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Effect of Oil Source, Cooking Method, and Storage Time on Fatty Acid Composition in Ground Beef Patties from Nellore Cattle

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Objectives

The aim of this study was to evaluate the effects of feeding vegetable oil sources (sunflower-SU; linseed-LO and soybean-SO) on fatty acids composition of raw and cooked beef patties stored for 0 and 90 d.

Materials and Methods

Ninety-six Nellore steers were fed diets containing 3.5% vegetable oils (DM basis). After 82 d on feed, animals were harvested and samples of Longissimus muscle and subcutaneous fat were collected to prepare hamburger patties (n = 40 per treatment; 100 g patty). Patties were prepared utilizing a commercial formulation (85.4% meat, 12% fat, 2% salt, 0.3% garlic and 0.3% emulsifier) and packaged in oxygen permeable plastic bags, then immediately frozen at –18°C and stored for 0 (fresh) and 90d. The patties were evaluated raw and cooked. The cooked patties were grilled at 170°C for 4 min on each side (internal temperature 70°C). Fatty acid composition was estimated using gas chromatography. The data was analyzed as a completely randomized design in a 4 × 2 × 2 factorial arrangement (3 oil sources plus control × 2 storage time × raw and cooked) using a mixed model (MIXED procedure of SAS; SAS Inst. Inc., Cary, NC), including the fixed effects of oil source, storage time, cooking method, and the interaction between the treatments where each patty was used as an experimental unit.

Results

There was an interaction between storage times, cooking methods and oil source ($P < 0.0001$). There was a higher concentration of SFA for SU and SO compared to the other treatments for fresh raw samples ($P < 0.0001$). The cooking process decreased SFA concentration of all the treatments with oil ($P < 0.0001$). There was a higher concentration of SFA for the control samples compared to the treatments with oil source for cooked patties ($P < 0.0001$). Both raw and cooked patties had a higher concentration of MUFA in the control treatment ($P < 0.0001$). Cooking process did not affect MUFA concentration in any treatment ($P = 0.19$). There was higher concentration of PUFA of LO, followed by SO ($P < 0.0001$), while SU and control samples did not differ ($P = 0.16$) for fresh raw patties. Cooked samples with oil had higher concentrations of PUFA than the control ($P < 0.0001$). The cooking process did not affect the concentration of PUFA for control and LO, however it increased for SU ($P < 0.0001$) and SO ($P = 0.0004$). The raw patties had a higher PUFA:SFA ratio for LO treatments, whereas the cooked patties had a higher ratio for all the oil source treatments compared to control. There was an increase in the PUFA:SFA ratio after cooking for SU ($P < 0.0001$) and SO ($P < 0.0001$), whereas neither control ($P = 0.27$) nor LO ($P = 0.38$) were affected. Comparing the effect of storage time, the samples that were not stored had higher concentration of PUFA in LO especially for 18:3 n3, and SO for 18:2 n6, followed by SU and control. There was a decrease in the PUFA concentration when the patties were stored for 90 d for all the treatments ($P < 0.0001$). The LO patties had a higher concentration of PUFA compared with patties from the other treatments ($P < 0.0001$) stored for 90 d.

Conclusion

In conclusion, ground beef patties made from the LO and SO had higher concentrations in PUFA, the cooking process decreased the SFA for patties with oil and the storage for 90 d decreases the concentrations of PUFA.

