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EFFECT OF BREED TYPE, SEX CLASS AND ANTEMORTEM EVALUATION OF YIELD GRADE ON CARCASS COMPONENTS OF MARKET LAMBS.

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INTRODUCTION

Consumer demands are forcing all segments of the red meat industry to decrease fat in products. However, in the last 20 years, the average fat thickness for lamb at the 12th/13th rib has increased from 4.8 mm to 7.4 mm, and the average USDA yield grade is now approximately 4. Over 39% of the lamb carcasses in a national carcass survey were yield grade 4 or 5 (Tatum et al., 1989). Individuals interviewed across industry segments listed overfinished lambs as the number one marketing/merchandising problem (Williams, 1991).

Comprehension of fat partitioning and deposition in sheep will become increasingly important, as knowledge of deposition sites and growth rates of fat will affect the development of breeding schemes and feeding methods for the lamb industry. Garrett et al. (1990) found that lamb carcass fatness has the greatest influence on the yield of closely trimmed retail products. Fat partitioning and distribution are critical because fat accounts for most of the variation in lamb cutability. Therefore, objectives for this study were to determine the influence of sex class, breed type, and preslaughter estimated yield grade on carcass components.

MATERIALS AND METHODS

Selection. This study utilized Commercial Rambouillet (Finewool), Suffolk and Finewool first cross lambs to characterize the current market lamb supply in Texas. To minimize the variation present between animals, lambs of similar genotype in each of the three breeds were selected, with 15 wethers and 15 ewes from each breed. The Suffolk lambs were purchased from two producers who use the same genetic base to produce Suffolk market lambs. The Commercial Finewool and F_1 lambs were purchased from one producer who uses the identified Suffolk line in his crossbreeding program. Ninety feeder lambs (27.2-31.7 kg) were bought and transported to the Texas A&M Sheep Center. Upon arrival, three males and females from each breed type were randomly assigned to one of five yield grade (YG) treatment groups (n=18), devised to simulate the fat thickness ranges designated by the USDA (1992) Yield Grade equation. According to Edwards et al. (1989), the best predictor of market lamb composition is still a subjective estimate of fatness by an experienced livestock evaluator. Therefore, the lambs were periodically evaluated and visually appraised by a team of three experienced livestock evaluators, who individually evaluated each lamb and compared estimates of fatness before making a collective decision. Lambs were slaughtered at staggered intervals, when the evaluators determined that the lamb had reached its assigned fat thickness.

Slaughter and Grading. All lambs were slaughtered at the Texas A&M University Rosenthal Meat Science and Technology Center using normal industry practices. All carcasses were evaluated for USDA quality and yield grade characteristics by trained carcass evaluators at 48 h postmortem. Kidney and pelvic fat (KP) was not removed on the kill floor, and was left intact until fabrication.

Fabrication. The right side of each carcass was dissected into knife-separable components of subcutaneous fat, intermuscular fat, internal fat, lean, and bone to determine physical composition. The left side was fabricated into retail cuts for use in an associated study.

Statistical analysis. Data were analyzed by analysis of variance using the general linear model (GLM) procedure of SAS (1988). Variables were analyzed in a completely randomized design. Main effects included yield grade, breed type, and sex class. Mean separations were performed using Least Significance Difference with a pre-determined significance level of $P < .05$.

RESULTS AND DISCUSSION

Distribution of carcass components by preslaughter estimated YG are located in Table 1. Percentages of subcutaneous and intermuscular fat tended to increase as preslaughter estimated yield grade increased, where YG 4 and 5 lambs had a higher ($P < .05$) percentage of these two fat depots compared to YG 1, 2, and 3 lambs. Percentage of internal fat displayed a different trend where YG 2 lambs had a higher ($P < .05$) percentage than YG 1 and 3 lambs. However, when total fat content was calculated, percentages tended to increase as YG increased, where YG 1 lambs had the least ($P < .05$) percentage and YG 4 and 5 lambs had the highest percentage ($P < .05$). Also, percentage of lean and bone decreased as YG increased, which coincides with the findings of Garrett et al. (1990). Yield grade 1 lambs had the highest ($P < .05$) of lean and bone and YG 4 and 5 lambs had the least ($P < .05$).

As anticipated, lambs of Suffolk breeding had a lower ($P < .05$) percentage of total fat and internal fat and a higher ($P < .05$) percentage of lean compared to the other two breed types (Table 2). Even though not significant, lambs of Suffolk breeding tended to have a lower ($P = .14$) percentage of subcutaneous fat than the other breed types. These results

are similar to the findings of Crouse et al.(1981). Finewool crosses had a lower ($P < .05$) percentage of internal fat than Finewool lambs, and percentages of intermuscular fat and bone were not affected by the breed types.

The only variable that was influenced by sex class was percentage of bone, where the wethers had a higher (Table 3) percentage than the ewes. Percentages of lean and subcutaneous, intermuscular, internal, and total fat were not affected by sex class. This is contrast with Tatum et al. (1989) who found that wether carcasses yielded a higher percentage lean and a lower percentage fat than ewes.

Table 1. Effect of estimated yield grade on percentage of carcass components

Traits	YG 1	YG 2	YG 3	YG 4	YG 5	SEM
Subcutaneous fat	14.9^{c}	15.9^{bc}	17.9^{b}	21.2^{a}	20.2^{a}	0.7
Intermuscular fat	9.4^{c}	10.9^{b}	11.5^{b}	13.1^{a}	13.9^{a}	0.4
Internal fat	2.1^{b}	2.8^{a}	2.3^{ab}	2.1^{b}	2.3^{ab}	0.2
Total fat	26.4^{c}	29.6^{b}	31.7^{b}	36.4^{a}	36.4^{a}	0.9
Lean	51.4^{a}	49.3^{b}	48.1^{b}	44.8^{c}	44.8^{c}	0.7
Bone	21.4^{a}	20.3^{b}	19.3^{c}	17.8^{d}	18.1^{d}	0.3

a,b,c,d_{LS}Means within rows with different superscripts differ ($P < .05$).

Table 2. Effects of breed type on percentage of carcass components

Traits	Finewool	Finewool Cross	Suffolk	SEM
Subcutaneous fat	18.6	18.3	17.1	0.6
Intermuscular fat	11.4	12.1	11.7	0.3
Internal fat	2.8^{a}	2.3^{b}	1.9^{c}	0.1
Total fat	32.8^{a}	32.8^{a}	30.7^{b}	0.7
Lean	46.9^{a}	47.2^{a}	48.9^{b}	0.6
Bone	19.5	19.1	19.5	0.3

a,b,c_{LS}Means within rows with different superscripts differ ($P < .05$).

Table 3. Effects of sex class on percentage of carcass components

Traits	Wether	Ewe	SEM
Subcutaneous fat	17.8	18.2	0.5
Intermuscular fat	12.0	11.5	0.3
Internal fat	2.2	2.5	0.1
Total fat	31.9	32.3	0.5
Lean	47.2	48.2	0.5
Bone	20.0^{a}	18.7^{b}	0.2

a,b_{LS}Means within rows with different superscripts differ ($P < .05$).

CONCLUSIONS

Percentage of subcutaneous, intermuscular, and total fat tended to increase as preslaughter estimated yield grade increased, while percentage of muscle and bone tended to decrease. Lambs with lower estimated yield grades are leaner and heavier muscled than lambs with higher estimated yield grades. The data suggests that preslaughter estimations of fat thickness are effective in segmenting lamb carcasses according to percentages of total fat, lean, and bone.

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