

CONSUMER ACCEPTABILITY OF PRODUCTS FROM THE FOREQUARTER MUSCLES OF GRASS-FED BULLS

Mustafa M. Farouk, Linda. O'Neil and Colleen Podmore

AgResearch MIRINZ centre, East Street, Private Bag 3123, Hamilton, New Zealand. E-mail: Mustafa.farouk@agresearch.co.nz

Background

A large portion of the muscles from bull forequarter are sold as low value cuts resulting in lower revenue from the whole carcass. To improve revenue from bull forequarter, the value of the cheaper cuts must be enhanced. To do this, beef processors must come up with added-value products from the cheaper cuts for various outlets. The success of any processed product will depend on how well it is accepted by the consumer. Meat cut properties; cattle diets and convenience are among the factors that affect consumer acceptance of beef products (Meyer *et al.* 1960; McCurdy *et al.* 1981; McKeith *et al.* 1985). Religious beliefs and practices also strongly influence people's perception and thus the desirability of various types of foods (Chaudry and Regenstein, 1994). For example, beef bacon would provide an alternative to real bacon for those who do not eat pork but would enjoy a bacon-like product. This product could be available in restaurants or fast food outlets, particularly in countries with a sizeable percentage of non-pork eaters or as an alternative to bacon in breakfast entrees.

Objective

This study was designed to determine the acceptability of meat products from the forequarter muscles of grass-fed bulls with the ultimate aim of adding value to those muscles and providing alternatives to consumers.

Methods

Grass-fed bull forequarter muscles including *longissimus cervicis*, *superficial pectoral*, *splenius*, *supraspinatus* and *triceps brachii* were profiled and used to produce breakfast beef (cured smoked beef to mimic bacon), pastrami (pumped and rubbed with a commercial pastrami seasoning) and soft jerky (softer and easier to chew than traditional jerky) respectively. The products were assessed on different days by 140 consumer panellists (70 males and 70 females) in three locations, a shopping mall, university science fair and a research institute cafeteria. Consumer panellists' demographic details were collected and the panellists assessed the products for colour, texture, flavour and overall acceptability on a 9-point scale (1 = like extremely; 9 = dislike extremely).

Results and discussion

The muscles used in making the products differed in their sizes, fat and collagen contents but did not differ in the remaining attributes (Table 1). *Longissimus cervicis* and *splenius* are small muscles (Table 1) and are not currently separated from the chuckroll. In bull chucks, these muscles each weigh at least a kilogram and have their fibres running parallel along the length of the muscles making the muscles suitable for further processing into products requiring portion control such as the ones produced in the present study. The two muscles are too small to be of practical use when separated from the chuckroll of cows and heifers. The physical and chemical properties of all the muscles used in the present study were taken into consideration in deciding the type of products to be made from the muscles. The desire to capture the growing trend in the consumption of beef particularly as delicatessens and snacks is the rationale for the choice of the three products produce from the muscles out of the range of possible ones. Recent surveys indicate that snack bars are expected to be one of the fastest-growing eating-place segments (Sloan, 2001). Beef is the most widely used meat source for meat snacks (Brandt, 1999), and the fastest-growing snack item is jerky.

There was no difference in the sensory data collected from the three locations used in this study (University, shopping mall and staff cafeteria) for all the products, thus all data was pooled and analysed as one sample set.

Consumers did not find any difference in the acceptability of the breakfast beef from *longissimus cervicis* or *superficial pectoral* (point end brisket) (Table 2). Similarly pastrami made from *splenius* and *supraspinatus* (chuck tender) were equally acceptable to consumers. The mean consumer overall acceptability scores for both breakfast beef and pastrami irrespective of the muscle used corresponds to 'like moderately' (Table 2). The mean overall acceptability scores for soft jerky correspond to 'like slightly'. The demographic data collected from the consumer panellists indicated they consume bacon – which the breakfast beef imitates – and pastrami at least 2-3 times a month while over 80% of the panellists have never tasted jerky before the trial. The difference in the consumer familiarity with the different products could be the reason for the lower score of the jerky product (Table 2). The texture of the jerky might have also influenced the consumer scores. Farouk and Swan (1999) found the texture of jerky to strongly influence its overall acceptability. The breakfast beef, pastrami and soft jerky were found moderately to extremely acceptable overall by 80 – 84, 73-76 and 54 percent of the consumers respectively (table 3), indicating that the forequarter muscles selected were suitable for the products processed. These products also provide opportunity for adding value to the muscles considering the price/100g of pastrami and soft jerky and by extension breakfast beef in most of the markets in developed countries compared to the cost of the muscles used in producing the products when sold in commodity form as manufacturing cuts. Pastrami and jerky are traditionally made from beef hindquarter cuts. Identifying cheaper cuts from the forequarter that produce comparable products as the more expensive hindquarter cuts would cut the cost of producing these products and consequently improve the revenue from the whole carcass.

