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Factors that Influence Consumers' Overall Sensory Acceptance of Strip Steaks

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Summary

Multivariate analysis was used to determine demographic, knowledge, habits, and sensory preferences that influence a consumer's opinion about the acceptability of strip steaks from corn-fed, barley-fed, and grass-fed beef. Even with all the additional information, most consumers' final opinions about specific types of steaks are based on how they perceive the flavor, tenderness, and juiciness of the beef.

Introduction

Numerous studies have asked consumers to pick which type of meat they prefer through taste panels, pictures, and descriptions of production systems. One of our studies looked at how individual demographic and beef knowledge impacted sensory and purchasing habits of consumers when comparing strip steaks from corn-fed beef, barley-fed beef, and grass-fed beef (2004 Nebraska Beef Report, pp. 83-85). However, unlike the individual trait approach used in most studies including the one mentioned above, multiple factors going into the decision-making process to purchase beef and return to buy the same type of meat again. To gain a better understanding of the traits that makes a person prefer a specific type of beef, an approach using multiple variables together must be used. Therefore, this study was conducted to determine specific characteristics of consumers and consumer habits that can help predict overall satisfaction of U.S. beef consumers with beef steaks produced on corn-based, barley-based, and grass-based finishing diets.

Procedure

Data were obtained as described by 2004 Nebraska Beef Report, pp. 83-85. Briefly, marbling scores, Warner-Bratzler Shear Force (WBSF), and chemical characteristics (moisture, ash, and fat percentages) were determined for strip steaks from domestic (corn-finished; n = 76), Canadian (barley-finished; n = 39), and Australian (grass-finished; n = 30) strip loins. Domestic steaks were paired with either Canadian or Australian steaks according to WBSF for consumer evaluations. Sensory evaluations on the paired steaks for tenderness, juiciness, flavor, and overall acceptability, Vickory auctions, a 10-question beef knowledge quiz, and a survey of demographic information, eating preferences, and purchasing behavior were collected from consumers in Denver, Colo. (n = 132) and Chicago, Ill. (n = 141).

After taste panels were performed, scores for overall acceptability were classified as like, neither like nor dislike, or dislike. A stepwise selection

procedure was performed using the STEPDISC function in SAS (SAS Inst. Inc., Cary, N.C.) to select variables that would contribute to a discrimination function of consumers for overall acceptability of domestic, Australian, and Canadian beef steaks. This procedure reduces the variables to the ones that may play a role in consumers preference to the specific steak type. These selected variables were used in the DISCRIM procedure of SAS with the canonical function. Canonical correlations with a P-value lower than 0.05 were said to be significant. As illustrated in Figures 1-3, domestic and Canadian-produced steaks had two significant canonical correlations (an x and y axis) for overall acceptability while Australian-produced steaks only had one. This means preference for Australian, grass-fed steaks can be explained by one set of variables while the domestic, corn-fed and Canadian, barley-fed had two combinations of variables that explained why U.S. consumers liked or disliked those types of steaks. Variables that

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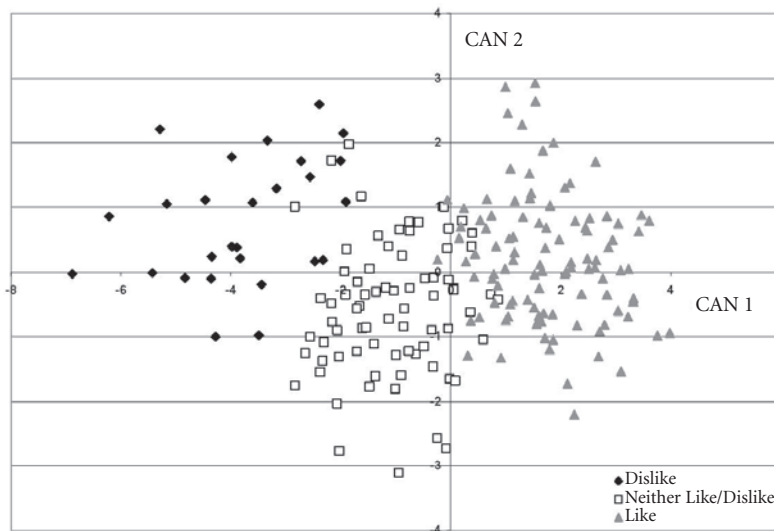


Figure 1. Classification of USA consumers for overall sensory acceptability of domestic, corn-fed beef. CAN 1 is the first canonical correlation of tenderness and flavor. CAN 2 is the second canonical correlation of marital status, whether or not they used magazines to get information about beef, and preference for frozen meat. These two canonical correlations were used to group the consumers into three groups: like, neither like nor dislike, and dislike.

contributed to each set of canonical correlations were chosen when the pre-set absolute value of 0.50 was reached.

