ABSTRACT #T347

PRELIMINARY RESULTS OF A COMPARISON BETWEEN TEXAS RAMBOUILLET SHEEP AND AUSTRALIAN MERINO F1 CROSSES

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INTRODUCTION

Rambouillet sheep in the United States are raised for lamb, wool, and hides. Long-term selection of Merino sheep in Australia has resulted in numerous types having a broad range of production characteristics. Our specific interest is in a type of smooth-bodied Merino that is capable of producing significantly more and finer wool than the Rambouillet while concurrently weaning a comparable quantity of lamb.

The majority of previously reported U.S. research with Rambouillet sheep (and most other breeds) has focused on improving lamb production with little emphasis on wool quality or quantity. To benefit from such improvements, it has generally been necessary to increase inputs into the system, typically increased nutrition and management. When nutrition and labor are limited (as is often the case in extensive production systems in Texas and the western range states), such approaches are rarely economically feasible.

Significant negative changes have impacted sheep production during the past 20 years, including: lower prices for wool and hides, stagnant domestic demand for lamb meat, higher labor costs, lack of labor, and increasing predator losses, to name a few. Consequently, wool and lamb production and the number of sheep operations have declined. We are investigating a cross-breeding approach for increasing income from Rambouillet-type sheep that is designed to increase wool production and value without decreasing lamb production or increasing inputs.

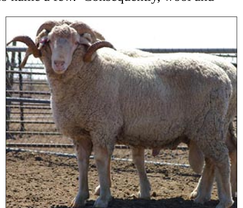

Figure 1. Australian Merino and Texas Rambouillet Rams.

EXPERIMENTAL PROCEDURE

Commercial Rambouillet (R) ewes (n = 187, 2-5 yr of age, BW = 61.5 ± 6.9 kg, average fiber diameter [AFD] = 21.3 ± 2.1 µm) were bred to selected Australian Merino (M) rams (n = 5) via laparoscopic artificial insemination (LAI) in June 2007. The LAI ewes were synchronized using intravaginal progesterone containing devices (CIDRS) on day 0, 14 days later they were injected with 500 IU of pregnant mare serum gonadotropin and teaser rams fitted with marking harnesses were introduced.

On day 16, LAI was performed on ewes exhibiting estrous until all ewes were bred. Purebred lambs were produced by exposing similar R ewes (n = 115) to highly productive, performance-tested R rams (n = 4) for three wk prior to and three wk after the LAI date. All ewes were pregnancy tested at 45 days after LAI was performed. Lambs were born and raised under range conditions. Their paternity was confirmed by DNA analysis of blood. Lambs were weighed at 5 (BW1) and 10 (BW2) mo of age. Fiber characteristics (AFD, average staple length [ASL], and average fiber curvature AFC]) were determined using an OFDA 2000 on mid-side samples obtained at 7 mo of age. Lambs were shorn at 16 mo of age, and whole fleeces were weighed and measured for clean yield (CWFP), AFD, AFC, and comfort factor (CF) using the OFDA 100, and for ASL. Data were analyzed using PROC MIXED of SAS. The model included fixed effects of genotype and sex and a random effect of sire within genotype.

Figure 2. Laparoscopic artificial insemination.

RESULTS

The low number of lambs weaned was attributed to the relatively low conception rate (LAI, 75%; naturally bred, 84% as determined by sonogram), subsequent fetal losses, and predation (percentages unknown). In fact, losses were so severe in fall 2007 that in spring 2009 we decided to shed lamb at another location where lamb production was dramatically increased, although pregnancy rates were lower than the previous year in naturally bred ewes (81%) and LAI (52%) ewes.

Least squares means of the traits measured to date are presented in Table 1. The 5-mo BW was not different between genotypes but at 10 mo, R were heavier than M X R lambs. At 7 mo, M X R were finer than R lambs and contained less crimp. Grease and clean fleece weights were not different between genotypes though M X R yielded higher than R fleeces. However, wool production per unit of BW was 20% greater in the case of the M X R crosses. M X R fleeces were finer, contained less crimp, and were of similar staple length to the R fleeces. Comfort factor in both genotypes was high, reflecting the fineness of the fleeces.

Females weighed less than male lambs at 5 and 10 mo of age. However, females grew as much wool as the males and it was coarser in the whole fleece. A possible explanation for this apparent anomaly may be that range conditions in the ewe pasture (between 7 mo and 16 mo) were superior to the pasture in which the rams were maintained.

Table 1. Body weights, fleece and fiber characteristics

Dependant Variable	Genotype			Sex		
	M X R (n = 47)	R (n = 44)	*P*	Female (n = 45)	Male (n = 46)	*P*
BW1, kg (5 mo)	27.8	29.3	0.357	27.0[b]	30.0[a]	0.011
BW2, kg (10 mo)	44.0[b]	48.6[a]	0.035	41.6[b]	51.0[a]	0.001
AFD, µm (7 mo)	18.1[b]	19.5[a]	0.005	18.8	18.8	0.896
ASL, cm (7 mo)	5.2	4.9	0.596	5.5[a]	4.6[b]	0.001
AFC, deg/mm (7 mo)	73.4[b]	80.8[a]	0.042	75.6	78.6	0.124
16 mo, whole fleece						
GFW, kg	4.3	4.1	0.543	4.1	4.2	0.509
CWFP, %	60.8[a]	56.3[b]	0.005	57.9	59.1	0.119
CFW, kg	2.6	2.3	0.119	2.4	2.5	0.239
CW/BW, g/kg	58.8[a]	48.0[b]	0.012	57.7[a]	49.1[b]	0.001
AFD, µm	17.8[b]	18.7[a]	0.015	18.6[a]	17.9[b]	0.012
CVFD, %	21.0	20.9	0.975	21.0	21.0	0.906
ASL, cm	12.0	11.4	0.429	12.0	11.4	0.077
CVSL, %	10.8	11.8	0.281	11.4	11.2	0.767
AFC, deg/mm	87.2[b]	95.5[a]	0.019	90.7	92.0	0.519
CVFC, %	66.2	65.6	0.370	66.1	65.7	0.553
CF, %	99.7[a]	99.5[b]	0.010	99.5[b]	99.7[a]	0.006

[a, b] Within genotype or sex and within a row, means without a common superscript differ ($P < 0.05$).

Key to abbreviations:
BW = body weight; AFD = average fiber diameter; CVFD = coefficient of variation of fiber diameter; ASL = average staple length; CVSL = coefficient of variation of staple length; AFC = average fiber curvature; CVFC = coefficient of variation of fiber curvature; GFW = grease fleece weight; CWFP = clean wool fiber present; CFW = clean fleece weight; CW/BW = clean wool production per unit of body weight; CF = comfort factor (% fibers < or = to 30 µm).

Figure 3. Rambouillet ewes and lambs in Texas.

APPLICATION

A strategy is being evaluated that was designed to produce crossbred sheep capable of growing significantly more and finer wool than their dams without additional inputs or decreased lamb production. If successful, this strategy would be of interest to range producers of fine-wool sheep.

Evaluated as yearlings, the M X R sheep from highly selected Australian Merino rams produced the same amount of wool as their R contemporaries. However, the M X R wool was finer and in a range that had a significant effect on value ($11.62 versus $7.45/kg clean). Wool production and BW gain may have been restricted by feed conditions in winter 2008 and spring 2009, though equally so within sex categories.

A second lamb crop has been produced with different M and R rams, and a third (and final) breeding is planned for the fall of 2009. Crossbred ewes will be evaluated further for wool and lamb production, and males will be evaluated for gain and possibly meat characteristics.