

Comparison of systems for assuring the eating quality of beef

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Introduction A number of quality assurance schemes have been developed to grade the eating quality of beef. The UK MLC Blueprint (UK BP) and New Zealand QMark (NZ QM) systems aim to improve eating quality through process control of factors such as carcass suspension, electrical stimulation and ageing. These systems select those carcasses expected to provide consumers with good eating quality. The USDA system classifies beef carcasses into quality grades based on the degree of maturity and intramuscular marbling. The Australian MSA system uses process control and carcass characteristics but also classifies individual beef muscles into eating quality grades derived from consumer perceptions, depending on cooking method.

Materials and methods A series of experiments were conducted to assess the role of factors including gender, breed, hanging method, ageing, electrical stimulation/chilling, muscle and position within muscle on eating quality. In total, 192 animals were used, giving 36000 beef samples which were assessed by 6000 consumers. Breed, sex, hot standard carcass weight and EUROP grade were recorded as were hump height, ossification, rib fat, marbling, meat colour, fat colour, ultimate pH and temperature. Grilled and roasted beef muscles were assessed by consumers who gave it a quality rating: 'unsatisfactory', 'satisfactory everyday quality', 'better than everyday quality' and 'premium' (Farmer *et al.*, 2009). The information recorded enabled the meat to be accorded a classification under several trial quality systems (Table 1). These were very similar to or were modifications of those available internationally. The distribution of the consumer scores for each muscle for each grade was evaluated statistically using a combination of Wald analyses (Genstat) with visual inspection of the distributions to establish the direction of any differences.

Table 1 Grading systems for delivery of good eating quality for NI beef

	MSA	MSA-B	USDA	UK BP	UK BP-C	NZ QM
Classifications for statistical evaluation.	Ungraded, Unsatis., (4* + 5*)	Ungraded, Unsatis., (4* + 5*)	Ungraded, Standard, (Choice + Prime)	Utility, Select	Ungraded, BP, BP+21d	Ungraded, QMark
Basis for classification	Processing & animal data, muscle & cooking method		Maturity and marbling	Processing & animal data, EUROP grade		Processing data
Amendments	-		Bulls included	-	'O' included	-

Results and Discussion Table 2 identifies where consumer quality ratings were significantly different between grades and where the more highly graded meat gave better eating quality (o) or not (~). No system was perfect. Beef passing the NZ and US systems delivered improved eating quality inconsistently and performed poorly for roasts. These systems do not consider hanging method and the US system focuses on marbling, which is generally much lower in European carcasses. The UK Blueprint performed well only when low conformation grades were included (UKBP-C). Versions of the MSA system performed well for the greatest proportion of muscles and for both cooking methods. The inclusion of bulls (MSA-B) improved performance for some muscles.

Table 2 Ability of beef eating quality systems to show differentiation between different levels of consumer satisfaction

Cooking	Muscle	MSA	MSA-B	USDA	UKBP	UKBP-C	NZQM
Grilled	Striploin – anterior (<i>l. dorsi</i>)	*** o	bx	ns ~	* o	*** o	ns ~
	Striploin – mid (<i>l. dorsi</i>)	*** ~	ns	~ **	o ns	~ ns	*** o
	Striploin – posterior (<i>l. dorsi</i>)	*** o	**	o ***	o ns	o ***	o ***
	Rump flat (biceps femoris)	* o	*	o ns	~ ns	~ ns	~ ns
	Rump (gluteus medius)	*** o	***	o ***	o ns	o ***	o *
	Rump (gluteus medius eye)	ns o	*	o *	o **	o **	o ns
Roast	Silverside eye	ns ~	ns	~ ns	~ ns	~ ns	~ ns
	Silverside	ns o	**	o ns	~ *	o *	o ns
	Rump (gluteus medius eye)	*** o	***	o ***	o ns	o ***	o ns
	Topside (semimembranosus)	*** o	bx	ns	~ *	o ***	o *

Statistical significance of distribution: ns, * = P<0.05, ** = P<0.01, *** = P<0.001; direction of eating quality indicated by: o where higher grades received better consumer scores or ~ no consistent relationship; bx = no bulls tested

Conclusions Of the quality assurance systems tested, the standard MSA system performed best for NI beef before amendment. Both MSA and MLC Blueprint performed well with amendments. MSA allows grading of individual muscles which improves versatility.

References

Farmer, L. J. et al. 2009. Proceedings 55th Int. Congress on Meat Science and Technology, Copenhagen: PE7.34