Results

Out of all of the questions asked and results from taste panels and lab assays, 17, 38, and 19 variables were used for classification for the domestic, Canadian, and Australian canonical discriminant analysis, respectively (Table 1). These variables for each specific type of steak (corn-finished, barley-finished, and grass-finished) were then used to try to group the consumers into one of three groups: they “like” that type of steak, they “dislike” that type of steak or they are “neutral” toward that type of steak. It should be noted there were almost double the amount of variables that go into the discrimination procedure to help predict how consumer’s will prefer Canadian, barley-fed steaks compared to Australian, grass-fed and domestic, corn-fed steaks.

Acceptability of domestic, corn-fed beef had two canonical correlations. Consumers’ ratings of tenderness and flavor (canonical correlation 1- CAN1 on the x-axis) as well as marital status, whether or not they used magazines to get information about beef, and preference for frozen meat were the main factors that influenced overall acceptability of domestic steaks (canonical correlation 2- CAN2 on the y-axis) (Figure 1). The figure shows the distinct groupings of consumers that liked, disliked, or were neutral toward the domestic, corn-fed beef. The right side of the x-axis illustrates a higher rating of tenderness and flavor for the corn-fed beef as scored by the panelists during the taste panel portion of the study. The higher value on the y-axis demonstrated, the more likely the individual had been married, did not use magazines to gain information about beef, and had a lower preference for frozen beef. When the first canonical correlation and the second one were plotted, the statistical program determined which category into which the consumer

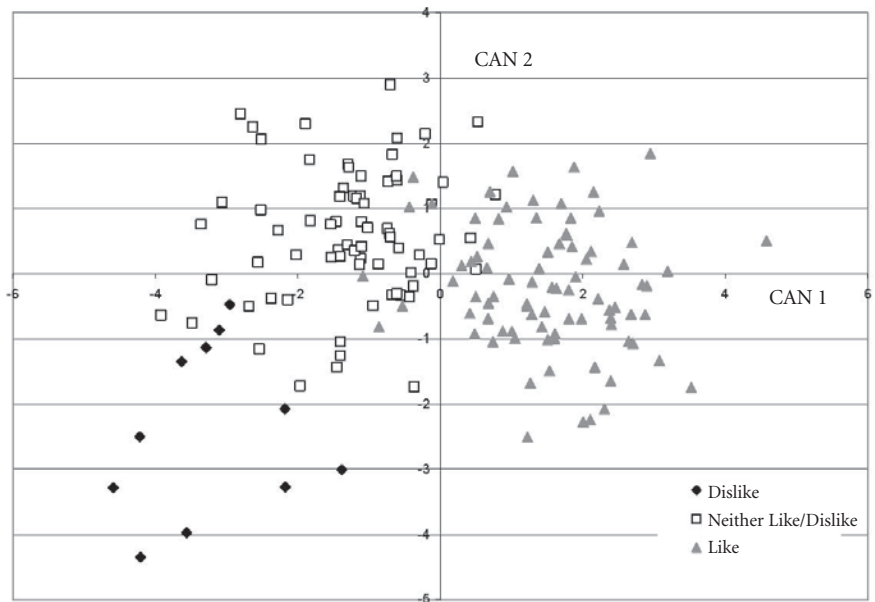


Figure 2. Classification of USA consumers for overall sensory acceptability of Canadian, barley-fed beef. CAN 1 is the first canonical correlation of tenderness and flavor. CAN 2 is the second canonical correlation of Warner-Bratzler Shear Force and household size. These two canonical correlations were used to group the consumers into three groups: like, neither like nor dislike, and dislike.