Conclusions

Consumers found breakfast beef, pastrami and soft jerky from forequarter muscles of bulls moderately to extremely acceptable. The result also demonstrates that the use of muscles from bull forequarter to produce the three products provides opportunity for adding value to the muscles and potentially increase revenue from the whole carcass.

References

- Brandt, L.A. (1999) *Prepared Foods* 168 (7), 57-62; Chaudry, M.M. & Regenstein, J.M. (1994) *Trends in Food Sci. Technol.* 5, 165-168; Farouk, M.M. & Swan, J.E. (1999) *J. Food Sci.*, 64, 465-468; McCurdy, S.M.; Hard, M.M. & Martin, E.L. (1981) *J. Food Sci.*, 46, 991-995; McKeith, F.K.; De Vol, D.L.; Miles, R.S.; Bechtel, P.J. & Carr, T.R. (1985) *J. Food Sci.* 50, 869-872; Meyer, B.; Thomas, J.; Buckley, R. & Cole, J.W. (1960) *Food Technol.*, 14, 4-7; Sloan, A.E. (2001) *Food Technol.* 55(4), 38-58.

Table 1. Physical, chemical and functional attributes of forequarter muscles used in making beef products

Muscle	Weight, Kg	Length, cm	pH	Moisture, (%)	Fat, (%)	Collagen, (%)	Total soluble proteins, (%)
Longissimus cervicis	1.06	41.33	5.86	76.32	0.79	1.52	18.80
Splenius	1.01	33.33	5.83	75.42	0.86	1.67	18.90
Superficial pectoral	2.06	55.00	5.85	75.45	2.23	2.05	17.70
Supraspinatus	1.02	32.33	6.08	76.45	1.87	1.70	17.30
Triceps brachii	1.97	35.67	5.91	75.45	1.33	2.05	18.60

Values are averages of 24 (n = 12 bulls) physical and 48 chemical measurements.

Table 2. Consumer acceptability of products from the forequarter muscles of beef

Product	Muscle	Consumer attribute and mean scores				SEM
		Colour	Texture	Flavour	Overall acceptability	
Breakfast beef	<i>Longissimus cervicis</i>	7.4	7.1	7.4	7.3	0.1
Breakfast beef	<i>Superficial pectoral</i>	7.3	7.1	7.7	7.4	0.1
Pastrami	<i>Splenius</i>	7.2	7.0	7.2	7.2	0.1
Pastrami	<i>Supraspinatus</i>	7.1	6.9	7.0	7.1	0.1
Soft jerky	<i>Triceps brachii</i>	6.1	6.1	6.2	6.2	0.2

Data are averages of 132, 140 and 122 consumer scores for breakfast beef, pastrami and jerky respectively.

SEM = Standard error of the mean

Sensory scale: 1 = Dislike intensely; 9 = Like extremely

Table 3. Mean percentage* of consumer panellists who liked the beef products moderately to extremely

Product	Muscle	Colour	Texture	Flavour	Overall acceptability
Breakfast beef	<i>Longissimus cervicis</i>	84.1	72.7	80.3	79.5
Breakfast beef	<i>Superficial pectoral</i>	86.3	78.8	88.6	84.1
Pastrami	<i>Splenius</i>	79.3	74.3	79.3	76.4
Pastrami	<i>Supraspinatus</i>	76.4	72.1	70.0	73.6
Soft jerky	<i>Triceps brachii</i>	54.1	54.9	59.0	54.1

* The number of consumer panellists who assessed the breakfast beef, pastrami and soft jerky were 132, 140 and 122 respectively