

final report

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Droughtmaster Eating Quality

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The Project

Meat Standards Australia[™] (MSA) is a beef grading program that labels beef with a guaranteed grade and recommended cooking method to identify beef eating quality according to consumers' perceptions. It commenced in Australia in 1996 following detailed consumer research investigating the continuing decline in beef consumption.

Research underpinning MSA showed that *Bos indicus* content has a negative impact on eating quality of many beef cuts and this was built into the MSA grading model. This generated a perception in the wider beef industry that *Bos indicus* cattle can not grade or has major difficulty grading through the MSA system. This perception is not true as with the correct management and processing (most of which today is standard practice) *Bos indicus* cattle can MSA grade 3, 4 or 5.

Even though this perception arose in the mid 90's it still lingers today. This is a major hurdle facing breeders, backgrounders and finishers of *Bos indicus* cattle including DBS members.

To overcome this perception the DBS group designed a meat grading and consumer taste test trial with the assistance of Tropical Beef Technology Services

Objectives

- 1. To increase awareness of factors effecting meat quality and the MSA grading system amongst breeders, finishers and processors of Droughtmaster cattle through forums (2), cattle selection workshops, newsletters, article in Droughtmaster Digest, and information on DBS web site.
- 2. To have a minimum of 100 bodies from Droughtmaster (Dm) and Droughtmater cross (DmX) steers and heifers MSA graded to supply hard factual data for items in objective 1.
- 3. The design of the trial in objective 2 will be discussed with meat science and experimental design experts before it is undertaken, such as Rob Banks (MLA), Rod Polkinghorn (MSA), Janine Lau (MSA), John Thompson (UNE/Beef CRC) and Drewe Ferguson (CSIRO).
- 4. If required after grading, collect at least 20 meat samples (striploins) from graded bodies and have consumer sensory tested through MSA pathways (Rod Polkinghorne).

What Was Done

On the 30th May 2005 three hundred and thirty (330) Droughtmaster steers were processed into Kurrawong feedlot, Quinalow via Dalby. On induction each steer was given a unique tag number, weighed, had a DNA sample collected (tail hair) had a Progrow (HGP) implant, given Demize (pour on), and injected with Vitamin ADE and 5 in1 vaccine. The trial steers were supplied by 7 producers mainly located in North West Qld.

Owner	Stud/Property	Location	Number
Alan Atkinson	Mungalla	Taroom	60
C & H Hawkins	Herbertvale Station	Camooweal	56

Table 1.Trial Cattle Owner, Location and Numbers Supplied.

D & W Brown	Latrobe	Longreach	34
J & A O'Neil	Doondoon	Munduberra	60
R & D Atkinson	Glen Ruth	Hughenden	60
R & J Underwood	Eversleigh	Hughenden	30
W & S Birchmore	Bernborough	Winton	30

At the feedlot the steers were drafted three ways so each owner had a third of their cattle in one of three trial pens. The steers were drafted this way to allow valid comparisons between the three trial pens (ie if pen differences occur it will not be due to differences in cattle).

The cattle were each individually re-weighed on the 8th day of the trial. This weight is used as the start weight for the trial. The average start weight for the three pens are 336 kg, 332 kg and 332 kg for pen 1, 2 and 3 respectively. The spread in start weight between the three pens were also similar as shown by the standard deviation of each. These being 23 kg, 20 kg and 21 kg for pen 1, 2 and 3 respectively.

The trial steers were slaughtered on the 22nd August 2005 at Nolans abattoir, Gympie after 72 days in the feedlot. All steers were slaughtered on the same day by standard Aus-meat practice and hung, prior to chilling, using the tenderstrech technique

All carcasses were graded for eating quality using the Meat Standards Australia (MSA) grading system. A summary of the grading performance is located in Table 2.

Thirty Six (36) striploins (a primal cut from the loin of a carcass) were collected from the trial steer carcasses. The striploins ranged in product quality as defined by the MSA chiller grade. The striploins were aged for 14 days, frozen and consumer taste tested over the period of June and July, 2006.

The MSA consumer taste testing procedure was developed to minimise the opportunity for error and to produce the strongest possible statistical base for data use. The design and accompanying operational procedures are such that product tested at one point can be accurately compared to product tested at any other time.

Common problems with less structured programs include the product result being affected by the consumer or group, by variation in cooking, by the order served, by the relative quality of other product tested or the relative order different samples were served. These effects are controlled within the MSA protocols by rigorous application of procedures for consumer recruitment, product preparation, cooking and presentation, mix of samples etc.

