

German consumers' beef and lamb acceptability and meat choice depending on country of origin, diet and price

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Abstract

German consumers (n=200) evaluated the eating quality of beef and lamb from animals fed A: grass, B: grass plus grain (0.6% LW), C: grass plus grain (1.2% LW) or D: grain. Conjoint analysis was conducted to determine the relative importance of country of origin (Argentina, Switzerland, Uruguay, United Kingdom), animal diet (grass, grass plus grain, grain) and price (low, medium, high) in purchasing decisions of fresh beef (n=100) and lamb (n=100). Beef and lamb overall acceptability was higher for treatment C, followed by B with treatments A and D being the least preferred, indicating greater eating quality for meat from animals fed a high level of grain supplementation. The most important attribute for purchasing decisions was country of origin followed by animal diet and meat price, for both beef (68, 16 and 16%) and lamb (46, 34 and 20%), respectively. Highest positive utilities were found for Argentina, grass and low price in beef and for Switzerland, grass, and low price in lamb. Consumers preferred the eating quality of meat from animals fed with high levels of grain supplementation. However, conjoint analysis showed a preference in purchasing decisions towards meat from animals fed mainly on grass in the low price range.

Introduction

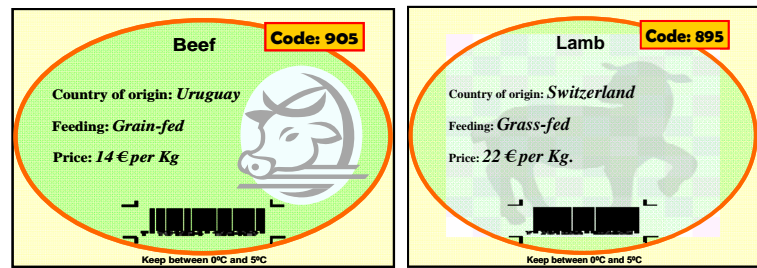
Uruguay is currently focused on becoming more competitive in the world beef market through increasing beef production and quality according to market needs with concentrated efforts in high value markets. It is important to understand consumer preferences in targeted export markets for the different attributes of beef to develop new marketing or branding strategies to increase consumer demand. Umberger *et al.* (2002) highlighted that country-of-origin labelling as well as niche marketing may need to be considered to provide consumers with a consistent beef product that meets their palatability expectations. The aim of this study was to evaluate the effect of the inclusion of different levels of grain on a grass feeding system on consumer acceptability of Uruguayan beef and lamb assessed by German consumers. The contributions of country of origin, animal feeding, and price in German consumers' fresh beef and lamb purchasing decisions were also evaluated using conjoint analysis.

Materials and methods

Eighty Hereford steers and 80 Corriedale wether lambs were finished on one of the following diets: A) grass, B) grass plus grain (0.6% live weight), C) grass plus grain (1.2% LW), and D) grain plus hay (*ad libitum*). *Longissimus lumborum* was removed at 24 h postmortem, vacuum packaged, aged at 4°C for 20 d, frozen and shipped to Germany for consumer sensory evaluation (n=200/species). Samples were thawed at 4°C for 24 h, cooked to an internal temperature of 72°C, cut into 2x2x2 cm samples and kept warm until tasting. Twenty sensory sessions were carried out with 10 consumers per session and each consumer rated overall acceptability, tenderness and flavour acceptability using 8-point category scales (1: dislike extremely to 8: like extremely). Sensory data were analyzed using the MIXED procedure of SAS (SAS Inst. Inc., Cary, NC) including beef or lamb type as a fixed effect, consumer as random, and session as a block effect in the model. Mean separation was carried out using the Tukey test. Conjoint analysis was used to determine the relative importance of selected attributes and levels in purchasing decisions of fresh beef and lamb (Table 1). The total number of possible product scenarios from the various attributes and attribute levels was 36 (4x3x3) for each species. The conjoint module of SPSS (SPSS v. 12) was used to reduce the number of profiles to fifteen using an orthogonal fractional factorial design, and presented to participants (n=100/species) as cards (Figure 1) in a randomized order. Each participant ranked the cards according to the probability to purchase fresh beef and lamb with those characteristics from 1 most likely to purchase to 15 least likely to purchase. Conjoint data analysis was carried out using the TRANSREG procedure of SAS.

