TESTING THE MEAT STANDARDS AUSTRALIA (MSA) MODEL ON IRISH BEEF

K. Brandon[1]*, P. Allen[1], R. Polkinghorne[2], A. Gee[3], J. Lau[4] and M. Drennan[5]

[1]Ashtown Food Research Centre, Teagasc, Ashtown, Dublin 15, Ireland, [2]Marrinya, Agricultural Enterprises, Bairnsdale, 3875, Victoria, Australia, [3]Cosign Pty Ltd, 20 Eleventh Avenue, Sawtell, 2452, NSW, Australia, [4]Meat Livestock Australia, 23 Kyabra Street, Newstead Qld, PO box 2363, Fortitude Valley, Queensland, Australia, [5]Grange Research Centre, Teagasc, Grange, Co. Meath, Ireland.
**Email: karen.brandon@teagasc.ie*

Keywords: beef grading, MSA, palatability, cooking method, muscle

Introduction

Meat and Livestock Australia has developed a meat grading scheme called Meat Standards Australia (MSA). The MSA grading scheme is based on the principles of Palatability Assurance at Critical Control Points (PACCP). The objective of PACCP is to identify and carefully control production and processing factors, which have the largest affect on palatability so that it is possible to accurately predict the quality of the final product (Polkinghorne *et al.*, 1999). The palatability of individual cuts is predicted by the model for a number of different cooking methods. In the MSA model, palatability is assessed by consumers as tenderness, juiciness, flavour and overall acceptability, with appropriate weightings to give a palatability score out of 100. Cut off points are used to give a quality rating, *e.g.* 3-star, 4-star and 5-star. The MSA model is currently being tested on Irish consumers using Irish and Australian beef to determine it's suitability as a grading system for the Irish beef industry. In order to do this Irish consumers are being asked to taste beef from both Irish and Australian heifers. The Australian and Irish heifers were chosen as similar homogenous groups, with the only notable difference being the country of origin. Consumer taste panels are being held at Ashtown Food Research Centre. The Australian beef is also being tasted by Australian consumers. The results will show whether the MSA model fits Irish beef and whether Irish consumers assess palatability in the same way as Australian consumers. Depending on the outcome, the model could be applied in Ireland or it may require some adaptation prior to adoption by the Irish industry.

The objective of this paper is to examine the predicted palatability scores for the Irish beef carcases for six muscles and two cooking methods using the MSA model and the grading data from the factory at time of slaughter.

Materials and Methods

Twenty crossbred (Charolais bulls x crossbred cows) heifers were selected from a homogeneous herd reared at Grange Beef Research Centre, Teagasc. The heifers were slaughtered together at a commercial abattoir (Meadow Meats, Rathdowney, Co. Laois). All heifers were stunned by captive bolt, shackled, hoisted up and bled within 30 seconds. The carcasses were dressed and centrally split into two sides, then hung by the aitchbone before chilling. The carcasses were graded using the Australian, American and European systems. The following muscles, M. *longissimus dorsi* (striploin), M. *psoas major* (tenderloin), M. *semimembransus* (topside), M. *gluteus medius* (rump), M. *biceps femoris* (outside flat) and M. *triceps brachii caput longum* (blade), were removed from the right side of the carcasses 4 days post slaughter, aged for 14 days and cut into steaks which were vacuum packed and frozen for use in consumer taste panels at Ashtown Food Research Centre. These muscles were chosen to give a range in palatability scores when combined with two cooking methods, grilling and Yakiniku (thin slice) cooking. This latter cooking method involves dry frying of thin slices on special domed hot plates.

The factory grading data was inputted into the MSA model (SP2004x04) and predicted palatability scores were recorded for the six muscles and two cooking methods.

