning room group at Townsville. Should we ignore TBC in the calculator?

### HGPs

Can we quantify the impacts of HGPs with respect to Oss, marbling and fat cover individually, and also in combination?

At given ages can we quantify the impact of HGP e.g. at 30 months HGP will increase ossification score by \_\_\_? \_\_\_\_\_ amount.

Do we have data which says X, Y, Z HGP treatments (e.g. increasing severity) increase ossification scores by \_\_, \_\_\_\_\_, \_\_\_ amount?

Can we quantify the impact of the TBA treatments versus the oestrogen HGPs. Did the research quantify outcomes on both types?

### Management

- Quantify techniques to get MSA marbling above 300
- Rank the “order of priority” of management techniques which impact on meat colour and pH (if possible!)
- Environmental or genetics impacts on meat colour other than glycogen or stress related i.e. what might happen when pH is quite good but for some reason meat colour is too dark. As discussed this happened with one steer in the FBG trial
- Can we quantify the impact of nutritional hardship on ossification score at different ages? For example is there any research which says that ossification will be increased by \_\_\_\_ if weaners up until \_\_\_\_\_ age don't grow at \_\_\_\_\_ rate?? This may also apply to marbling.

### Plant Information

In 2008 what percentage of steers (and heifers) sent to JBS have been consigned MSA? What were the results in terms of:

- meeting JBS specifications,
- ungrades due to pH and dark cutting
- and boning room group results?

After % ungrades what appears to be the biggest problems? Do we have any take home messages at this stage?

Are there any clear cut regional or seasonal variations at this stage? For example increase in ossification as the season progresses? Or pH?

Is there any correlations coming through in the data? Such as between:

- Hump height and marbling
- Hump height and ossification? Or is it too early to look at this?

Is there any take home messages from the plant in terms of the physical/logistical aspects of consigning cattle to JBS Townsville (i.e. mistakes producers are making, things producers could do to make it easier for JBS etc.).

### Economics of Targeting MSA

To the producer we need to demonstrate cost effective strategies to achieve MSA and improve market compliance in general. For example:

- Demonstrating the economics of not using HGPs. This will require dozens of sensitivity analyses. Some of the model questions above will partly assist with this, but you may have other information.
- Develop process/tools and economic case studies to work out how much producers can afford to supplement animals. Particularly where higher levels of inputs are required. We have to demonstrate that the financial returns are there.

We have agreed that without this information it will be more difficult to advise industry. It is also for promotion of MSA to producers.

### On Property Logistics

Feedlots have found that handling cattle (for treatments, vaccinations, etc.) can have a negative impact on feed intakes in the period following, especially with Brahmans. The concern in extensive situations is the energy requirements of mustering drafting 2 weeks prior and impact on the glycogen bucket if intakes drop. Do we have any evidence at all which shows well handled “splitting” of steers immediately prior to slaughter can produce a similar level of ungrades?

## 8.2 Appendix 2. Example of participant feedback sheet

Dalrymple MSA Meeting 23 March 2009 - Charters Towers DAFF

### Participant Feedback

Rating Score Used

(1=Not, 2=Little, 3=Some, 4=Useful, 5=Quite, 6=Very, 7=Extremely)

Question	Average rating
How do you rank the usefulness of being part of this PDS group?	5.8
Usefulness of Activity (Day)	5.9
Flinders Beef group data	5.1
MSA Calculator	5.8
Breeding Objectives	5.3
Genetics & Selection	5.5
Selection of Traits	5.4
Understanding EBVs	5.6
Gene Markers	5.1
Web Info & Breed Object	5.4
Lisgar MSA PDS results	5.4
HGPs	6.0

### 8.3 Appendix 3. Compliance with JBS specification for MSA grading

August 2008. The overall level of compliance with JBS specifications for MSA grading was high at 83%. Dentition and HSCW were the main parameters dragging the level of compliance down. However it should be noted that steers out of spec for HSCW were too heavy. Fat cover compliance was good at 98%.

