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ALABAMA
SHEEP
RESEARCH

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1954 to 1969



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Alabama Sheep Research

1954 to 1969

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INTRODUCTION

IN THE MIDDLE 1800's sheep were quite numerous in Alabama, particularly in the southeastern part of the State. Numbers steadily declined until about 1950 when it was estimated that there were less than 10,000 head in the State. Increasing emphasis on livestock production and good prices for both lamb and wool in the early 1950's resulted in the development of considerable interest in sheep, particularly in western Alabama. As sheep numbers began to increase Auburn University Agricultural Experiment Station began to receive requests for information and recommendations regarding sheep production. Therefore, sheep research was begun at five Substations of the Experiment Station in 1954 and 1955. In 1956, research began at the Main Station at Auburn, and this work along with the Substation work was conducted in part under Hatch Project 109, a contributing project to the Southern Regional Sheep Breeding Project S-29.

In the early years of the project most of the effort was directed toward the solution of problems associated with production of fall-dropped lambs. Fall lamb production was considered desirable because of the availability of winter grazing crops such as small grain, ryegrass, and clover; more favorable climatic conditions for growing lambs; greater ease of parasite control; and favorable prices for milk-fat lambs in the late spring and early summer months.

It was known that breeds and strains of ewes differed in estrual activity and that estrual activity was affected by latitude and pos-

sibly other factors. Therefore, the initial project at four Substations involved comparisons of several existing breeds and cross-bred strains of ewes for early lamb production. At the other Substation comparisons were made of early lambing ability of early- and late-born ewes. At the Main Station, efforts were made to develop strains or lines of ewes specifically suited to conditions of this area by the application of breeding and selection methods. Considerable research effort was also directed toward determining the nature of the breeding season in certain breeds and crosses and identifying the causes of variation in estrual activity in order to produce a higher percentage of fall-dropped lambs.

At the time the sheep research project was initiated the sheep population in Alabama included over 100,000 breeding ewes. Sheep numbers began declining in 1958, and by January 1, 1968, it was estimated that there were fewer than 5,000 breeding ewes in the State. Because of this decline in sheep numbers, experimental work at the Substations was phased out with the final projects being terminated in 1965.

At the Main Station research emphasis was shifted in the later years from the problems associated with the production of fall-dropped lambs to those associated with intensive lamb production. Areas of investigation included year-round lambing, extremely early weaning (e.g., at 30 to 45 days of age), and the use of elevated slotted floors for growing and finishing of lambs during the summer months.

Sheep are currently being used and will probably continue to be used as experimental animals in ruminant nutrition and reproductive physiology investigations at the Main Station. However, formal research whose ultimate objective was the solution of problems associated with sheep production in Alabama was sharply curtailed in 1966 and 1967, and terminated in 1969.

EWES SUITABILITY STUDIES

Comparisons of Breeds and Strains of Ewes

Flocks consisting of 30 ewes each of 2 breeds or breed crosses were secured and located at the Black Belt and Piedmont Substations in 1954 and at the Lower Coastal Plain and Tennessee Valley Substations in 1955. Breeding groups consisting of equal numbers of each of the breeds or crosses being compared were selected each year. Each breeding group was pasture-bred to two rams of the same breed from about May 15 to October 1. Com-

parisons were terminated at the Black Belt in 1957 and at the other Substations in 1958 after it became obvious that differential culling for lamb production would invalidate further comparisons between breeds or crosses.

Results clearly show that the ewes having the higher percentages of fine-wool ancestry exceeded those having more medium-wool breeding in their ability to lamb early, Table 1. This is in agreement with reports of several workers (12,14,16) who have investigated the possibilities of producing out-of-season lambs in other sections of the United States. It is pointed out that the fine-wool ewes actually had a greater advantage than is apparent from the data since a higher percentage of ewes in the other groups was culled for poor lamb production during the course of the experiment. The relatively poor performance of the Dorset ewes was not expected since ewes of this breed are reputed to be more nearly polyestrous than ewes of most other breeds (11).

