PERFORMANCE OF EWES FROM RAMBOUILLET CROSSES WITH BOOROOLA MERINO, DORSET AND FINNISH LANDRACE RAMS

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Story in Brief

Lambings (n=638) from crossbred ewes, over a four year period, were used to compare Dorset x Rambouillet, Finn x Rambouillet and Booroola x Rambouillet ewes for prolificacy and lamb growth to weaning. Litter size and weight at birth and weaning, lamb viability to weaning, and lamb birth weight and weaning weight were evaluated. Lambs were born during both spring and fall lambing seasons during the years 1991 to 1995. Dorset x Rambouillet ewes were superior for birth weight, weaning weight, litter weight at birth and litter weight at weaning. Finn x Rambouillet and Booroola Merino x Rambouillet ewes were similar in prolificacy and superior to the Dorset x Rambouillet ewes. Sheep producers may, if sufficient feed is available, consider the use of the more highly prolific Booroola Merino or Finn crossbred ewes. The single gene for prolificacy in the Booroola Merino is especially interesting since it could be moved into other populations of sheep that have better production characteristics than the Booroola Merino.

(Key Words: Sheep, Crossbred Ewes, Booroola Merino, Growth, Reproduction, Prolificacy.)

Introduction

The number of lambs born per ewe in a given period (prolificacy) and the total lamb weight weaned per ewe lambing are major factors affecting profitability in a sheep operation. Crossbreeding with prolific breeds such as the Booroola Merino and Finnish Landrace has the potential to improve overall productivity through the increase of litter size. However, it may have a negative effect on BWT of crossbred lambs. The Booroola Merino has unique qualities in that a gene (the F gene) at a single major locus controls its prolificacy. Thus, it can provide a rapid mechanism of increasing prolificacy in commercial flocks. The objective of this study was to compare F1 ewes sired by Booroola Merino (homozygous for the F gene), Dorset and Finnish Landrace rams using Rambouillet ewes for lamb growth traits and ewe reproduction in the environment of the southern great plains in Oklahoma

Materials and Methods

The data consisted of 638 lambing records over a period of three years (1991 through 1993) at the USDA-ARS Forage and Livestock Research Laboratory near El Reno, OK. Lambings were from three ewe breed groups comprised of Booroola Merino x Rambouillet (BxR), Dorset x Rambouillet (DxR) and Finnish Landrace x Rambouillet (FxR). The total numbers of ewes in each dam group across years were: 95, 202 and 161 for BxR, DxR, and FxR breed groups, respectively. Ewes ranged in age from 2 to 5+ yr. However, not all age categories were represented in each year of the study. The F1 dams in this study were generated from grade Rambouillet ewes. All F1 dams were mob-mated to either Suffolk or Hampshire terminal sires to produce market lambs.

At breeding (September), spring lambing ewes, which had been previously flushed, were exposed to fertile rams at the ratio of 1:30 (ram to ewe). Ewes were maintained on native pasture and flushed with corn. From October to December, ewes continued on native pasture, but also received a corn supplement. In January, ewes were put in a drylot and fed silage and corn to meet late gestation nutritional requirements. Lambs were born in the lot and moved to lambing pens after birth with their dams for about two days before they were moved to mixing pens for three to five days. From February to weaning, ewes and their lambs were on wheat pastures. Lambs had access to a creep ration. From May to August, ewes were put on native bermuda range.

Fall lambing ewes were flushed with corn prior to rams in May and were maintained on native range with corn supplement during breeding. From late June to August, ewes continued on native range. Ewes were moved to a drylot in September in preparation for lambing and fed silage and corn to meet late gestation nutritional requirements. Lambs were born in the lot and moved to lambing pens after birth with their dams for about two days before they were moved to mixing pens for three to five days. From lambing to weaning, ewes and their lambs were maintained on wheat pasture, while lambs had access to a creep ration.

Data for each lamb record included dam ID, breed group of dam, age of dam, sire breed group, lambing date, sex, type of birth, rearing type, birth weight, weaning weight, weaning date, and year/season of birth.

Traits subjected to statistical analysis were: birth weight - weight of individual lamb taken within 24 hr of birth, adjusted weaning weight - weight of individual lamb at weaning adjusted to a standard age of 70-d, litter weight at birth - total weight of lambs born per ewe lambing excluding fostered lambs, litter weight at weaning - the total weight of lamb per ewe lambing at weaning excluding fostered or nursery-reared lambs, litter size at birth or prolificacy - the number of lambs born to a ewe per lambing, litter size at weaning - the number of lambs reared by each ewe to weaning excluding fostered or nursery-reared lambs and lamb viability to weaning - proportion of lambs alive at weaning excluding fostered or nursery-reared lambs.

All traits were analyzed by least squares analysis of variance. The model included the main effects of breed group of dam, sex of lamb (individual lamb traits), age of dam, type of birth, type of birth/rearing and year/season of birth as well as appropriate two and three way interactions. The least significant difference was used to test for differences between means.

Results and Discussion

Means for litter size at birth and at weaning are presented in Table 1. Ewe prolificacy is a function of the genetic potential of the ewe for ovulation rate, ability of the ova to be fertilized and be able to develop into a viable offspring. Number of lambs born per ewe lambing was influenced ($P<.01$) by breed of dam. The FxR and BxR ewes were more prolific than were the DxR ewes, which can likely be attributed to higher ovulation in the BxR and FxR dams. The differences were smaller ($P>.05$) at weaning and the DxR ewes actually had slightly larger litters at weaning than the FxR ewes.

