Aligning price signals throughout the beef value chain to reflect consumer preferences by assigning economic weights to the Meat Standards Australia (MSA) model inputs

By

Ivan Andrew Doljanin

A thesis submitted in partial fulfilment for the degree of

Master of Economics

University of New England

Armidale, NSW

June 2012

ABSTRACT

The international measure of beef quality has largely been associated with the increased presence of intramuscular fat, also known as marbling. Using a palatability analysis critical control point (PACCP) process, consumer research collated by Meat Standards Australia (MSA) over the last 20 years has demonstrated the interconnectivity of pre and post-slaughter treatments with the traditional measurements in relation to consumer palatability scores. This has enabled consumer grading of beef - predicting the consumers' assessment of the specified meal as either 3 star (good everyday), 4 star (better than everyday), or 5 star (premium) eating quality for six cooking methods (grilling, roasting, stir-frying strips, slow cooking cubes, thin sliced, corned).

A commercial dataset (n=3,735) was collated over an eight year period that described the eating quality and yield of beef product offered to consumers using the MSA grading matrix of eating quality and cooking method. This dataset created an opportunity to overlay financial terminology to the various steps of beef production by aligning consumer choice about the predicted quality of beef with the production input variables. This financial information can overlay the PACCP process with economic weights for the production input variables, thereby contributing toward the creation of its financial equivalent (FACCP) for the beef industry. Generating effective long-term financial modelling by accurately linking consumer demand to production variables would help to secure future investment. Ongoing investment in the industry is essential to keep beef a competitive source of protein.

In this thesis, six measures of carcase yield – primal, trim, waste and fat, bone, loss, and saleable meat (SMY%) – were assessed to determine the most appropriate indicator of carcase value. The analysis found SMY% was the best indicator of carcase value, with a 0.85 coefficient of determination (R^2). SMY% was followed by waste and fat, trim, primal, loss, and bone with an R^2 of 0.72, 0.69, 0.42, 0.29, 0.28 respectively.

The SMY% measure was used in subsequent analyses to partition out the effects of yield and quality on carcase value. The carcase value is influenced by the pricing methodologies used in its calculation. To ensure the yield and quality effects were thoroughly explored, two pricing methodologies were compared:

1. A conventional pricing system that differentiates primal values within a carcase, but not between carcases;
2. An MSA premium pricing system applying the retail willingness to pay thresholds where 3 star was the base, 4 star was 1.5x three star and 5 star was 2.0x three star pricing for retail portions;

The analysis found SMY% was the best individual indicator of carcase value. SMY% was worth $0.09/kg hot standard carcase weight (HSCW) per one percent change in SMY%, using either the conventional or MSA premium pricing models.

Ossification was significant in both the conventional and MSA premium pricing models, with or without SMY% as a covariate. The coefficient for ossification in MSA premium pricing model was $0.54/kg HSCW/100 points, without SMY% as a covariate. Neither of the coefficients for ossification in the conventional or MSA premium pricing model changed significantly with the inclusion of SMY% as a covariate. This suggests that the impact of ossification on carcase value is independent of SMY%.

In contrast, the coefficient for marbling more than doubled from $0.07 to $0.15/kg HSCW/100 points with the inclusion of SMY% into the MSA premium pricing model. The conventional pricing model coefficients improved with SMY% as a covariate. The improved value of marbling in both

pricing models indicates SMY% masks the impact of marbling on carcase value unless it is included as a covariate.

Females were worth more than castrated males in both pricing methodologies, with or without SMY% as a covariate. Using the conventional pricing model, the value of females over castrated males increased from $0.03 to $0.06/kg HSCW when SMY% was included in the model. Similarly, using the MSA premium pricing model, the value of females over castrated males increased from $0.02 to $0.05/kg HSCW when SMY% was included in the model. Only a $0.01/kg HSCW discount could be justified on the basis of SMY% difference, completely at odds with the standard industry practice of discounting females $0.05 - $0.10/kg HSCW in favour of castrated males.

Tenderstretching was only significant in the MSA pricing model, worth $0.27 and $0.32/kg HSCW respectively, with and without SMY% included in the MSA pricing model. This result demonstrates a high value impact on carcase value, particularly for a fixed effect.

