

Sensory characteristics of beef from cattle finished with cottonseed in feedlot

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Objectives: The main objective of this study was to evaluate the sensory characteristics of beef from cattle finished in feedlot with cottonseed. Cottonseed is a byproduct from the textile industry that has been used in animal husbandry, mainly cattle, in feedlots due to nutritional characteristics, demonstrating that animals obtain performance similar to that of conventional feed. The principal interest for using this product to feed cattle is to improve economic profitability. However, there are some concerns when cottonseed is used in feedlots for finishing cattle because it is associated with the occurrence of off-flavor in beef. Some authors reported that this byproduct might influence beef composition and flavor. The enlarged polyunsaturated fatty acids in this product could contribute to an increase in the lipid content in beef, and the occurrence of unpleasant flavors, such as aldehydes and ketones, due to the rancidity process could influence the occurrence of some off-flavors.

Materials and Methods: For this experiment, male Nellore animals from the group of animals in a feedlot with a mean initial live weight of 386.19 ± 4.48 kg and age between 13 and 48 months were used. The experimental design was completely random, with two treatments: Treatment A (control treatment - diet without the addition of cottonseed) and Treatment B (diet with addition of cottonseed at 15%), with 50 replications. Each animal was considered an experimental unit, totaling 100 animals. The diets were formulated to meet the requirements of beef cattle, and ingredients were provided in the form of a complete diet. The animals remained in the feedlot for 88 days and were slaughtered, weighing 527.82 ± 17.96 kg. The animals were slaughtered after a 12-hour solid fast and under humanitarian conditions. After cooling the carcass for 24 hours at $\pm 1^\circ\text{C}$, samples were taken from the Longissimus thoracis muscle for sensorial analysis. To carry out the sensory analysis, the meat sample was cooked until the internal temperature reached 72°C and then sliced and served to taster. In the sensory analysis panel, a total of 100 untrained tasters participated, and the sensorial parameters evaluated were color, flavor, aroma, tenderness and overall impression in a paired manner (Treatments A-B and B-A). These parameters were evaluated by a hedonic scale from 1 to 9 (1 - Extremely disliked and 9 - Extremely Liked) and to check for abnormal taste or off-flavor, each taster assessed absence or presence, and in positive cases, they rated intensity at 1-low intensity or 2-high intensity. All statistical analyses were performed using the Statistical Package SPSS® 20.0, and the Wilcoxon test ($\alpha=0.05$) was used to evaluate the sensory parameters. For the occurrence of off-flavor in meat, the chi-square test (χ^2) or Fischer's exact test ($\alpha=0.05$) was used.

Results and Discussion: These results revealed better flavor scores ($P<0.05$) attributed to the meat of the animals that were not given cotton seed in the feeding, while for the other parameters, there was no difference (color, tenderness, taste and overall impression). The results showed that taster indicated that there was no difference in the occurrence of off-flavor in beef samples from the two treatments ($P=0.1410$). This indicates that only the use of cottonseed in feed cattle is not directly responsible for causing the occurrence of off-flavor in beef, as described by some previous authors. However, in the group of tasters who indicated the occurrence of some strange taste, the beef samples from the treatment with the use of cottonseed a greater number of tasters (68.2%) classified it as being of high intensity, while in beef samples from the control treatment, 71.4% of the tasters classified them as being of low intensity ($P<0.05$). Therefore, beef from cattle finished with cottonseed in the proportion of 15% showed a 5 times greater chance of presenting some off-flavor of high intensity ($p<0.039$, $\text{OR}=5.37$, $\text{IC}_{95\%} = 1.237-23.207$). The occurrence of off-flavor provided a modification of the sensory perception by taster from beef samples during the sensorial evaluation ($P<0.05$). In beef samples from the control treatment, the occurrence of off-flavor also was attributed by taster lower scores for color ($p=0.009$) and flavor ($p=0.027$). Additionally, in beef samples from the treatment with the use of cottonseed, taster gave lower grades for color ($p=0.012$), taste ($p=0.002$) and overall impression ($p=0.003$). In general, when cottonseed is used in the diet until 15% in feedlot does not modify the qualitative sensorial aspects of beef, there is a chance of the appearance of some strange taste with a greater intensity. When off-flavor occurs in meat, it will influence the sensorial performance of consumers regarding other parameters in beef. Thus, the occurrence of off-flavor in beef should be further investigated.

Key words: Byproduct, Meat quality, Feedlot, Flavor, Color