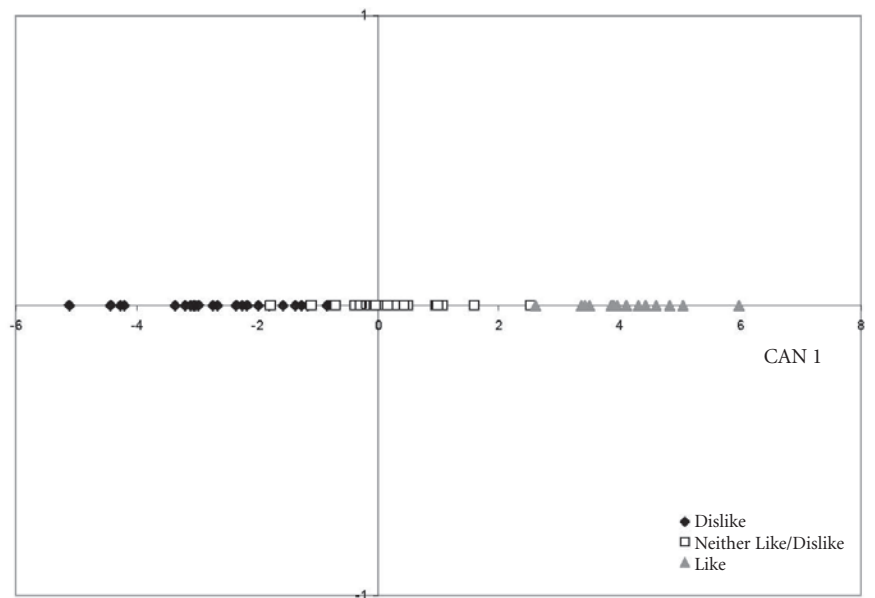


Figure 3. Classification of USA consumers for overall sensory acceptability of Australian, grass-fed beef. CAN 1 is the canonical correlation of tenderness, flavor, and juiciness used to group the consumers into three groups: like, neither like nor dislike, and dislike.

likely fell — like, dislike, or neither like nor dislike. Canadian steak acceptability classification was also based on two canonical correlations of tenderness and flavor (canonical correlation 1- CAN1 on the x-axis) along with a slight decrease in WBSF and larger household sizes improving the acceptability (canonical correlation 2- CAN2 on the y-axis) (Figure

2). Unlike the domestic, corn-fed beef that was separated mainly based on the first canonical correlation of tenderness and flavor on the x-axis, the consumers that “liked” and were “neutral” toward Canadian, barley-fed steaks were separated by tenderness and flavor, but the consumer’s that “neither liked nor disliked” or “disliked” were discriminated into

Table 1. Selection variables for discriminant analysis for corn-finished, barley-finished, and grass-finished steaks.

Corn-Finished Domestic	Barley-Finished Canadian	Grass-Finished Australian
Sensory tenderness	Sensory tenderness	Sensory tenderness
Sensory flavor	Sensory flavor	Sensory flavor
Marital status	Marbling score	Sensory juiciness
Education	WBSF	Gender
Employment status	Fat content	Income
Type of meat most often consumed at home	Ash content	Household size
Type of meat most often consumed at restaurant	Moisture content	Raised in Colo., Ill., or another state
Degree of doneness preference	Gender	Marinate/Season steaks
Beef information learned from family	Household size	Frequency meat prepared at home
Beef information learned from magazines	Marital status	Beef cut preference
Purchasing importance of knowing who produced the beef	Employment status	Importance of COOL on hamburger/ground beef
Purchasing importance of good visual presentation of beef	Age	Location beef is purchased
Purchasing importance of beef being frozen	Type of meat preferred	Average value of meat purchases
Preference of COOL labeled beef	Frequency meat prepared at home	Purchased beef product after unsatisfactory experience
Amount willing to pay for COOL hamburger	Cooking method for steaks	Beef information learned from family
Importance of COOL on steaks	Degree of doneness preference	Beef information learned from cookbooks
Importance of COOL on hamburger/ground beef	Main factor for buying meat	Importance of COOL on steaks
	Average pounds of meat purchases	Purchasing importance of production methods
	Average value of meat purchases	Purchasing importance of beef being frozen
	Beef palatability satisfaction	
	Grade of beef purchased	
	Beef information learned from magazines	
	Beef information learned from meat counter personnel	
	Beef information learned from grocers' pamphlets	
	Type of beef purchased to prepare at home	
	Purchasing importance of knowing who produced the beef	
	Purchasing importance of beef freshness and tenderness	
	Purchasing importance of beef quality grade and marbling	
	Purchasing importance of food safety inspection	
	Purchasing importance of beef production systems	
	Influence of beef packaging information	
	Raised in Colo., Ill., or another state	
	Importance of COOL on roasts, pre-prepared, and processed meats	
	Change selection criteria after unsatisfactory beef eating experience	

their proper groups because of the WBSF and how many people were in their households. Results from Australian steak acceptability revealed classification was based on one canonical correlation of flavor, tenderness, and juiciness (canonical correlation 1- CAN1 on the x-axis) (Figure 3). U.S. consumers can be grouped on how they will respond to Australian, grass-fed beef by the palatability traits without significant contribution from their demographics, beef knowledge, or beef buying habits.

Using cross-validation, this analysis correctly placed consumers' overall acceptability responses into the three

groups (like, neither like nor dislike, or dislike) approximately 92.2%, 83.5%, and 91.7% for domestic, Canadian, and Australian steaks, respectively. Consumers' ratings of overall acceptability were based mainly on palatability issues, but other demographic and social factors may also play a role in satisfaction of strip steaks.

Continued efforts are being made to investigate factors that play a role in purchasing habits which have larger impact on marketing plans for specific niche markets in the beef industry. However, based on this analysis despite differences in education,

knowledge, feelings about the environment, and other demographics, most people base their overall eating satisfaction on how they rate the palatability of the steak.

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