Table 1. Attributes and levels for fresh meat.

Attributes	Levels	
Country of Origin	Uruguay (UY)	
	Argentina (AR)	
	United Kingdom (UK)	
	Switzerland (SW)	
Animal Feeding	Grass	
	Grass and Grain	
	Grain	
Price (€/kg)	Beef	Lamb
	13	16
	16	19
	18	22

**Figure 1.** Profile sample cards evaluated by

Results and discussion

Overall, tenderness and flavour acceptability scores of Uruguayan beef and lamb from 4 production systems evaluated by German consumers are presented in Figure 2. Overall beef acceptability by German consumers was higher for C compared with A and D. There were no differences between B and C or among A, B and D treatments in overall acceptability. Tenderness acceptability of beef was higher for C compared with A, while A, B and D or B, C and D did not differ ($P > 0.05$). Beef flavour scores were higher for C compared with A and D, and for B relative to A. German consumers preferred beef from steers supplemented with grain on grass compared with beef from steers fed grass or grain only. Overall and tenderness acceptability of lamb was higher for treatment C compared with A, B, and D. Flavour acceptability was rated higher for lamb from treatments B and C than A and D, indicating a preference for grass-fed animals with grain supplementation compared with lamb from animals fed grass or grain only. Previous studies evaluated the eating quality of Uruguayan beef and lamb compared with beef (Oliver *et al.* 2006) and lamb (Font i Furnols *et al.*) produced in Germany and reported that German consumers did not prefer the same type of meat suggesting that individual preferences could lead to market segmentation based on taste preferences.

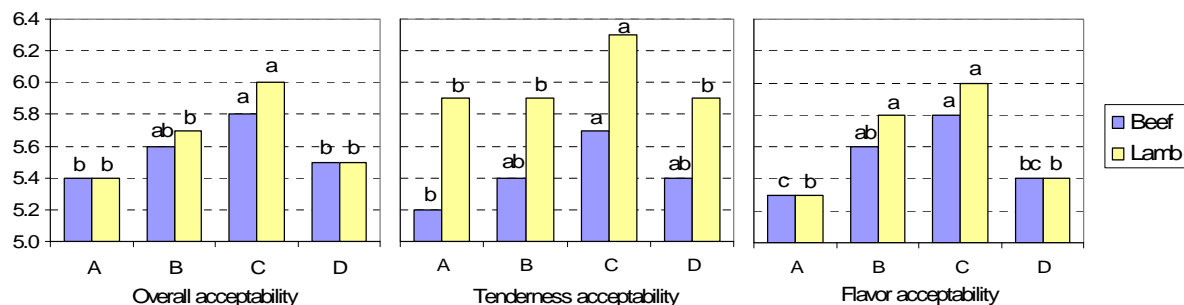


Figure 2. Overall, tenderness and flavour acceptability scores of Uruguayan beef and lamb from 4 production systems evaluated by German consumers. A: grass, B: grass plus grain (0.6% LW), C: grass plus grain (1.2% LW) and D: grain plus hay *ad libitum*. Means within the same attribute and species with different letters (a,b,c) differ ($P < 0.05$).

Results from conjoint analysis showed that country of origin was the most important factor for the choice of beef followed by animal feeding and meat price (68.4, 16.1 and 15.5%, respectively). Country of origin was also the most important attribute when purchasing lamb but the relative importance was lower compared with beef (45.6%). Price was the second factor and finally animal diet was the least important attribute determining purchasing decisions of fresh lamb (33.8 and 20.6%, respectively). Utilities for each level of the attributes are shown in Figure 3 by species. German consumers showed high importance in country of origin and a clear preference for beef from AR and SW (positive utilities) followed by UY and UK (negative utilities) which was the least preferred origin. The high and negative utility of beef from UK may be associated with a negative perception of German consumers in relation to BSE. Lamb from SW and AR was also preferred (similar and positive utilities) by German consumers compared with lamb from UY and UK (similar and negative utilities). Utilities for each level of animal feeding were very similar for both species, showing a preference by German consumers for beef and lamb fed feeding sources including grass compared with grain only. Although price was more important for lamb purchasing decisions than for beef,

German consumers showed positive utilities for lower cost of meat and negative utility for a higher priced product in both species.