TABLE 1. EARLY LAMBING PERFORMANCE OF EWES OF DIFFERENT BREEDS AND CROSSES, ALABAMA, 1954 TO 1958

Substation	Years	Ewes lambing before January 1			
		Breed	Pct.	Cross	Pct.
Black Belt.....	3	Dorset	23 ¹	Suffolk x Rambouillet	53
Lower Coastal Plain.....	3	Hampshire	45 ¹	Columbia x Rambouillet	79
Piedmont.....	4	Rambouillet	78	Suffolk x Rambouillet	62
Tennessee Valley.....	3	Dorset	54 ¹	Dorset x Merino	78

¹ Some ewes culled during the course of the experiment for poor lamb production.

In view of the relatively poor performance of both the Suffolk x Rambouillet and Dorset ewes at the Black Belt Substation this comparison was repeated. Thirty fall-born Suffolk x Rambouillet and 30 fall-born grade Dorset ewes were secured from two breeders in Mississippi in the spring of 1957. There were no real differences between the groups and the performance of both was quite satisfactory, Table 2. A comparison of the first and second trials suggests that in an early lambing production program the best performance would be realized from ewes that were born early.

On the basis of the first comparisons the Columbia x Rambouillet ewes appeared to be suitable for use in an early lambing pro-

TABLE 2. EARLY LAMBING PERFORMANCE OF DORSET AND SUFFOLK-RAMBOUILLET EWES, BLACK BELT SUBSTATION, MARION JUNCTION, ALABAMA

Age of ewe	Dorset				Suffolk x Rambouillet			
	Bred	Lambing			Bred	Lambing		
		Early ¹	Late ²	Total		Early	Late	Total
Yr.	No.	No.	No.	No.	No.	No.	No.	
2.....	31	26	0	26	32	26	0	26
3.....	30	28	0	28	31	27	1	28
4.....	25	16	3	19	29	27	1	28
All.....	86	70	3	73	92	80	2	82

¹ Before January 1.² After January 1.

gram, Table 1. Since the Targhee breed was developed principally from a Columbia x Rambouillet cross (17) the performance of this breed was also investigated. They were compared with the Rambouillet breed which had performed well in the first comparisons.

A group of 125 purebred Targhee ewe lambs was purchased in Montana in the fall of 1957. At the same time 125 Rambouillet ewe lambs were purchased in the Edwards Plateau section of Texas. Both groups were moved to the Piedmont Substation. The first three years the ewes of each breed were divided into three breeding groups and exposed to individual rams of their own breed from about May 10 to September 1. Breeding pens were rotated during the season to minimize pasture differences and the ewes of both breeds were managed as one flock the rest of the year. After the third lambing season both breeds were rigorously culled and ewes that had lambed irregularly or had consistently lambed late were removed from the flock. For the remaining two years of the experiment the ewes were bred from May 15 to July 1.

Rambouillet ewes exceeded Targhees in proportion of ewes lambing by approximately 25 per cent in each of the first two years, Table 3. However, the performance of both groups was unsatisfactory. There was improvement in performance in both groups particularly after the heavy culling following the third lambing year but the Rambouillets continued to surpass the Targhees in percentage of ewes lambing.

The relatively poor performance of the ewes of both breeds was unexpected and is at variance with results obtained at the Main Station and earlier results at the Substations. The Rambouillets used in this comparison were somewhat smaller and considerably more covered-faced than the ewes at the Main Station. This may

TABLE 3. COMPARISON OF RAMBOUILLET AND TARGHEE EWES AT THE
PIEDMONT SUBSTATION, CAMP HILL, ALABAMA

Age of ewe	Rambouillet				Targhee			
	Bred	Lambing			Bred	Lambing		
		Early ¹	Late ²	Total		Early	Late	Total
<i>Yr.</i>	<i>No.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>No.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
2.....	124	44	15	59	82 ³	12	20	32
3.....	105	54	20	74	70 ⁴	36	14	50
4.....	97	85	2	87	91	64	0	64
5.....	46	93	0	93	47	77	0	77
6.....	43	95	0	95	39	85	0	85
All.....	415	67	10	77	329 ⁵	49	8	57

¹ Before January 1.² After January 1.³ Does not include one breeding pen of 41 ewes exposed to a sterile ram.⁴ Does not include one breeding pen of 33 ewes exposed to a sterile ram.⁵ Two breeding pens totaling 74 ewes not included.

account for some of their poor performance since Terrill and Stoehr (19) reported that large Rambouillet ewes exceed smaller ewes in lamb production. Terrill (18) also reported that open-faced ewes are more productive than covered-faced ewes. The Targhee ewes that performed well in the early years remained in the flock and continued to produce satisfactorily throughout the experiment.