October 2008. The overall level of compliance with JBS specifications for MSA grading was less for the October 08 consignment at 69%. Although HSCW compliance was good at 98%, the dentition and P8 fat cover compliance dragged down the overall level of compliance with JBS specifications. This group consisted of mainly bought cattle.

September 2009. The overall level of compliance with JBS specifications for MSA grading was high at 83%. Dentition and P8 fat compliance were high at 96% and 97% respectively. HSCW were the main parameters dragging the level of compliance down, however it should be noted that steers not within JBS specifications for HSCW were too heavy.

November 2009. The overall level of compliance with JBS specifications for MSA grading was very poor at 23%. This was a reflection of seasonal conditions and the steers consigned being the tail of the age group. This indicated that it may not be worth consigning cattle MSA very late in the year. The main parameter dragging the compliance % down was p8 fat at only 48% within specifications. Therefore 53% of the mob would have had P8 fat at 4mm or less.

May 2010. The overall level of compliance for eligibility for MSA grading was reasonable at 74%. Compliance for specific parameters was higher with: dentition compliance at 89%; fat cover compliance at 82% however 38 hd with only 5mm; and HSCW compliance at 83%. This shows some steers failed compliance for MSA grading in more than 1 parameter, with low P8 fat cover being the most prevalent.

November 2011. The overall level of compliance for eligibility for MSA grading was only 35%. The steers were unfinished with fat cover compliance only 50% and then of those that complied 57 hd/61hd with only 5mm. It was necessary to sell this group for cash flow reasons. The group was consigned MSA as we wished to acquire MSA data on 9 head not HGP treated. This group represented the lead of the No 9 steer group.

May 2012. This group represented the remainder of the No 9 steer group i.e. HGP and non HGP steers. Due to difficulties in accessing the steers (late wet seasonal conditions) the mob couldn't be mustered until May. These steers were not consigned MSA. Eligibility for MSA grading was only 18% for the HGP steers and 27% for the Non HGP steers. The average HSCW was higher than any other consignment, the steers were older and dentition compliance was low.

The average ossification scores ranged from 196 through to 294. However for the August 08, which had an average score of 252, 71% had an ossification score higher than 190. Most steers have the same HGP treatment: Compudose 400 at 12 months old and again in November at 18 months.

Heifers consigned MSA without HGPs had a higher level of compliance (40%) in boning room 10, 9 and 8. A small group of no 9 steers without HGPs had a 33% compliance level with boning group 10 or better, however overall carcass weights averaged from all no 9 steers without HGPs were 13kg heavier for HSCW and therefore were more profitable (see section 4.3.2).

The average marbling score for 2009 was 296, similar to 2008 and 2011 (293) consignments. Average marbling scores for 2009 and 2010 consignments were lower at

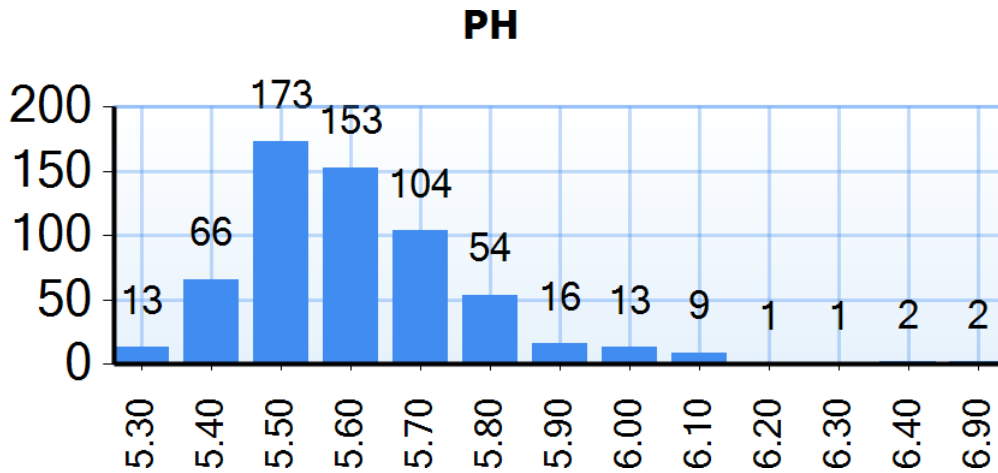


276 and 269 respectively. All these scores were below the suggested target marbling score of 300.