The samples were tested "blind" with the sensory organisation and consumers having no record of the product source or type. Each consumer is served seven samples covering a broad eating quality range from grass fed cow beef to long fed, high marbled Wagyu. Every cut is sampled by ten consumers.

Each consumer scores each sample on a 1 to 100 scale for tenderness, juiciness, flavour and overall liking. A weighted combination of the four scores are used to generate the meat quality 4 (MQ4) score for each sample. The reported MQ4 for each cut is the average of the 10 consumers. A more stable indicator of eating quality is the CMQ4 score, which is the MQ4 scores of 6 samples per cut after clipping (removing) the two highest and two lowest scores.

The CMQ4 scores are then used to allocate a MSA eating grade. The grades are described in figure 1 and CMQ4 ranges listed in Table 2.

Table 2.	CMQ4	Score	ranges	for	MSA	Grades
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CMQ4 Score Range	MSA Grade
0 to 46.5	Fail
46.5 to 63.5	MSA 3
63.5 to 77.5	MSA 4
77.5 to 100	MSA 5



Figure 1. MSA Grade Description

What Happened

Feedlot Performance:

Overall the trial steers averaged 1.63 kg/day in the 72 day feeding period. During this period (June, July, August 2005) the cattle encountered a week of extremely cold and wet weather. This weather set the cattle back to a degree and resulted in a longer feeding period and lower average daily gain (ADG) than would have occurred if the weather was more favorable. Feed intake was not measured on an individual or group basis.

MSA Chiller Grading Performance:

All carcasses were graded for eating quality using the Meat Standards Australia (MSA) grading system. A summary of the grading performance is located in Table 3.

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	No. Bodies	% Bodies
Compliant	260	80 %
Non- Compliant	67	20 %
Nolan Private Selection	205	63 %
Total	327	

Table 3. MSA grade performance

The majority (260 or 80%) of carcasses were MSA compliant. A minority (20% or 67 bodies) were Non-compliant. The percentage of non-compliant carcasses is comparable to the national non-compliance rate. The reasons for non-compliance are located in Table 4.

The compliance level was quite outstanding considering the people supplying the cattle had not sent stock through the MSA grading system prior to this trial and that most of the steers were breed and backgrounded in Northwest Queensland.

Also of interest, 63 % of the bodies were compliant for the Nolans Private selection brand. This brand is known for its superior eating quality and is sold in many butcheries and restaurants across Australia. It has more stringent compliance criteria compared to MSA pass or fail.

The main reason for MSA non-compliance in the trial steers was fat depth less than 3mm (8%), muscle pH greater than 5.70 (7%) and meat colour score less than 4 (7%). Had the steers with fat levels less than 3 mm not been part of a trial that

required all steers to be slaughtered in one consignment they would have been fed longer to bring their fat levels up to compliance levels.

More information on the MSA grading system can be accessed at <u>www.msagrading.com</u>

Grade Code	Description	No.*	% Non-Compliant	% Total
				Animals
1 (All)	Fat Depth < 3mm	27	40 %	8 %
2 (All)	Ossification ≥ 300	6	9 %	2 %
4 (All)	pH > 5.70	23	34 %	7 %
5 (All)	Meat Colour > 4	23	34 %	7 %
10 (All)**	Company requirements	122	-	37 %

Table 4. Reasons for MSA non-compliance

* Individual animals may be non-compliant for more than 1 reason.

** Bodies that did not Nolan Private Selection requirements may still meet MSA grade criteria. Extra requirements of Nolan Private selection are < 250 Ossification and < 3 Meat Colour.

Consumer Taste Test Results:

The results from the independent consumer taste testing of the 36 Droughtmaster striploins are listed below (Table 4 and Table 5).

Table 5. Average, Maximum and Minimum CMQ4 Scores.

	Tenderness	Juiciness	Flavour	Overall Like	CMQ4
Average	65	57	62	63	63
Min	47	37	43	38	47
Max	84	79	81	83	81

Grade	Number	Percentage
Fail	0	0
MSA 3	19	53
MSA 4	16	44
MSA 5	1	3

Overall the CMQ4 scores averaged 63 which is at the top end from MSA 3 grade or bottom end for MSA 4 grade product. MSA 4 grade product is described as a "premium" product that consumers prefer for more special occasions and is often found in boutique lines in the retail sector and food service industry. No samples failed to grade and one sample was graded MSA 5 which is described as "supreme tenderness".

