VIDEO IMAGE ANALYSIS OF CARCASS CONFORMATION OF TEXEL CROSS AND CHEVIOT LAMBS

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SUMMARY

Carcasses from 44 intact male lambs were used in a study to examine conformation differences of North Country Cheviot and Texel-North Country Cheviot cross lambs. Videotapes were made of the dorsal view, side view, and close-up side view of the hindquarter, and digitized. Repeatabilities of measurements off digitized views were high, indicating the value of video image analysis techniques for assessing carcass conformation. Crossbred lambs born to Texel sires had a greater depth of carcass relative to length, ie. a more compact shape, compared to North Country Cheviot lambs.

INTRODUCTION

The Canadian sheep industry commonly uses crossbreeding to improve the growth and carcass composition of lambs, and to take advantage of heterosis for reproductive traits. If the dam breed used in such a cross is one of the prolific breeds, the resulting lambs may have higher fat levels and lack of carcass conformation compared to meat-type breeds (Maijala and Osterberg, 1977). It is thus critical to evaluate potential sire breeds in terms of their ability to produce a lean, well muscled carcass. The Texel is one breed which is of interest as a terminal sire breed. The North Country Cheviot is a breed commonly used in Atlantic Canada.

Researchers normally estimate carcass composition using carcass weight and grade, and physical dissection, although real time ultrasound is becoming popular for in vivo measures (Edwards et al, 1989). Conformation and muscling are usually subjectively evaluated. Purchas et al (1991) have proposed an index of muscularity using more objective measurements, but this technique requires taking muscle depth and length of bones. Video image analysis (VIA) techniques provide an opportunity to use more objective measures of conformation with minimal disturbance of the carcass. Several countries have recognized the value of VIA in supplementing the usual carcass grading methods (Kirton, 1989; Kallweit, 1992) but the value of VIA for assessing sheep carcass conformation has not been well explored.

MATERIALS AND METHODS

Carcasses from intact male lambs, chosen at random from two farms in Nova Scotia, were used in this study. Lambs were either North

Country Cheviot, NCC (N=21), or Texel-North Country Cheviot crossbreds ,TX (N=23). Two TX rams were used as sires, with each ram having progeny on each farm. Lambs were born during April and early May, 1992, grazed with their dams on pasture without creep feed, and weaned in late August. After weaning, lambs were transferred to a drylot and fed ad libitum a mixture of grain and ground hay containing 17% crude protein. Six TX lambs from one farm reached slaughter weight off pasture before weaning. Lambs were slaughtered at 45 kg live weight.

Chilled whole carcasses were videotaped hanging from the rail. Each carcass was marked with reference points and a ruler was included in each view to set the scale of measurement. Side views, dorsal view and close-ups of the hindquarter were videotaped. A divider of constant length was used to separate the legs for the dorsal view. Each image was digitized using the Bioquant™ Image Analysis System, and measurements taken from the digitized views. Each measurement was repeated twice, on different frames of the same view, with the same technician taking all measurements.

Data were analyzed by a model including the fixed effects of breed, farm and the breed by farm interaction, with chilled carcass weight as the covariate. Other than for calculation of repeatabilities, the average of the two values for each measurement was used in statistical analyses.

RESULTS

There were no significant farm, breed, or farm by breed effects on chilled carcass weight. Average chilled carcass weight was 18.3 kg (st. dev. 1.59 kg). All carcasses graded A. The average time required to digitize views and take measurements was eight to ten minutes per view (12 to 15 measurements per view). Repeatabilities of the measurements were in the 80 to 99% range for all but two measurements on the dorsal view (Table 1).

Significant effects of farm occurred for a number of measurements, and the farm by breed interaction was also significant in some cases. Measurements on the side view showed that the TX lambs had significantly shorter carcasses than did the NCC lambs (Table 2). Overall, TX carcasses were deeper through both the hindquarter and forequarter in comparison to their length. Chilled carcass weight was significant as a covariate for area and length measures, but not for ratios of measurements.

The dorsal view measurements showed the same trend (Table 3). TX carcasses were broader in comparison to their length, with the difference more pronounced in the hindquarter area. A similar pattern was seen in the close up side view of the hindquarter, with Texels having a ratio of 0.88 for hindquarter depth over length, compared to a ratio of 0.83 for NCC lambs (P=0.07). The ratio of the widest part of the leg to the narrowest part was 0.82 for TX and 0.76 for NCC (P=0.002).

Table 1. Typical repeatability values for three carcass views

VIEW	MEASUREMENT	REPEATABILITY	AVERAGE, cm (ST.DEV.)
Dorsal	Butt width	89.3 %	25.4 (1.12)
	Shoulder width	95.8 %	21.0 (1.48)
	Carcass length	63.3 %	71.4 (2.71)
Side (full)	Width at tail	99.5 %	16.0 (1.26)
	Shoulder width	93.3 %	26.5 (1.29)
	Carcass length	95.7 %	78.9 (3.27)
	Leg area	89.4 %	131.1 (23.37)
Leg (side)	Width at tail	97.2 %	16.0 (1.18)
	Leg length	89.2 %	19.9 (1.57)
	Leg area	87.1 %	140.9 (21.12)

Table 2. Breed Least Squares Means and Significance Levels, Side View (Values in cm, area in cm^2)

TRAIT	BREED		PROBABILITY
	NCC	TX	
Leg area	127.4	129.6	0.73
Carcass length	80.0	77.7	0.02
Carcass width below tail	15.6	16.3	0.06
Carcass width at shoulder	26.5	26.6	0.58
Tail width/length ratio	0.19	0.21	0.01
Shoulder width/length ratio	0.33	0.34	0.01

Table 3. Breed Least Squares Means and Significance Levels, Dorsal View (Values in cm, area in cm^2)

TRAIT	BREED		PROBABILITY
	NCC	TX	
Hindquarter width	25.1	25.6	0.07
Shoulder width	20.9	21.1	0.66
Carcass length	72.8	70.3	0.004
Hindquarter width/carcass length, ratio	0.34	0.36	0.002
Shoulder width/carcass length, ratio	0/29	0.30	0.09

DISCUSSION

Values obtained show that it is possible to get repeatable measurements from video images. Carcasses need to be displayed against a uniform background, and in a standardized manner. Higher repeatabilities are obtained when anatomical reference points can be clearly identified in video views. If measurements are needed in real size it is necesssary to include a measuring device in the same plane as the carcass. However ratios of measurements can be taken without this device.

A number of studies have shown that Texel-sired lambs generally have leaner carcasses than lambs sired by many other breeds (Wolf et al, 1980; Kempster et al, 1987; Clarke et al, 1988; Leymaster and Jenkins, 1993). Edwards et al (1989) found that live weight was not in itself a good predictor of salable carcass yield. However carcass leg conformation subjective score was significantly correlated ($r=0.4$) to yield of the untrimmed carcass. Leymaster and Jenkins (1993) showed that Suffolk and Texel carcasses of equivalent weight were different in shape, with Texel sired carcasses being more compact and shorter in length. However such differences in shape and conformation may be difficult to detect with standard Canadian carcass grading techniques.

The results of the present study confirm that the Texel cross carcasses are shorter and wider, especially through the hindquarter. Video image analysis provides an opportunity to study breed differences in carcass conformation in a relatively fast, objective manner.

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