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Meat and Muscle Biology™



Providing Lean Beef for the Next Project: Beef as a Component of a Healthy Dietary Pattern in Cancer Survivors

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Objectives

An analytical characterization study was conducted at The Ohio State University Department of Animal Sciences in support of a dietary intervention research trial conducted by researchers in the James Comprehensive Cancer Center to incorporate lean beef as a component of a healthy dietary pattern in cancer survivors. For this study, half of the participants were expected to consume 12 to 18 oz of lean beef each week for 24 wk. According to the United States Department of Agriculture (USDA), lean beef is defined in part as beef containing less than 10% lipid by weight. Because lipids constitute the most variable of all nutritional components in meat, quantification of extractable lipid content of beef provided by The Ohio State University Meat Science Laboratory was necessary to ensure the criteria of lean beef was met for the nutritional trial. Therefore, the objective of this study was to quantify extractable lipid content in all beef samples prior to incorporation into the diet of the study participants.

Materials and Methods

Beef *semimembranosus*, *semitendinosus*, *biceps femoris*, and *rectus femoris* muscles were obtained from the round primal of beef carcasses classified as A maturity. Muscles were trimmed until no more than 8 mm of subcutaneous fat was present. To provide variety for the participants, muscles were fabricated into 9 retail cuts including fine ground beef, coarse ground beef, top round steaks, bottom round steaks, eye of round steaks, thinly sliced beef (cut from the *biceps femoris*), fajita meat (cut from the *semimembranosus*), stew meat (cut from the *rectus femoris*), and cubed steaks (cut from the *semimembranosus*). Representative samples were collected from each batch of retail cuts and powdered in liq-

uid nitrogen in duplicate. After weighing powdered samples into packets and lyophilizing, extractable lipid content was quantified using a Soxhlet extraction with an 87:13 mixture of chloroform:methanol. Extractable lipid content (%) was determined using the following equation: extractable lipid (%) = (mass after lyophilization - mass after soxhlet extraction) / (original mass of sample) × 100. Any cut that did not classify as USDA lean beef could have been rejected from the study and not provided to the participants. However, no beef was excluded from the study.

Results

A table of descriptive statistics of the extractable lipid content of the 9 different retail cuts is provided (Table 1). A total of 124 samples were analyzed and the beef provided for the study contained an average overall extractable lipid content (%) of 3.6% ± 2.0% (mean ± SD).

Retail Cut	N	Mean Extractable Lipid (%)	SD	Min. (%)	Max. (%)
Fine Ground Beef	5	5.5	2.7	2.9	8.9
Coarse Ground Beef	5	3.3	2.7	0.9	7.2
Top Round Steak	5	2.8	1.4	1.1	4.7
Bottom Round Steak	26	4.1	2.6	0.3	9.6
Eye of Round Steak	42	4.4	2.6	0.1	9.8
Thinly Sliced Beef	23	2.9	2.4	0.2	8.8
Fajita Meat	3	1.4	0.7	0.6	2.0
Stew Meat	8	2.0	1.3	0.8	4.7
Cubed Steak	7	1.8	1.3	0.1	3.7

Conclusion

Lean beef was provided for this human nutrition study. Further results and conclusions from the dietary intervention research trial are forthcoming.