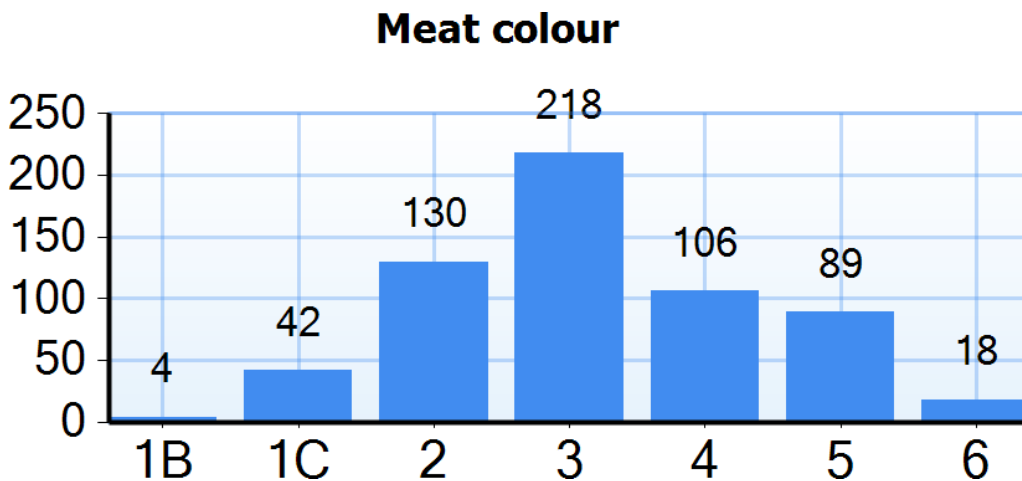
The average HSCW was 313kg for 2009, and 299kg for 2008. The average HSCW was 300 kg for 2010 and 317kg for 2011. Steers which fell outside the JBS HSCW specifications for MSA grading were mostly too heavy.

No correlation can be drawn from the average consignment figures for ossification, marbling, hump height, or HSCW, and the % compliance with MSA boning group 10 or better for any of the consignments. This is because all these parameters collectively contribute towards an EQ score which determines a boning group. To ascertain the reasons why carcasses graded in a particular boning group it is necessary to review each carcass individually, and note which scores were favourable and which are less favourable. Analysing the average scores within a boning group does in some, but not all, instances show expected trends.

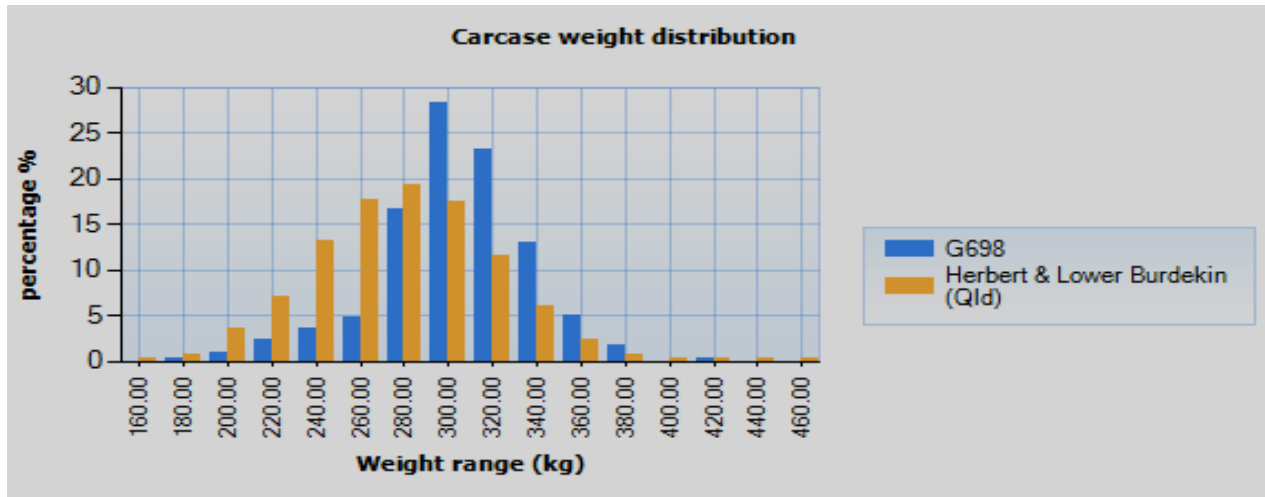
8.4 **Appendix 4. Additional Trafalgar MSA results from MSA graded steers 2008-2011**