Comparisons of Early and Late-born Lambs for Replacement Ewes

Fall-born ewe lambs are ready for market in the spring and usually sell for much higher prices than spring-born lambs that sell at lighter weights later in the summer. An experiment was conducted at the Upper Coastal Plain Substation to determine if spring-born ewe lambs would be as satisfactory for replacement ewes as more expensive fall-born lambs.

In April and May of 1965, 15 early-born ewe lambs were purchased from Alabama producers. In July, 15 late-born ewes were purchased. This was repeated in 1956 and 1957, so that a total of 45 early and 45 late lambs were compared. Most of the lambs of both groups were by Dorset rams and out of ewes of predominately medium-wool breeding. All ewes were kept through three lambing seasons. They were exposed to Dorset rams from about May 10 to October 1 each year.

During their first lambing season, 19 of the 45 early-born ewes lambed before January 1 and 10 lambed after January 1, Table 4. None of the late-born ewes lambed before January 1 and only two lambed after this date. This was to be expected because the late

TABLE 4. REPRODUCTIVE PERFORMANCE OF EARLY-BORN AND LATE-BORN EWES, UPPER COASTAL PLAIN SUBSTATION, WINFIELD, ALABAMA

Item	Total ewes ¹	Ewes lambing			Lambs dropped		Lamb crop ⁴
		Early ²	Late ³	Total	Born	Raised	
	No.	No.	No.	No.	No.	No.	Pct.
First season							
Early ewes.....	45	19	10	29	32	22	48.9
Late ewes.....	44	0	2	2	3	3	6.8
Second season							
Early ewes.....	42	37	0	37	45	35	83.3
Late ewes.....	43	21	2	23	27	19	44.2
Third season							
Early ewes.....	40	36	1	37	50	37	92.5
Late ewes.....	37	30	1	31	35	26	70.3

¹ Number of ewes in flock at beginning of lambing season.

² Before January 1.

³ After January 1.

⁴ Percentage of lambs raised of ewes present at lambing.

born lambs were still relatively immature. However, in the second lambing season 37 of the 42 early-born ewes remaining in the flock dropped lambs before January 1 compared to only 21 of the 43 late-born ewes. A higher percentage of the early-born ewes also lambed early in the third year although the difference was not as great as in the first two years (90 per cent vs. 81 per cent). Over all years, 23.3 per cent of the early-born ewes and 16.1 per cent of the late-born ewes produced twins. There was no appreciable difference in lamb mortality in the two groups but mortality in both groups was considerably higher than expected. Although several possible causes were carefully investigated no obvious explanation for the high mortality was found.

These results, as well as results with other breeds and cross-breeds at the Black Belt Substation and at the Main Station, suggest that early-born ewes are much more satisfactory for early lamb production than late-born ewes.

REPRODUCTIVE PHYSIOLOGY STUDIES

Estrual Activity in Open Rambouillet Ewes

It is apparent from the literature (6,7,8,10,12,13,14,16) that estrual activity in the ewe is quite variable from one geographical area to another and within breeds in the same area. Previous work at this Station had suggested that the Rambouillet ewe was well suited to a program of early lamb production in Alabama. This study was conducted over a 4-year period to determine the

normal pattern of estrual activity of the Rambouillet ewe throughout the year.

A group of 25 grade Rambouillet ewes was selected at random from the breeding flock at the Main Station. These ewes were not bred but were checked for estrus twice daily with vasectomized rams from May 19, 1957, until the experiment was terminated May 31, 1961.

A higher percentage of ewes were in estrus during the fall months than at any other time of the year, Table 5. With the exception of one year, 1958-59, estrual activity was lowest during April or May. The data reveal considerable year to year variation in the percentages of ewes exhibiting heat during months of minimal estrual activity but it should be noted that some ewes were in heat each month throughout the study. This is at variance with the findings of Godley *et al.* (5) who reported a complete cessation of estrual activity in Rambouillet ewes during the early summer months in South Carolina.