The estimated percentage of *Bos indicus* (EPBI) was also significant in the MSA premium pricing model. The coefficient increased from $0.03 to $0.13/kg HSCW for animals with 18.5% EPBI, when SMY% was included into the MSA premium pricing model. Whilst significant, these results are only indicative due to the industry nature of the dataset and require further investigation using a balanced experimental design.

To calculate the relative impact of the three dominant traits in the MSA premium pricing model, the potential value impact was calculated using the range of elasticities, one standard deviation either side of the mean. SMY%, ossification and marbling were worth $0.58, $0.24 and $0.18/kg HSCW respectively. Using the average 241kg HSCW, this equates to potential carcase values of $140 for SMY%, $58 for ossification and $43 for marbling.

The results demonstrate the importance of combining MSA quality traits with SMY% to ensure effective feedback is provided throughout the value chain. Without this integrated approach, the priorities communicated are very different. Establishing an effective pricing methodology that incorporates both eating quality and carcase yield addresses the century old problem of not making progress because we study beef supply chain components in isolation, when in reality they are part of an integrated system. While looking for greater efficiency we need to be mindful to retain the beef characteristics that make it demanded by consumers. All efforts should be aligned to a common goal – a consumer focused product.

This study demonstrated that effective economic weights could be derived for the Meat Standards Australia (MSA) grading model inputs and saleable meat yield percentage (SMY%) traits associated with the beef industry value chain. Complimentary objectives can be achieved by providing consumers with distinct pricing alternatives based on eating quality, implementing a process of traceability throughout the value chain and incorporating an eating quality and saleable meat yield-focused payment for carcases. These results could be applied to an integrated value chain optimised for whole chain profitability.

ACKNOWLEDGMENTS

Firstly, I need to thank my family – Rachel, Alastair, Joseph and Charlotte for still being with me, I will endeavour to be fully engaged in our conversations and not be as "distracted" from now on, although it may take some time to break these now entrenched habits! I am looking forward to spending a lot more time with each of you. Thank you for allowing me to indulge in this pursuit through your patience, love and support.

I would like to thank my supervisors Professor John Thompson, Professor Garry Griffith and Professor Euan Fleming. I need to make special mention of Professor John Thompson for encouraging me to take on this challenge, your commitment and forthright, honest feedback have made it possible – a true professional.

Special mention also needs to be made of Susan Thompson, Andrew and Tania Slack-Smith and their family for their continual generosity and warm hospitality on my trips to Armidale despite their busy schedules. Without Andrew's broad knowledge, robust discussions, direction and support it would not have been possible.

To all the staff associated with the various entities that comprised the Polkinghornes value chain, in particular John Innes for his assistance collating the data, Tiffany Ferguson, Louis Ferguson and particularly Rod Polkinghorne for creating a new paradigm. Whilst we have different ideas about the implementation of the vision, there is no doubting your foresight and commitment; To the producers who put their faith in us and trust in me, particularly Joe and Julie Ingram, Dick and Judy Edwards and John Buxton; Our processor Robert Radford and his team; To Alan Gee of Cosign who provided the programming code for the systems utilised to collect the data. Without this committed group of people, the business would not have achieved what it did and the data would not have been assembled. A special mention to Judy Philpott for making our lives difficult!

Whilst not directly involved with this project, I would also like to make mention of the people I have worked with as I grew up developing this passion for all things to do with cattle and beef – my parents Dali and Joan Doljanin, late grandfather Ivan, Uncle Milan and siblings Milorad, Mary, Anthony, Nadia and Peter, our workmates Michael Price and the late Lawrie Clarke. This development continued through the relationships I formed whilst working at Dugald Cameron's Aronui Feedlot – Staff: Garry Spencer, Greg and Maryanne Gibbons, Doreen Sawle, Melissa Driscoll; Suppliers: Bevan and Allison Doyle, Lee McNicholl, Danny Wilkie, Richard Doyle; Business Associates: Pat Dempsey, Geoff Teys, all those involved in the Pacific Pride Beef Alliance; and to a degree has come full circle to Pat Gunston and the team at Allflex.

I would also like to acknowledge and thank the Cooperative Research Centre for Beef Genetic Technologies for providing me with the opportunity.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES