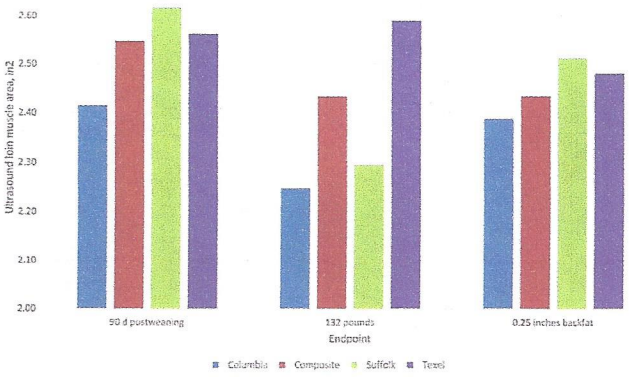
Part 2: Terminal Sheep Breeds for Use in Western Range Operations

Carcass Composition is Part of Evaluation of Columbia, USMARC-Composite, Suffolk, and Texel Rams in Rangeland Production System

The crossing of terminal sire sheep breeds with documented superiority for production characteristics such as growth rate, efficiency of feed utilization and carcass muscling and leanness with well-adapted maternal breeds provides opportunity to increase carcass value while maintaining acceptable environmental adaptation in the crossbred lambs. Large, lean terminal-sire breeds such as the Suffolk and Columbia typically have been used in extensive rangeland conditions found in much of the western United States. Relatively intense selection in these breeds for adult body weight and frame size led to correlated increases in growth rate but also concerns regarding fitness of breeding rams and survival to weaning in their crossbred lambs. Other less-extreme terminal-sire types of most moderate size have been increasingly promoted as alternatives and interest in increasing muscling in terminal-sire types has increased.

Loin Muscle for Ewe and Wether Lambs
(Sired by Columbia, Composite, Suffolk and Texel Rams)



This experiment was conducted at the U.S. Sheep Experiment Station (USSES), Dubois, Idaho, to compare Columbia, U.S. Meat Animal Research Center (USMARC) Composite, Suffolk and Texel sires in matings with Rambouillet ewes in an extensive rangeland production system. Differences among sire breeds in ewe productivity and lamb survival, growth and feed efficiency were discussed last month, in Part 1. Part 2 discusses differences among the sire breeds in carcass composition and muscling.

Experimental Procedures

Columbia, Suffolk, and Texel rams (n =22, 22, and 21, respectively) were sampled from industry and USSES flocks and Composite rams (n = 22) were obtained from USMARC. Details of sire selection and breeding management were provided in Part 1. In each year, lambs were assigned at weaning, within sex and sire breed, to one of three replicated drylot pens. The lambs were then weighed weekly and scanned every two weeks using ultrasound to estimate loin muscle area and backfat thickness. Wether lambs were also assigned to one of three groups to be harvested when the average of all wethers in the study reached 120, 135 or 150 lbs. When wethers reached these endpoints, they were transported to The Ohio State University Meats Laboratory in Columbus for harvest. Measurements on chilled carcasses included loin muscle area and backfat and body wall thicknesses. Carcasses were then fabricated into wholesale cuts, and the rack, loin and leg were closely trimmed and the leg was trimmed and deboned to estimate the yield of high-value retail cuts.

Results and Discussion

Over the three years of the study, a total of 1,049 ewe and wether lambs were sequentially scanned using ultrasound to estimate breed differences in loin muscle area and backfat thickness, and actual carcass characteristics were measured on 518 wether lambs.

Predicted breed differences in loin muscle area at various harvest endpoints are shown for ultrasound and direct carcass measurements in Figures 1 and 2, respectively, and

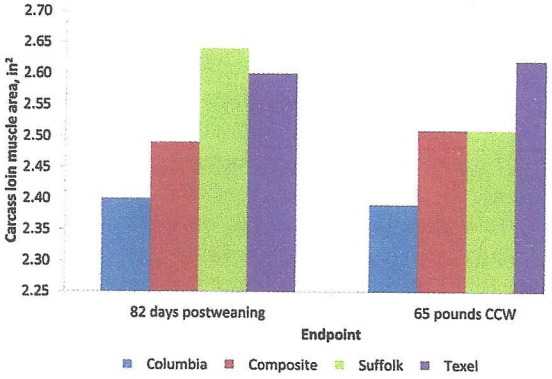
were generally consistent for the two types of measurements. At 90 days after weaning, Suffolk-sired lambs were much heavier (see Part 1) and, as expected, had larger loin muscle areas compared to other sire breeds. By contrast, at comparable body weights, Texel-sired lambs were superior in loin muscle area to lambs sired by the other breeds, but were also substantially fatter than Suffolk- and Columbia-sired lambs, and somewhat fatter than Composite-sired lambs, at these weights (Figures 3 and 4). At comparable harvest weights, Columbia-sired lambs had smaller loin muscle areas than lambs sired by the other breeds.

Repeated scans on the same lambs allowed us to predict breed differences in loin muscle area at comparable levels of ultrasound backfat thickness (Figure 1). At 0.25 inches of ultrasonic backfat thickness, Suffolk- and Columbia-sire lambs were heavier than lambs of the other breeds (125 and 123 lbs., respectively). Texel-sired lambs weighed the least (112 lbs.) and Composite-sired lambs were intermediate (119 lbs.). At these weights, Suffolk-sired lambs had larger loin muscle areas than lambs sired by the other breeds. Columbia-sired lambs, despite their relatively heavy weights, still had the smallest loin muscle areas.

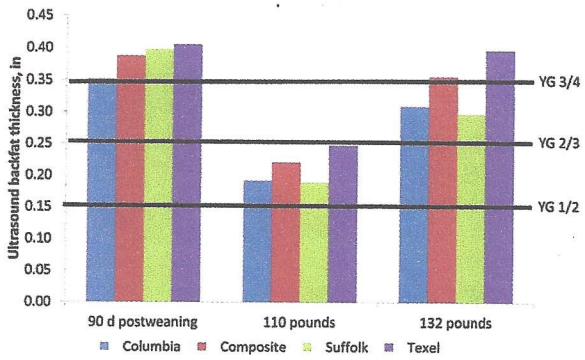
Differences among sire breeds in ultrasonic backfat thickness are shown in Figure 3. Values in the figure are averages for ewe and wether lambs. At comparable body weights, Texel-sired lambs had the most backfat, Suffolk- and Columbia-sired lambs were leanest, and Composite-sired lambs were intermediate. When harvested at 110 lbs., estimates of untrasonic backfat indicated that lambs sired by all breeds would have been predominantly in yield grade (YG) 2, although nearly 50 percent of Texel-sired lambs would have fallen into YG 3. At 132 lbs., Suffolk- and Columbia-sired lambs were mainly in YG 3, whereas Composite and, especially, Texel sires had substantial numbers of progeny in YG 4. By contrast, after 90 days on test, Texel-sired lambs weighed least but were fattest; Suffolk-sired lambs were heaviest and relatively fat; Columbia-sired lambs were relatively heavy but remained lean; and Composite-sired lambs were intermediate in both body weight and backfat thickness. These differences were generally consistent with recognized differences among these sire breeds in adult body size and associated maturing patterns.

Direct measurements of backfat and body wall thickness in wether lambs harvested at mean weights of 120, 135, or 150 lbs. were used to derive sire-breed means for these variables at an average of 82 days on test or an average chilled carcass weight of 65 lb (corresponding to an average live weight at harvest of approximately 135 lbs.) (Figure 4). Breed rankings for observed carcass fatness were similar to those observed for ultrasound backfat, but the magnitude of the differences among sire breeds in measured carcass backfat thickness was considerably less than those observed for ultrasonic measures of backfat thickness. Based on observed carcass backfat, lambs produced by all sire breeds were

Carcass Loin Muscle Area for Wethers
(Sired by Columbia, Composite, Suffolk and Texel)



Backfat Thickness for Ewe and Wether Lambs
(Sired by Columbia, Composite, Suffolk and Texel))



solidly in YG 2 at mean chilled carcass weights of approximately 65 lbs., whereas measures of ultrasonic backfat thickness would have predicted substantial numbers of lambs in YG 3 at this weight. Interestingly, measures of sire breed differences in carcass body wall were more consistent with those for ultrasound backfat. For example, relative to Suffolk-sired lambs, Texel-sired lambs were predicted to have 33% greater ultrasound backfat thickness at 132 lb (Figure 3) and 20-percent greater carcass body wall thickness at a chilled carcass weight of 65 lb but only 10% greater carcass backfat thickness at a chilled carcass weight of 65 lbs.

Differences in the magnitude of sire-breed effects on backfat thickness have implications for assigning value to carcasses of lambs sired by the various sire breeds. Lamb YG is based exclusively on predicted carcass backfat thickness, although graders have the option to 'adjust' the backfat to reflect differences in fatness observed at other sites on the carcass. Differences in ultrasound backfat thickness in Figure 3 indicate clear differences among sire breeds in YG and, therefore, carcass value and are, to some extent, supported by observed differences in body wall thickness in Figure 4. However, differences in carcass backfat thickness in Figure 4 would not result in meaningful differences among sire breeds in YG.

Results in Figure 4 were based on only wether lambs whereas results in Figure 3 are averages of ewe and wether lambs. Wethers were somewhat leaner, but the sex difference alone cannot account for the observed differences in results. A few lambs with obvious tearing of the fat cover at pelt removal were identified and removed from the data, so we believe that our harvest procedures were representative of those used in the industry. Bias in estimation of carcass backfat thickness from ultrasound measurements was addressed by scanning each wether lamb on the morning of shipment to the abattoir. No overall bias in estimation of carcass backfat was observed across years, harvest groups and breeds. However, ultrasonic estimates of backfat thickness overestimated carcass backfat as lambs began to fatten (i.e., in harvest group 2 and, to a lesser extent, harvest group 3). Ultrasound measurements also tended to preferentially overestimate carcass backfat in Texel-sired lambs. However, these harvest group- and breed-specific biases would change means for Texel-sired lambs in Figure 4 by at most 0.03 to 0.05 inches. When carcasses were fabricated into closely trimmed high-value cuts from the rack, loin and leg, the ultrasound backfat measurement was superior to the actual carcass backfat thickness as a predictor of yield of high-value trimmed cuts, and carcass body wall was a superior predictor compared to either measurement of backfat thickness.

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Carcass Backfat and Body Wall Thickness for Wethers
(Sired by Columbia, Composite, Suffolk and Texel)