TABLE 5. OPEN RAMBOUILLET EWES IN ESTRUS BY MONTHS, AUBURN, ALABAMA

Month	In estrus				Unweighted mean
	1957-58 ¹	1958-59	1959-60	1960-61	
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
May.....		59.1	56.3	16.7	44.0
June.....	78.3	66.7	73.3	88.9	76.8
July.....	70.0	33.3	66.7	76.5	61.6
August.....	59.1	40.0	68.8	52.9	55.2
September.....	70.0	63.2	88.2	82.4	76.0
October.....	86.4	94.5	83.3	100.0	91.1
November.....	95.5	82.3	88.9	100.0	91.7
December.....	86.4	88.2	94.4	82.4	87.9
January.....	70.0	88.2	94.4	88.2	85.2
February.....	81.2	87.5	61.1	82.4	78.1
March.....	59.1	75.0	33.3	70.6	59.5
April.....	50.0	75.0	16.7	35.3	44.3

¹ Checking began May 19, 1957.

Three types of estrual activity in individual ewes were noted: (1) ewes having continuous cyclic activity; (2) ewes having one well defined period of estrual activity during the year followed by an equally well defined anestrual period; and (3) ewes having two periods of estrual activity and two periods of anestrus during the year, Table 6.

These data, as well as data on estrual activity in lactating ewes reported by Barker and Wiggins (2) and Miller and Wiggins (15), suggest that a program of lambing at less than 12-month intervals might be possible with Rambouillet ewes in this region.

TABLE 6. PATTERNS OF ANESTRUS IN OPEN RAMBOUILLET EWES,
AUBURN, ALABAMA

	1957-58		1958-59		1959-60		1960-61	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Ewes exhibiting continuous estrual activity.....	4	18	2	12	3	20	2	12
Ewes having one anestrual period during the year.....	9	41	6	38	11	73	8	47
Ewe having two or more anestrual periods during the year.....	9	41	8	50	1	7	7	41

Estrual Activity in Lactating Ewes

Results of this work were published by Barker and Wiggins (2). This work may be summarized as follows:

Fall-lambing ewes were checked for estrus at approximately 12-hour intervals from time of parturition to the beginning of the breeding season in each of two years. The average intervals from lambing to establishment of regular cyclic estrual behavior in the two years were 73.0 and 86.1 days for grade Rambouillets and 38.8 and 66.0 days for purebred Dorsets.

Average intervals in one year for eight Dorset x Rambouillet and nine Columbia x Rambouillet ewes were 53.4 and 112.0 days, respectively. Two Hampshire x Rambouillet ewes were not observed in estrus by the beginning of the breeding season in May, 1959.

Approximately 90 per cent of 244 grade Rambouillet ewes were cycling within 120 days after parturition in the 1957 lambing season, as compared to 82 per cent of 262 ewes that lambed in the 1958 season. Approximately 5 per cent of the ewes in 1957 and 9 per cent in 1958 had not exhibited estrus within 150 days after lambing. The correlation coefficient between the day of lambing within the lambing season and the interval to first estrus was highly significant in both years ($r=.25$ and $.18$).

Age within years was not a significant cause of variation in length of interval from lambing to beginning of estrual activity.

The average intervals from lambing to first estrus for non-suckled ewes in the 1957 and 1958 lambing seasons were 57.7 and 54.9 days, respectively. Corresponding figures in each year for ewes that nursed a single lamb were 72.1 and 88.4 days, respectively. Ewes that nursed twin lambs averaged 86.6 days in 1957 and 88.1 days in 1958 before estrual activity was resumed after lambing.

There was no interruption in cyclic estrual activity from first estrus after lambing to the beginning of the breeding season in mid-May in approximately 39 per cent of Rambouillet ewes that lambed in 1957-58. Similarly, 40.5 per cent of the lambing flock continued regular cyclic estrual activity to the beginning of the breeding season in 1958-59. The average length of the spring anestrus in 1957-58 was approximately 71 days. Ewes in which anestrus began late in the spring season returned to estrus in a shorter period of time than ewes in which anestrus began earlier. Anestrus terminated in most Rambouillet ewes by late May or early June.