This is an outstanding result considering the steers came from a number of vendors, had a short backgrounding period together and were only lot-fed for 72 days.

The above trial demonstrates that *Bos indicus* and *Bos indicus* derived cattle produced in the Northern Australian environment can achieve industry acceptable MSA chiller grade rates with minimal extra management or processing requirements. The commercial taste testing results verified the MSA chiller grade results and showed that a "premium" product can be supplied.

Extension of Results:

The results of this trial have been disseminated to industry through a range of media such as the Droughtmaster Digest (quarterly circulation to 2,584 cattle producers), Droughtmaster Stud Breeders website (www.droughtmaster.com.au) and the Queensland Country Life (weekly circulation of approximately 74,000 units).

Detailed feedback has been provided to all suppliers of the trial cattle (Table 1.). This included feedlot performance and MSA grading performance of each individual animal. Each of these producers has a significant client base through their bull selling enterprises. The results from their individual trial cattle and the overall trial results will be discussed directly with many of their commercial bull buying clients. The impact of this method of extension in hard to measure but should not be overlooked.

The results of the MSA chiller grading have also been delivered at an open forum in Rockhamtpon on the 19th September 2005. It attracted approximately 80 seedstock and commercial cattle producers. A second field day was planned for the Southern Queensland (Gympie) but due to the ongoing impact of the drought it has been postponed.

Outcomes Compared to Objectives

The following section will discuss the outcomes of the trials compared to the objectives set at the start of the trial.

Objectives:

1. To increase awareness of factors effecting meat quality and the MSA grading system amongst breeders, finishers and processors of Droughtmaster cattle through forums (2), cattle selection workshops, newsletters, article in Droughtmaster Digest, and information on DBS web site.

The trial methodology was purposely designed with simple practical requirements that all cattle producers and processors can meet to decrease the incidence of unsatisfactory beef entering the supply chain. This included yard weaning, short feeding on a high plan of nutrition and tender stretch hanging after slaughter. As discussed in the above section, these results have been disseminated to industry through a range of media.

2. To have a minimum of 100 bodies from Droughtmaster (Dm) and Droughtmater cross (DmX) steers and heifers MSA graded to supply hard factual data for items in objective 1.

A total of 327 bodies (versus a minimum of 100) were MSA graded in this trial. Straight bred Droughtmaster steers were sourced for all 330 trial animals. No Droughtmaster cross animals were used in the trial as it was difficult to source a significant line (number) of the same breed makeup. The data collected from the 330 trial steers has provided hard factual data relating to objective 1.

3. The design of the trial in objective 2 will be discussed with meat science and experimental design experts before it is undertaken, such as Rob Banks (MLA), Rod Polkinghorn (MSA), Janine Lau (MSA), John Thompson (UNE/Beef CRC) and Drewe Ferguson (CSIRO).

The trial was discussed and designed with input from meat science and experimental design experts. The group specifically discussed the trial in detail with Rod Polkinghorn (MSA), Janine Lau (MSA) and Paul Nicholls (ex NSW DPI Biometrician).

The trial was also briefly discussed with Rob Banks (MLA), Drewe Ferguson (CSIRO).

4. If required after grading, collect at least 20 meat samples (striploins) from graded bodies and have consumer sensory tested through MSA pathways (Rod Polkinghorne).

A total of 36 striploins (versus at least 20) were collected from a sample of trial steers carcasses. They were independently consumer sensory tested through MSA pathways. It was decided to progress this section of the trial due to the convenience of having a large sample of trial cattle sourced and managed the same from back grounding to slaughter.

Next Steps

This trial was designed to understand how different factors affect beef eating quality and how to manipulate these factors so to reduce the incidence of unsatisfactory product entering the supply chain. Further analysis of the data collected in the trial will continue and may reveal other important points that producers can take home.

DNA samples have also been collected from all trial steers and could be used to cross reference the MSA grade results and CMQ4 scores with the current DNA marker tests for tenderness that are in the market.

Acknowledgments

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- Suppliers of trial cattle: Alan Atkinson, C & H Hawkins, D & W Brown, J & A O'Neil, W & S Birchmore, R & J Underwood and R & D Atkinson.
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- Janine Lau from Meat Standards Australia.
- Rod Polkinghorne from MSA commercial product testing service.
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