

EFFECT OF STEROID IMMUNIZATION AND BODY CONDITION SCORE ON NUMBER OF CORPORA LUTEA AND LITTER SIZE IN SHEEP

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Story in Brief

The effect of an immunization against androstendione (Fecundin) and body condition score on ovulation rate and litter size was studied on 335 Rambouillet ewes. The effect of Fecundin and body condition on number of corpora lutea was also evaluated in 147 of these ewes. Ewes receiving the Fecundin treatment were found to have a significantly greater ovulation rate as assessed by number of corpora lutea visualized by a laparoscopic examination of the ovaries. Ewes showed no significant differences between treated and non-treated ewes for lambing rate. The body condition of these ewes prior to laparoscopic examination did not have a significant effect on the number of corpora lutea, but the condition of the ewe at the time of breeding was shown to have a significant effect on subsequent litter size. In addition, the lambing rate in a field trial utilizing 99 two year old Rambouillet ewes managed under normal production conditions using Fecundin was included in the study. These ewes exhibited significantly higher litter size for the treated group. These results indicate a possible use for steroid immunoneutralization as a means to increased litter size in sheep. In addition, these findings indicate the importance of body condition of the breeding ewe as a factor controlling litter size.

(Key Words: Sheep, Immunization, Body Condition, Ovulation Rate and Litter Size)

Introduction

An increase in litter size is one of the most economically important goals in the sheep industry. The purpose of this study was to examine the effect of active immunization against androstendione on corpora lutea (CL) count and litter size. This was accomplished by using a product developed in Australia and sold in that country under the brand name Fecundin.

In addition, ewes were assigned a condition score prior to breeding using the New Zealand scoring system (Pryor, 1980). The effect of body condition score on the total number of CL and litter size were then evaluated. It is thought by some researchers in this country that the effect of the Fecundin compound is similar to the effect achieved by flushing ewes prior to breeding. Research in New Zealand and Australia however does not support this position. It was hoped that an evaluation of body condition score prior to breeding on CL number and litter size would allow evaluation of this relationship.

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Materials and Methods

Experiment 1:

Multiparous Rambouillet ewes, (n=320) located at the El Reno, Oklahoma USDA research facility, were randomly assigned to a control or steroid immunoneutralized treatment group which were administered Fecundin. Ewes were injected with 2 CC's of vehicle or the Fecundin compound (anti-androstenedione) twice at a 3 week interval prior to the onset of the fall 1985 breeding season. Two weeks after the second injection ewes were joined with vasectomized rams fitted with marker crayons to detect estrus. Ewes remained with vasectomized rams for 2 estrous cycles. Eight to ten days after detection of the second estrus half of the animals in the control or Fecundin treated groups were subjected to a laproscopic examination to evaluate the number and position of corpora lutea on the ovaries. Following laproscopy ewes were joined with fertile rams. At the time of the second injection all ewes were condition scored for condition (Table 1) and assigned one of two flushing rations. Ewes, regardless of treatment group, scoring 1-2 were fed a ration of corn and alfalfa hay (40:60% pellet) whereas ewes scoring 2.5-4.5 were fed a 20:80% pellet of the same ration. Both groups were fed at the rate of 1.5 lbs/ewe/day and supplemented with ad libitum bermuda pasture for 6 weeks prior to breeding. The second body condition score was the one used in the evaluation of condition on CL number and litter size.

Breeding for these ewes began in late November and continued into January. Ewes were handled as one large flock during the gestation period in order to reduce any variation which might be due to the location of the ewes during the winter.

At lambing ewes were placed in lambing pastures and were allowed to lamb in these smaller enclosures. Ewes lambed with only occasional assistance given to difficult births.

Table 1. New Zealand condition scoring system.