Sixty-seven Rambouillet ewes were unintentionally bred to sexually precocious ram lambs (less than 120 days of age) in the spring of 1958. All these ewes had lambed between August 15, 1957 and January 28, 1958. The average interval from lambing to first estrus was 67.1 days. The average number of estrual periods prior to conception was 5 (range 2 to 12). Conception occurred an average of 116 days from lambing (range 27 to 276 days).

The average length of estrus for fall-lambing ewes was 2.15 checks (12-hour intervals). The monthly differences in length of estrus were not significant in either year.

Ovarian Activity and Fertility in Lactating Ewes

Results of this work, published by Miller and Wiggins (15), are summarized as follows:

Twelve fall-lambing, lactating Rambouillet ewes were laparotomized shortly after the end of the first lactation estrus. All of these ewes had a corpus luteum from a previous ovulation as well as a newly-formed corpus hemorrhagicum, indicating that a quiet ovulation had occurred. Another group of 40 ewes was checked twice daily for estrus beginning the day after lambing. On alternate days smears of cervical mucus were collected and placed on microscope slides and examined. At the time of appearance of the fern-like pattern that is typical of estrus in cycling ewes, none of the lactating ewes would accept the ram and none showed any other symptoms of heat. Eight of these ewes were laparotomized the day after the first appearance of the fern pattern, and all had recently ovulated as shown by newly formed corpora hemorrhagica. Positive smears, accompanied by estrus, occurred in 39 out of the 40 ewes between 16 and 19 days after the first estrual smear. In another study 20 ewes were force-mated when the fern

pattern first occurred after lambing. Only one ewe lambled to this breeding.

Occurrence of Post-Partum Estrus in Fall-lambing Ewes

Results of this work were reported by Barker and Wiggins (1). Therefore, only a brief summary is presented here.

Approximately 9 per cent of 240 grade Rambouillet ewes lambing in the period of October 10, 1957, to January 30, 1958, exhibited postpartum estrus between 15 and 27 hours after parturition. Similarly, 7 per cent of 274 grade Rambouillet ewes lambing between June 24, 1958, and January 28, 1959, had a postpartum estrus. No postpartum estrus occurred in ewes lambing before October 10 of the second lambing year. Of 20 Rambouillet ewes that had a postpartum estrus the first year and lambled again the second year, only two had a postpartum heat the second year. The average length of the postpartum estrual period was 2.4 (12-hour intervals) checks the first year and 2.0 the second year. Ewes having a postpartum estrus in the 1957 lambing year returned to a cyclic pattern of estrual activity an average of 61 days after lambing, compared with 73 days for ewes not having a postpartum estrus. Corresponding figures for the 1958 lambing year were 63 days and 86 days.

The ovaries of ewes slaughtered 1 day after the end of postpartum heat were small and inactive and practically devoid of follicular growth.

The injection of 50 U.S.P. units of purified oxytocin preparation immediately after parturition was without effect in producing or inhibiting post-partum estrus.

Age at Puberty in Ewe Lambs

Wiggins (21) and Hulet *et al.* (9) reported that lamb production as 2-year-olds was higher in spring-born Rambouillet, Targhee, and Columbia ewe lambs that came into heat during their first winter than in those that did not. Age at puberty has also been reported to be associated with some aspects of subsequent reproductive performance in swine (3,20).

This study was conducted to secure information on age at first estrus in ewe lambs of different genetic composition and to determine the effects of age at puberty on subsequent reproductive performance.

A total of 189 ewe lambs that had been selected for replacement ewes were checked for heat twice daily from shortly after

birth to first estrus (puberty). Breeds and crosses represented included grade Rambouillet and Columbia x Rambouillet, Dorset x Rambouillet, and Hampshire x Rambouillet. Age at puberty was extremely variable, ranging from 197 to 577 days of age, Table 7. The weighted mean age at first estrus for all lambs was 316 days or slightly more than 10 months. There were practically no differences in age at puberty among the different breeds and breed crosses except that the Hampshire x Rambouillets were somewhat older. Breed differences in age at puberty were not significant but the year differences and the breed x year interaction were significant at the 1 per cent level. The average number of estrual periods in the first year of estrual activity was 3.5 with a range of 1 to 10, Table 8. Forty-five per cent of the ewes had two or three estrual periods, 23 per cent had four or five periods, 17 per cent had from six to ten, and 15 per cent had only one period. Correlations of age at puberty with season of birth, 120-day weight, and age at first lambing, were quite variable from one year to another and from one breed group to another. Pooled correlations over all years and breed groups were small and insignificant.