Trafalgar had more carcasses with pH > 5.7. The average pH of all steers MSA graded was 5.6 which are quite high.



The Trafalgar carcass weights were higher than the regions for the same time period with Trafalgar having approximately 15% more carcasses in the 300-340kg range. This data is shown in Graph 9. This result is testimony to the effort Roger Landsberg has put into objectively selecting bulls with good weight for age using Breedplan 600 day weight EBVs.



Graph 9. Carcase weight distribution 2008 to 2011 Trafalgar compared to the region.

## 8.5 Appendix 5. Economic analysis – information for methodology

### 8.5.1 Molasses feeding prior to slaughter

The purpose of molasses feeding analysis was to investigate the cost and potential production benefits of feeding molasses in the 30 days prior to slaughter. One of the objectives of the project was to reduce the percent “ungrades” by 50% and this could be achieved if a higher percentage of steers at slaughter had carcass pH values within specified ranges. Molasses feeding pre slaughter would improve muscle glycogen levels at slaughter, and thus potentially reduce “ungrade” percentages. Additionally molasses feeding could improve live weight gain and result in heavier carcasses. Molasses feeding would therefore need to result in sufficient live-weight gain and MSA compliance increases to offset the extra cost of molasses for the exercise to be economically viable. A cost-benefit analysis was undertaken to determine feasibility of this exercise.

Steers were assumed to be fed for 30 days and each steer would consume 4kg of M3U per head per day across a total of 391 steers, resulting in a total intake across the group of 46.92 tonnes. A quote was received for a M3U molasses mix to be delivered into troughs in the paddock for \$262.00/tonne.

Feeding M3U to steers was assumed to conservatively increase live-weight gains by 0.4kg/day or 12kg over the feeding period. This assumption was reached from observations on a number of trials and from information from properties over a number of years. An average carcass of 308kg or a 55.34% dressing rate was used based on property data. MSA premiums were assumed to be 10c/kg on steers achieving boning group 10 or less. M3U feeding was assumed to increase MSA compliance into this boning group by 33%. Price received was assumed to be 2.80/kg, based on recent kill data.

### 8.5.2 Hormonal growth promotants

Hormone growth promotants are known to increase live-weight gains, but also reduce MSA compliance. A cost benefit analysis was conducted on No 9 Steers from Trafalgar to determine the trade-off between revenue generated by MSA compliance (and subsequent premiums) and carcass weight differences between treated and non-treated animals. The key assumptions are listed in table 3a. Actual slaughter data was used. Analysis was only conducted on slaughter animals, and impact across the herd was not investigated. HGP cattle also graded MSA and the revenue generated by the MSA premium was included in the HGP treated system analysis.

