BEEF QUALITY AUDIT IN MEXICO 1. COMPOSITION AND MUSCLE TRAITS

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Background

In the last years, Mexico has become one of the major importers of beef. Together with Japan and Korea, it imports about 30% of the beef world trade, being the USA its main supplier. Under such circumstances, the Mexican beef producers are most affected due to the free market treaty with the USA. In an open market context, the domestic beef production has not been able to counteract the geometric increase of imported beef, particularly refrigerated boned beef, which has grown over 40 times since 1990. So far, research projects on meat quality are rather scarce. No investigation has been made to elucidate the composition and quality traits of the national beef supply in relation to imports. This information could help clarifying the actual value of the domestic beef, identifying targets to reach and optimizing the production system towards higher productivity.

Objective

To evaluate the composition and muscle quality traits of beef at the retail level.

Methods

Beef retail cases in 80 supermarkets from three Mexican cities were surveyed for proximate composition, pH, total and soluble collagen content, Warner Bratzler shear force and cooking loss. The supermarkets were randomly selected within the cities, taking from one to five samples of New York steaks in each store, according to availability. Both national and imported beef were considered. After purchasing, the beef was transported to the National Autonomic University of Mexico, where it was analyzed. Upon arrival, the steaks were assigned a random number, vacuum packed and deep frozen for one month before the analyses were performed. Samples of ground beef were also prepared for the chemical analysis. All samples were identified according to their origin into national (N) and imported beef. Besides, imported beef was classified into USDA choice (CH) or less than choice (LCH). Considering the formed groups, the means were contrasted in order to determine significant differences. The statistical analysis was performed by means of the Statgraphics Plus 2.1 statistical software. The Kruskal-Wallis non parametric test was used to analyze those variables violating the principles of parametric statistics. All other variables were processed by analysis of variance.

Results

Nearly 100% of the surveyed supermarkets sold national beef, from which about 75% sold exclusively national beef. The remaining 25% sold both national and imported beef. Within the imported category, around 10% sold USDA choice beef and 90% sold beef less than choice. The proximate composition analysis showed that the CH beef has a significantly higher ($P<0.001$) fat content (%) than the N and LCH beef: 6.3, 3.0 and 2.8, respectively. The moisture content (%) was negatively correlated to the fat content ($r = -0.8048$; $P<0.001$) and varied accordingly ($P<0.001$) across the different groups: 69.9, 73.1 and 73.1 for CH, N and LCH beef, respectively. The protein content (%) was more stable and showed no variation across the different beef categories ($P>0.05$). The pH values suggested that beef aging is generally not practiced before the product reach the market. Less than 2% of the samples had a pH higher or equal to 6.2, normally expected in aged beef. The total collagen content (mg/g) was higher ($P<0.05$) in N (12.0) and LCH (13.4) than in CH beef (11.1). The percentage of soluble collagen tended ($P<0.10$) to be higher for the CH and N than LCH beef: 15.7, 15.2 and 12.7, respectively. The shear force showed lower values ($P<0.05$) for CH compared to N and LCH beef: 3.5, 4.7 and 4.6, respectively. The results indicate that the USDA choice beef has better quality traits if compared to national beef, though its high fat content and the corresponding higher price might not be well accepted by the average Mexican consumer. This might be one of the reasons why a major part of imported beef has a quality grade inferior to choice, which is similar in both composition and quality to the domestic beef and its price is not as high as the choice beef category.

Conclusions

A major part of the beef being sold at the retail level in Mexico has a similar quality whether it is domestic or imported. The imported USDA choice beef has better quality traits but it does not reach over 10% of the total market. Probably, the combination of a higher price and higher fat content is a limiting factor for the expansion of this item in the market.

Table 1. Composition and muscle quality traits of retail beef from the Mexican market

Traits	Beef category			ES ±
	National	USDA choice	Less than choice	
n	90	35	55	
Moisture, %	73.1[a]	69.9[b]	73.1[a]	0.3***
Fat, %	3.0[a]	6.3[b]	2.8[a]	0.2***
Protein, %	22.1	21.7	22.2	0.2
Total collagen, mg/g	12.0[a]	11.1[b]	13.4[a]	0.8*
Soluble collagen, % of the total collagen	15.2	15.7	12.7	0.9+
Shear force, kg	4.7	3.5	4.6	0.3*
Cooking loss, %	22.7	22.2	22.5	1.0

+P<0.10; *P<0.05; ***P<0.001
a,b Means with different superscripts within the same row are significantly different

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