TABLE 7. AVERAGE AGES AT FIRST ESTRUS IN EWE LAMBS, ALABAMA

Breed	Lambs	Age at first estrus		
		Range	Average	Standard deviation
		<i>No.</i> <i>Days</i>	<i>Days</i>	<i>Days</i>
Rambouillet.....	73	197-577	312	71.93
Columbia X Rambouillet.....	48	203-406	315	42.11
Dorset X Rambouillet.....	46	216-393	313	54.04
Hampshire X Rambouillet.....	22	262-381	339	30.24
All.....	189	197-577	316	57.34

TABLE 8. FREQUENCY OF ESTRUS IN EWE LAMBS, ALABAMA

Breed	Ewes	1 estrual period		2-3 estrual periods		4-5 estrual periods		6-10 estrual periods		Av.
		<i>No.</i>	<i>Pct.</i>	<i>No.</i>	<i>Pct.</i>	<i>No.</i>	<i>Pct.</i>	<i>No.</i>	<i>Pct.</i>	
Ramb.....	73	13	17.8	38	52.8	14	19.2	8	11.0	3.0
Colum. X Ramb.....	48	10	20.8	23	47.9	11	22.9	4	8.3	3.1
Dorset X Ramb.....	46	4	8.5	17	38.3	11	23.4	14	29.8	4.1
Hamp. X Ramb.....	22	1	4.5	7	31.8	8	36.4	6	27.3	4.4
Total.....	189	28	14.7	86	45.3	44	23.2	32	16.8	3.5

MANAGEMENT STUDIES

Finishing Spring-born Lambs in Drylot

Early in the course of these investigations lambs born in the spring were managed in a conventional manner. They were weaned about June 1 and placed on the best grazing available. They were shorn about July 1 and treated for parasites regularly throughout the summer. This method was quite unsatisfactory. In the fall they weighed little more than at weaning. However, most of them had grown considerably in frame but had lost condition and were often too heavy to command top market prices by the time they were fat enough to sell. In addition, some lambs were permanently stunted and death losses were also abnormally high.

In 1960, late-born lambs were moved directly to drylot at weaning time and self-fed a high concentrate ration. These lambs were fed in small pens on dirt floors. Electric fans provided some air circulation and on hot days the lambs tended to crowd as close to the fan as possible. Two lots of 13 lambs each were fed from May 31 to September 24. These lambs gained .34 and .37 lb. per day and graded high Choice and low Prime at slaughter, Table 9. Another group of 44 lambs fed from August 30 to December 3 gained at a slightly slower rate but graded slightly higher. These lambs were about 10 pounds heavier when started on feed. In 1961, a group of 72 lambs was fed from June 5 to August 7. These lambs weighed about 80 pounds at the beginning of the feeding period and, as expected, gained at a considerably slower rate

TABLE 9. PERFORMANCE OF SPRING AND SUMMER BORN LAMBS IN DRYLOT, AUBURN, ALABAMA, 1960 TO 1961

Date of feeding period	Lot	Lambs <i>No.</i>	Initial weight <i>Lb.</i>	Final weight <i>Lb.</i>	ADG <i>Lb.</i>	Carcass grade <i>Score</i> ¹
1960						
May 31-September 24.....	A	13	60	97	.339	14.6
	B	13	59	101	.374	14.4
August 30-December 3....	C	15	68	97	.308	15.0
	D	14	70	103	.350	14.6
	E	15	69	100	.325	15.1
1961						
June 5-August 7.....	F	24	80	100	.238	----- ²
	G	24	78	98	.266	-----
	H	24	78	101	.272	-----

¹ Carcass grades based on the following scale: 14—High Choice; 15—Low Prime; 16—Average Prime.