Table 3a. Data and assumptions on HGP versus no HGP analysis

	<b>Treated</b>	<b>Non-Treated</b>
<b>Price</b>	<b>\$2.80/kg</b>	<b>\$2.80/kg</b>
<b>Average HSCW</b>	<b>352.00kg</b>	<b>339.00kg</b>
<b>Compliance</b>	<b>33%</b>	<b>1%</b>
<b>Premium</b>	<b>\$0.10/kg</b>	<b>\$0.10/kg</b>
<b>HGP Cost</b>	<b>10.80/Head</b>	<b>\$0</b>

#### *Age of Turnoff*

Breedcow & Dynama modelling was used to determine the impact of a reduction in age of turnoff of Trafalgar bred steers by 6 months, from 38 months down to 32 months. Data for age of turn-off and weights came from property averages over 6 years. A “before” scenario was modelled based on figures in 2007, and an “after” scenario was modelled reflecting the reduced age of turnoff in 2012 for Trafalgar bred steers only (i.e. does not include bought steers). Specifically, Trafalgar steer turnoff fell from an average of 38 month to 32 months. Impact of this change was modelled across the herd to better reflect impact across the rangelands and extensive breeding herds. Interest on herd capital was 10%.

*Trafalgar Age of Turnoff – Summary Sheets*

	<b>Summary 32 Months</b>	<b>Summary 38 Months</b>
Total adult equivalents .....	2166	2168
Total cattle carried .....	2444	2458
Weaner heifers retained ....	372	309
Total breeders mated .....	1001	832
Total breeders mated & kept	929	771
Total calves weaned .....	744	618
Weaners/total cows mated ..	74.31%	74.31%
Wnrs/cows mated and kept	80.11%	80.11%
Overall breeder deaths .....	5.00%	5.00%
Female sales/total sales %	46.46%	47.21%
Total cows and heifers sold	300	249
Maximum cow culling age	11	11
Heifer joining age .....	2	2
Weaner heifer sale & spay	0.00%	0.00%
One yr old heifer sales % .	0.00%	0.00%
Two yr old heifer sales % ...	10.00%	10.00%
One yr old heifer spay % ....	16.32%	16.32%
Two yr old heifer spay % .....	0.00%	0.00%
Total steers & bullocks sold	346	279
Max bullock turnoff age .....	3	4
Average female price .....	\$663.64	\$663.64
Average steer/bullock price	\$923.25	\$1,065.57
Capital value of herd .....	\$1,401,534	\$1,571,562
Imputed interest on herd val.	\$86,194	\$96,651
Net cattle sales .....	\$518,135	\$462,124
Direct costs excluding bulls	\$58,631	\$48,960
Bull replacement .....	\$19,955	\$16,575
Gross margin for herd .....	\$439,549	\$396,589
GM after imputed interest ...	\$353,355	\$299,937
GM per adult equivalent .....	\$202.89	\$182.93
GM/AE after interest .....	\$163.10	\$138.35

### 8.5.3 Regional impact

Modelling was done using Beef CRC Breedcow templates for the 313 ABARE region (see [www.futurebeef.com.au](http://www.futurebeef.com.au) ). An assumption was made based on 33% of steers turned off receiving a MSA premium of \$0.10/kg as opposed to no premium. The result of this increase on the herd gross margin was \$4,427,611. Table 3b herd gross margins by region.

Table 3b. Herd Gross Margin of ABARE 313 Region

<b>Region</b>	<b>Before</b>	<b>After</b>	<b>Difference</b>
313 A	\$4,799,456	\$4,907,781	\$108,325
313 B	\$40,841,169	\$41,615,817	\$774,648
313 C	\$51,072,991	\$51,906,217	\$833,226
313 D	\$23,952,457	\$24,432,683	\$480,226
313 E	\$155,437,308	\$157,668,494	\$2,231,186
<b>Total</b>	<b>\$276,103,381</b>	<b>\$280,530,992</b>	<b>\$4,427,611</b>

## 8.6 Appendix 6. Producer workshop details and 'usefulness' scores

### Workshop 1, July 2008

- Group purpose, boundaries and direction
- Monitoring cattle performance and MSA Compliance (Site data)
- MSA grading and consigning cattle MSA – issues that need clarification (Mark Englis, MSA)
- Key reasons for non-compliance so far at JBS Townsville
- Group experiences so far
- MSA Feedback system

Benchmarking of group members for their "current level of understanding of MSA" was 3.3 out of 7 (with 7 being 'extremely high').

The score for the "usefulness" of the meeting was 6 out of 7.