Lamb viability was affected (P<.05) by type of birth. The viability to weaning was higher for lambs born as singles.

Table 1.	**Litter size at birth and weaning and lamb viability to weaning for lambs out of Rambouillet (R) crossbred ewes sired by Booroola Merino (B), Dorset (D) and Finn (F) rams.**								
	Litter size at birth			Litter size at weaning			Lamb viability to weaning		
Sourcea	n	Mean	SE	n	Mean	SE	n	Mean	SE
Breed group of dam	***			NS			NS		
BxR	82	2.08c	.12	67	1.41b	.10	82	.80b	.06
DxR	182	1.82b	.08	163	1.37b	.05	182	.81b	.03
FxR	140	2.30c	.09	128	1.35b	.06	140	.77b	.03
Type of birth								*	
single	--	--	--	--	--	--	209	.84c	.03
multiple	--	--	--	--	--	--	195	.75b	.03

aBxR = Booroola Merino x Rambouillet; DxR = Dorset x Rambouillet; FxR = Finnsheep x Rambouillet.
b,c,dMeans within a column in a subgroup with different superscripts differ (P<.05).
*P< .05; ***P< .001.

Breed group of dam and type of birth influenced (P<.01) LWB and LWW. Means for LWB and LWW are presented in Table 2. The DxR dams ranked first in both LWB and LWW. This was a reflection of the higher BWT and WWT of their lambs and occurred in spite of smaller littersize at birth. The effect of type of birth was an important (P<.01) source of variation influencing LWB and LWW. As might be expected, the litters with multiple lambs were substantially heavier at birth and weaning.

Means for birth and weaning weights are presented in Table 3. The effect of breed group of dam was a significant (P<.01) factor influencing lamb growth. The DxR lambs ranked first in both birth weight and weaning weight. Sex of lamb also influenced (P<.05) lamb growth traits. Ram lambs were heavier at both birth and weaning. Type of birth and rearing also had an effect (P<.01) on weight. Single lambs were heavier (P<.01) at birth and single born-single reared lambs were heavier (P<.01) at weaning. Additionally, lambs born in a multiple birth litter but reared alone were heavier than multiple birth lambs reared with their littermate(s).

The Dorset-cross ewes were superior in birth weight, weaning weight, litter weight at birth and litter weight at weaning as well as having a slight advantage in fertility and lamb viability to weaning. On the other hand, the Finnish Landrace-cross and the Booroola-cross ewes were similar in prolificacy and superior to the Dorset crossbred ewes. Sheep producers may, if sufficient feed is available, consider the use of the more highly prolific Booroola Merino or Finn crossbred ewes. The Booroola Merino is especially interesting in view of the major gene influencing prolificacy. It should be possible to develop ewes with a high frequency of the prolificacy gene but to also select for other characteristics in the base breed. The advantages in growth in the Dorset breed make it an attractive candidate for receiving the prolificacy gene

Table 2.	**Litter weight at birth and weaning for lambs out of Rambouillet (R) crossbred ewes sired by Booroola Merino (B), Dorset (D) and Finn (F) rams.**					
	Litter weight at birth (lb)			Litter weight at weaning (lb)		
Source of SE	variation[a]	n	Mean	SE	n	Mean
Dam breed group		***				**
BxR	82	12.79[b]	.44	66	51.31[b]	2.23
DxR	182	15.17[c]	.29	163	60.62[c]	1.48
FxR	140	12.81[b]	.35	128	57.95[c]	1.72
Type of birth	***	***				
single	209	9.94[b]	.31	178	46.57[b]	1.57
multiple	195	17.22[c]	.29	179	66.68[c]	1.43

[a]BxR = Booroola Merino x Rambouillet; DxR = Dorset x Rambouillet; FxR = Finnsheep x Rambouillet.

[b,c]Means within a column in a subgroup with different superscripts differ (P<.05).

**P<.01; ***P< .001.

Table 3.	**Body weight at birth and weaning for lambs out of Rambouillet (R) crossbred ewes sired by Booroola Merino (B), Dorset (D) and Finn (F) rams.**					
	Birth weight (lb)			Weaning weight (lb)		
Source of variation[a]	n	Mean	SE	n	Mean	SE
Dam breed group		***				*
BxR	136	8.56[b]	.40	86	41.70[bc]	1.68
DxR	261	9.97[c]	.18	211	45.18[c]	.86
FxR	241	7.96[b]	.20	182	42.62[bd]	.95
Sex of lamb		***				*
female	298	8.45[b]	.20	232	42.40[b]	.82
male	340	9.24[c]	.18	247	43.92[c]	.79
Type of birth		***				
single	212	9.50[b]	.24	--	--	--
multiple	426	8.16[c]	.18	--	--	--
Type of birth/rearing	***					
single/single	--	--	--	177	47.58[d]	.99
multiple/single	--	--	--	65	42/110[c]	1.35
multiple/multiple	--	--	--	237	40/123[b]	.77

[a]BxR = Booroola Merino x Rambouillet; DxR = Dorset x Rambouillet; FxR = Finnsheep x Rambouillet.

[b,c,d]Means within a column in a subgroup with different superscripts differ (P<.05).

*P<.05; ***P<.001.

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