² Carcass grades not obtained in 1961.

than the lighter lambs fed the year before. These results indicate that lambs can be successfully fed in drylot during the summer months. Not only did these lambs reach acceptable market weights and finish in a relatively short time but only 1 of 143 lambs died. Thus drylot feeding of lambs during the summer appears to be superior to a grazing program for spring-born lambs.

Conventional and Elevated Slotted Floors for Summer Feeding of Lambs

In the summer of 1965, direct comparisons were made of the performance of lambs fed in conventional pens and on elevated, slotted floors. Approximately 60 lambs weighing slightly over 50 pounds each were divided into two comparable groups. One group was fed on a dirt floor in a 12 x 24-foot pen. The other group was fed in an identical adjacent pen except on a slotted floor elevated 36 inches. A 36-inch electric fan set at floor level was provided for each group.

Lambs on the slotted floor gained nearly twice as fast as lambs fed on the conventional floor although the latter lambs performed as well as had similar lambs in earlier years, Table 10. While the reasons for the superior performance of the lambs on the slotted floor are not known, these lambs appeared to be cooler and more comfortable. They were more active during the day and showed less tendency to crowd near the electric fans. Increased air circulation and cooler floor temperatures resulting from the elevated slotted floor would appear to be important factors. Differences in levels of parasite infestation would not appear to be a factor. Both groups were drenched at the beginning of the feeding period and periodic fecal egg counts indicated that the level of parasite infestation in both groups was very low throughout the experiment.

TABLE 10. PERFORMANCE OF LAMBS ON CONVENTIONAL AND ELEVATED SLOTTED FLOORS, AUBURN, ALABAMA, 1965

Type of floor	Lambs	Initial weight	Final weight	ADG	Feed cwt/grain
	<i>No.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>
Conventional.....	31	51	82	.31	760
Slotted.....	32	52	109	.57	490

In more recent experimental work at this Station lambs on elevated wire floors gained faster than lambs fed in small drylots. They also had a lower incidence of foot rot, a lower level of parasite infestation, and a lower mortality rate.

Lambing at Less Than 12-Month Intervals

Rather extensive studies of estrual and ovarian activity and more limited studies of fertility strongly suggested the possibilities of lambing at less than 12-month intervals. However, it did not appear that lambs produced in the late spring or summer months could be successfully raised by conventional methods of management. Later work at this Station and at other experiment stations in the Southeast (4) showed that the post-weaning performance of fall-born lambs weaned at rather early ages was quite satisfactory. Work at this Station revealed that spring-born lambs could be successfully fed in drylot during the summer months, particularly if they were kept on elevated, slotted floors. Therefore, investigations of the possibilities of increasing lamb production per ewe through the use of a year-round lambing program were initiated.

In the spring of 1965, 121 grade Rambouillet ewes were bred to lamb in October and November. At this time a program of continuous breeding was begun. This program involved the setting up of three bands of ewes: A "wet" band consisting of ewes and their nursing lambs; a "drop" band consisting of ewes exhibiting udder development and other indications of impending parturition; and a "dry" band which included all ewes not in the other bands. At lambing time ewes and their new born lambs were removed from the drop band and put in the wet band where they were exposed to fertile rams. Their lambs were weaned, at ages varying from 30 to 90 days depending on the season of the year and the amount of grazing available. The ewes were then shifted to the dry band and exposure to fertile rams continued. Ewes in the dry band were examined at 2-week intervals. As they exhibited udder development they were placed in the drop band. Ewes in the drop band and in the wet band were maintained on relatively high levels of nutrition. The rations fed depended on the season of the year but maximum use was made of temporary grazing crops such as small grains and clovers and sudan-sorghum hybrids. Grazing was supplemented as necessary with concentrates to provide adequate nutrients to support gestation and/or lactation. Ewes in the dry band were maintained as economically as possible. In the spring and summer they grazed permanent pastures consisting of common bermudagrass, coastal bermudagrass, and bahiagrass. In the winter they were fed sorghum silage and a small amount of protein supplement.

In the 32-month period between May 1, 1965 and January 1, 1968, 6 per cent of the ewes lambled five times, 75 per cent lambled four times, 13 per cent lambled three times, and 6 per cent lambled twice, Table 11. This is an average of 3.81 lambings per ewe or an average of 8.4 months between lambings.