Results and Discussion

Summary statistics for the 20 Irish heifers are shown in Table 1. Given that the Irish heifers were a relatively homogeneous group, (age at slaughter 559-646 days, carcass weight 257-334 kg) considerable variation was noted in rib fat depth (CV = 46%), US marbling score (CV = 36.7%), Australian marbling score (CV = 87%), conformation score (CV = 17.5%) and fat score (CV = 31.4%). Rib fat depth had a high correlation with US marbling score ($r = 0.82$), Australian marbling score ($r = 0.69$), and EUROP fat score ($r = 0.67$). EUROP fat score was also highly correlated with US marbling score ($r = 0.80$) and Australian marbling score ($r = 0.73$). Carcass weight was correlated with eye muscle area ($r = 0.45$) but not with age, US marbling score or Australian marbling score.

The predicted MSA palatability scores for the six muscles and two cooking methods are shown in Table 2 and the associated star ratings are shown in Table 3. Thin slice cooking has the effect of increasing the palatability score compared to grilling for all cuts except the tenderloin, for which there was a small reduction. The greatest increase in palatability score for the thin slice cooking was for the topside cut, which increased from 36 to 57 or from 'unsatisfactory' to 'good every day' quality. The range in mean palatability scores was greater for grilling (36 – 77) than for the thin slice method (58 – 74), indicating that this latter method is suitable for a wider range of cuts than

grilling. Of the six cuts included in the test, the striploin showed most variation between heifers in the predicted palatability score, whether grilled or cooked by the thin slice method. The heifer with the highest palatability scores across muscles and cooking methods also had the highest US marbling score and, conversely, the heifer with the lowest scores had the lowest marbling score, indicating the overriding importance of marbling score when other factors are relatively constant. All grilled blades and rumps were graded as 3-star (good everyday eating quality), while topsides were graded as 2-star (unsatisfactory) when grilled. Cooking method influenced the predicted eating quality of the muscles. The predicted eating quality of topsides increased from 2-star to 3-star when cooking method was changed from grill to thin slice. Grilled PM steaks had an average predicted star rating of 4.75 (better than every day quality to premium quality) while thin slice PM had a predicted star rating of 4.1 (better than every day quality).
When the results from the consumer trials are available it will be interesting to see how closely they match the predicted scores and whether any deviations are due to differences between Irish and Australian consumers or between Irish and Australian beef.

Conclusions

Predicted eating quality scores for a relatively homogeneous group of heifers showed little variation within muscle and cooking method, with the exception of the striploin. There was less variation in mean predicted eating quality score between cuts for the thin slice cooking method compared to grilling. In this relatively homogeneous group of heifers most of the variation in predicted palatability score was accounted for by variation in the marbling score.

References

Polkinghorne, R., Watson, R., Porter, M., Gee, A., Scott, J. and Thompson, J. (1999). Meat Standards Australia, A 'PACCP' based beef grading scheme for consumers. 1) The use of consumer scores to set grade standards. Presented at the 45th International Congress of Meat Science and Technology, Yokohama, Japan. 45:14-15.

Table 1: Summary statistics for the group of 20 heifers.

	Carc. wt (kg)	Age (d)	EMA (cm^2)	Rib fat (mm)	US marbling score	AUS marbling score	Conformation score (1-15)	Fat score (1-15)
Mean	303.5	609.1	104.2	4.1	320.5	0.83	8.7	7.6
SD	22.7	26.1	9.3	1.9	117.6	0.72	1.5	2.4
CV	7.5	4.3	8.9	46.1	36.7	86.9	17.5	31.4

Table 2: Mean predicted palatability scores for the six muscles using two different cooking methods.

	Striploin	Tenderloin	Blade	Rump	Topside	Outside Flat
Grill	56.4(50-66)	77.5(74-82)	54.1(52-58)	53.3(52-56)	35.9(33-41)	NA
Thin slice	60.3(54-70)	74.2(71-79)	59.7(57-64)	63.7(57-67)	57.8(55-62)	57.7(54-62)

Table 3: Mean predicted star ratings for the six muscles using two different cooking methods.

	Striploin	Tenderloin	Blade	Rump	Topside	Outside Flat
Grill	3	4	3	3	2	NA
Thin slice	3	4	3	3	3	3

(2 star = unsatisfactory; 3 star = good every day eating quality; 4 star = Better than every day eating quality; 5 star = premium quality)