Grade 1	The spinous and transverse processes are sharp, the fingers pass under the transverse processes and it is possible to feel between the processes.
Grade 2	The processes are smooth and rounded. The fingers can be passed under the transverse processes with pressure.
Grade 3	The spinous processes are smooth and rounded and have only a small elevation. Individual bones can be felt only by applying pressure. Firm pressure is needed to feel over the ends of the transverse processes.
Grade 4	Spinous processes can be detected only by firm pressure. the ends of the transverse processes cannot be felt.
Grade 5	The spinous processes cannot be detected, nor can the transverse processes. The eye muscles (iliopsoas and psoas minor) are very full and fat.

The lamb numbers reflected by this study are based on the number of full term fetuses for each ewe. An analysis was performed on the death loss data and no effect was found. The dominate factor in the survival of the lamb appeared to be the weight of the lamb at birth.

Experiment 2:

In the fall of 1985 a field trial was conducted in Amherst, Texas in which the effect of Fecundin administration on lambing rate was determined under production and environmental conditions found in the southern great plains. In this experiment, 98 two year old grade Rambouillet ewes made up a Fecundin (n=52) and control (n=46) treatment group. These ewes were managed as part of a 1000 head commercial ewe flock. The injection procedure of Fecundin or vehicle to ewes in this experiment were as described for experiment 1.

Two weeks prior to, and during the 4 week breeding period all ewes were flushed by limit grazing (4 hr/day) on wheat pasture and given alfalfa hay every third day at the rate of approximately 2.5 lbs/ewe. In addition cotton gin trash was offered free choice. During gestation ewes were fed alfalfa hay (2.5 lbs/ewe/every third day) and cotton gin trash free choice. Two weeks prior to lambing ewes were limit grazed on wheat pasture (4 hr/day) in addition to free choice cotton gin trash.

Results and Discussion

The results of using the immunoneutralization procedure on the number of CL is shown in Table 2. These data indicate that the use of the compound increases ovulation rate in Rambouillet ewes.

Table 3 shows the results of the steroid immunoneutralization on the litter size of the ewes both at the El Reno facility and in the

Table 2. Effect of steroid immunoneutralization using Fecundin on number of corpora lutea.

	Treatment Group		P
	Injection	No Injection	
Number of ewes	72	75	
Number of CL/ewe	2.13	1.79	.0005

Table 3. Effect of steroid immunoneutralization using Fecundin treatment on litter size.

	Number of Lambs/Ewe		P
	Injection	No Injection	
El Reno trial	1.68	1.61	.1
Number of ewes	167	168	
Field trial	1.74	1.39	.005
Number of ewes	53	46	

field trial performed in Texas. Animals from which data was obtained in the Texas field trial showed a significant difference in litter size between the ewes which did and did not receive the treatment steroid immunization. However, ewes used in the El Reno trial showed no significant difference in litter size between the treated and untreated ewes. One possibility for this difference between the two studies could be due to the fact that there was an extended length of time between the time of the 2nd injection and the time of breeding (9-12 weeks) which may have resulted in lower antibody titer's to the immunogen.

In addition, ewes which had laparoscopy performed on them had a tendency to have a smaller litter size than did ewes that did not have this procedure ($P < .10$).

The effect of body condition score on litter size in the ewes in the El Reno study was also analyzed. These data indicate that the body condition of the ewes prior to the time of breeding had no significant effect on the number of CL present at the time of the laparoscopy. However, there was a highly significant effect of condition score on the litter size of the ewes ($P < .002$). This would indicate that the body condition of the animal at the time of breeding could have a significant effect on the number of lambs which could be conceived and/or maintained during gestation and the neonatal period.

These studies suggest that the use of steroid immunization has the potential of increasing litter size in sheep. In addition, body condition of the ewe at the time of breeding appears to have a very important role in litter size and should be taken into consideration by producers when they are feeding ewe prior to the breeding season.

Table 4. Effect of body condition score on litter size.

Body Condition Score	Number of Lambs
2.0	1.39(40)
2.5	1.59(31)
3.0	1.69(95)
3.5	1.77(96)
4.0	1.80(73)

Number of animals is shown following each mean.

Literature Cited

Pryor, W.J. 1980. Feeding sheep for high reproductive performance. *Current Therapy in Theriogenology*, p. 882.