TABLE 11. SUMMARY OF LAMBING PERFORMANCE OF EWES ON CONTINUOUS BREEDING PROGRAM, AUBURN, ALABAMA, 1965 TO 1968

	No.	Pct.
Ewes lambing twice.....	7	6
Ewes lambing three times.....	16	13
Ewes lambing four times.....	91	75
Ewes lambing five times.....	7	6
Total lambing.....	461	
Av. lambings/ewe.....	3.8	
Av. interval between lambings.....	8.4 months	

WOOL STUDIES

Early in the course of sheep research in the Auburn University Agricultural Experiment Station System it became apparent that the grease fleece weights of the ewes of most breeds and crosses were considerably lower than published weights of similar wool produced in other sections of the country. Visual appraisals of these fleeces suggested that they were unusually "clean" and therefore high yielding. If this were indeed the case the reason for the lighter fleece would be established, but even more important it would establish that Alabama wools were worth more on a grease basis because of their higher yields.

To obtain information on clean yields of Alabama wools, samples were taken from 300 sheep before shearing in 1958, Table 12. The samples were sent to the Sheep, Goat, and Fiber Section, Agricultural Research Service, USDA, Beltsville, Maryland, for individual clean yield determinations.

TABLE 12. WOOL TYPES AND LOCATIONS OF SHEEP USED IN CLEAN WOOL DETERMINATION, ALABAMA, 1958

Wool type	Samples	Locations
	No.	No.
Fine.....	193	3
Half-blood.....	52	3
Medium.....	55	4
Total.....	300	

It can be seen in Table 13 that yields of the various grades of Alabama wools were considerably above the national average. The fine wools yielded 17 per cent more clean wool, the half-

TABLE 13. CLEAN YIELDS OF ALABAMA WOOLS COMPARED WITH NATIONAL AVERAGE, 1958

Wool type	Samples	Alabama average yield	National average yield ¹
	No.	Pct.	Pct.
Fine.....	193	57.4	40
Half-blood.....	52	60.6	45
Medium.....	55	63.1	53

¹ The mid-point of the ranges in yields of domestic wools as given in The Domestic Wool Clip, USDA Production and Marketing Administration, 1951, pp. 7-8.

blood wools yielded about 15 per cent more, and the medium wools about 10 per cent more. In view of the range in ages of the sheep sampled and the fact that they were from a number of locations within the State, the clean wool yields obtained should be representative of wools produced in this area. These results indicate that these are unusually high yielding wools and should sell for more money per pound than those similar wools produced in other areas.

SUMMARY

The results of the experimental work reported herein can be summarized as follows:

1. Ewes having a high percentage of fine-wool ancestry surpassed ewes having more medium-wool breeding in their ability to lamb early.
2. Ewes that were themselves born early were more suitable for an early-lambing program than ewes born late both from the standpoint of the percentage lambing early and total percentage of ewes lambing.
3. Although a higher percentage of fine-wool ewes exhibited estrual activity during the fall than at any other season, many ewes exhibited estrual activity nearly the year round.
4. The average interval from lambing to the beginning of cyclic estrual activity in fall-lambing Rambouillet ewes was about 60 days and over 90 per cent began cycling within 90 days after lambing.
5. First estrus in the post-partum ewe was almost invariably preceded by a "quiet" ovulation which could be detected from the fern-like pattern of the cervical-vaginal mucus smears.
6. Approximately 12 per cent of fall-lambing ewes exhibited an anovulatory estrus within 12 to 36 hours after lambing.

7. The average age at puberty in fall-born ewe lambs selected as replacement ewes was about 10 months.

8. Early weaning followed by drylot finishing of spring-born lambs was found to be superior to the conventional carry-over method which involves grazing permanent summer pastures followed by winter grazing on small grain and clover pastures.

9. Lambs fed on elevated slotted floors gained almost twice as fast and required about one-third less feed than similar lambs fed on conventional dirt floors.

10. Rambouillet ewes used in a program of continuous lambing averaged 3.81 lambings per ewe over a 32-month period or an average of 8.4 months between lambings.

11. The clean yields of Alabama wools over a wide range of grades were from 10 to 17 per cent higher than the national average for those grades.

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