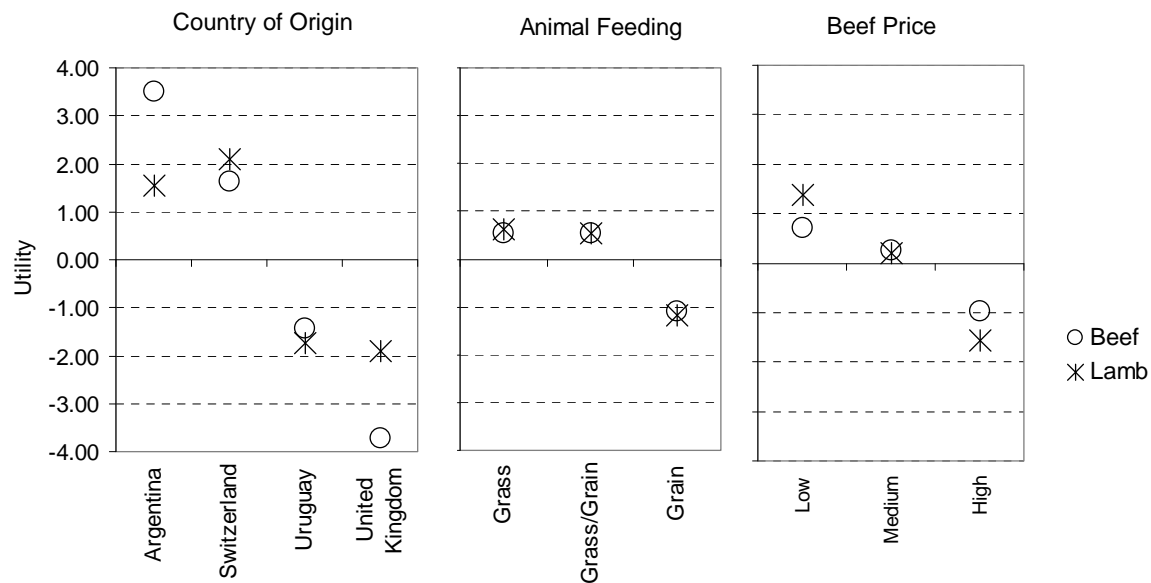


Figure 3. Utilities for each level of the attributes by species.

Conclusions

German consumers preferred beef and lamb from grain-supplemented animals with lower ratings for meat from animals fed grass or grain only. The most important attribute for purchasing decisions of fresh meat was country of origin followed by animal diet and meat price, for both beef and lamb, respectively. Highest positive utilities were found for Argentina, grass and low price in beef and for Switzerland, grass, and low price in lamb. Consumers preferred the eating quality of meat from animals fed with high levels of grain supplementation. However, conjoint analysis showed a preference in purchasing decisions towards meat from animals fed mainly on grass in the low price range.

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References

- Umberger, W.J., Feuz, D.M., Calkins, C.R. & Killinger-Mann, K., 2002. U.S. consumer preference and willingness-to-pay for domestic corn-fed versus international grass-fed beef measured through an experimental auction. *Agribusiness*. 18(4), 491-504.
- Oliver, M.A., Nute, G.R., Font i Furnols, M., San Julian, R., Campo, M.M., Sañudo, C., Cañeque V. Guerrero L., Alvarez, I. Diaz, M.T., Branscheid, W., Wicke, M. & Montossi, F., 2006. Eating quality of beef, from different production systems, assessed by German Spanish and British consumers. *Meat Science*. 74, 435-442.
- Font i Furnols, M., San Julián, R., Guerrero, L., Sañudo, C., Campo, M.M., Olleta, J.L., Oliver, M.A., Cañeque, V., Álvarez, I., Díaz, M.T., Branscheid, W., Wicke, M., Nute, G.R. & Montossi, F., 2006. Acceptability of lamb meat from different producing systems and ageing time to German, Spanish and British consumers. *Meat Science*. 72, 545-554.