### Workshop 2, November 2008

- Trafalgar - Management & Recording - MSA results and observations.
- Group results - sharing MSA feedback
- Growth pathways & the physiology of growth (Stu McLennan)
- Optimising Growth Paths for Increased Profitability @ Swans Lagoon (Stu McLennan)
- MSA steer growth pathway map - where are the intervention points? The score for the "usefulness" of the meeting was 6 out of 7.

### Workshop 3, March 2009

- Flinders Beef Challenge - MSA experience and learning's
- Breeding and Marketing Objectives
- Genetics and Selection principles
- Understanding Breeding Values
- Gene Markers
- Breed Object
- Lisgar PDS site results
- HGPs

The score for the 'usefulness' of this meeting was 5.9 out of 7.

The group scored 'the usefulness of being part of MSA PDS group' at 5.8 out of 7 (with 7 being extremely useful).

All group members had by this stage identified areas for improvement in their management of their cattle to target MSA and improve overall market compliance rates.

### Workshop 4 (Lisgar Field day), July 2009 (Burdekin MSA PDS)

- Progressive tools to use in Bull Selection (in use at Lisgar)
- Targeting market specifications – Lisgar experiences, the MSA Producer Demonstration Site
- The Epigenetics project
- AI programs
- Paddock inspection
  - cull heifers on molasses brew targeting MSA plus and minus HGP
  - Lisgar fat cattle ready for MSA turnoff (bullocks, heifers)
- NLIS demo – scan, record PD, notes and weights

The score for the "usefulness" of this meeting was 6 out of 7.

Workshop 5, October 2009

- JBS Marketing Manager - Jamie Ferguson
- MSA grading and consigning cattle MSA – issues that need clarification (Mark Englis, MSA)
- Key reasons for non-compliance so far at JBS Townsville
- MSA Compliance Trafalgar data (Mark Englis and Roger Landsberg)
- Group experiences so far
- CRC data plus ultrasound demo

The score for the “usefulness” of this meeting was 6 out of 7.

Workshop 6, May 2010

- Trafalgar - Management & Recording - MSA results for 2009
- Group results - sharing MSA feedback
- Breeding and Marketing Objectives Revisited
- Using Estimated Breeding Values – practical application
- Breeder management for heavier weaners
- Gene Markers (beef CRC research)
- BreedObject

The score for the ‘usefulness’ of this meeting was 6.5 out of 7.

Benchmarking of group members for their ‘current level of understanding of MSA’ was 5.0 out of 7 (with 7 being ‘extremely high’).

Three MSA articles had been published: 1 for the MLA Feedback magazine and 2 for the Northern Muster (June 2009 and April 2010).

Workshop 7 Burdekin MSA PDS site – Lisgar field day, July 2010

- Market signals for high quality beef
- Bull Buyer perspectives
- Epigenetic effects in breeding
- Fixed Time Artificial Insemination
- Pestivirus in beef herds
- Measuring carcass performance – Lisgar MSA results
- Premium EQ beef in north Qld

The score for the ‘usefulness’ of this meeting was 6 out of 7. Workshop 8

VIB NLIS PDS site – Thalanga Field Day, October 2010

- Using NLIS to collect Animal performance data
  - Practical application of NLIS at Thalanga – breeder performance
  - Practical application of NLIS at Wambiana – growth & carcass data
  - Demonstration of NLIS technology and equipment
- The score for the ‘usefulness’ of this meeting was 6 out of 7.

Workshop 9, Townsville MSA PDS and VIB Forum, 17 December 2010

- MSA overview and update (Lachlan Willcox, MLA)
  - Lisgar MSA PDS – 2010 growth and MSA results
  - Meat Seaming Demonstration (Lachlan Willcox, MLA)
  - Trafalgar MSA PDS – 2010 growth and MSA results
  - Flinders Beef Challenge – 2010 growth and MSA results
  - Growth Pathways Project (Stu McLennan) – discussion and results
- The score for the ‘usefulness’ of this meeting was 6 out of 7.