

A STUDY OF THE EXTENT OF LACTATION ANESTRUM
IN WESTERN RANGE EWES

by

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INTRODUCTION

Practical and economical methods of increasing productivity in domestic animals has been a challenge to man since history began. Progress has been made, yet a myriad of problems remain. As our knowledge in scientific fields increases we are better able to cope with the problems and answer the questions concerned, in the demand for an ever increasing production. That the domestic sheep has been the object of intensive study, along these lines, is obvious from the literature compiled in various scientific journals.

The study of the reproductive phenomena in sheep has probably received as much attention as any other one phase of the over all problem. The bulk of this work has been accomplished since the turn of the century. This paper concerns itself, in a very limited way, with but a single phase of the reproductive phenomena; namely, the suppression of estrus due to lactation or "lactation anestrus". This problem is of significant importance to the commercial sheep breeder from the standpoint of increased production. Is it possible and feasible to obtain two lamb crops per year from a single flock of ewes? The answer to this question is dependent on a number of factors. The most prominent ones under Kansas conditions would seem to be the extent of the sexual season, i. e. the period during which the ewe experiences estrus and is capable of conceiving, and the duration of lactation anestrus. It is apparent that with a gestation period of approximately twenty-one weeks, that the potential sexual season would have to extend over a period of six months and that the suppression of estrus due to lactation could not continue for more than about five weeks. Post-parturitional heat occurs in some mammals but does not seem to be characteristic of sheep (20), though it has been observed. From the literature it would appear that extent

of the sexual season is not a serious problem, since the normal breeding season for the breeds of sheep common to the United States extends from September to March (4) (13) (19). It has been suggested however, that within a population of sheep in a general geographic area, the onset, intensity and duration of estrus may vary considerably among ewes of the same breed origin. This is explained by the unconscious selection by the individual breeder of ewes which breed at a optimum date along with the culling and disposal of ewes that do not lamb when bred at this particular time (19). The other problem, lactation anestrus, is the object of this paper. The purpose being to ascertain if a ewe may come in heat and breed during the suckling period, or if it is necessary to wean the lamb in order for the ewe to exhibit estrus.

It is apparent that if two lamb crops are to be obtained from a single flock of ewes in the same year, breeding must take place early in the season (August and September) so that the ewes will lamb in January and February. This allows a period of four to six weeks for the period of lactation anestrus prior to the cessation of breeding.

REVIEW OF LITERATURE

Pertinent experimental work relative to the problem studied in this paper is limited. In Australia, Granger (7) working with a flock of Merino ewes which had been lambing both spring (October and November) and autumn (April and May) took a small group which had lambed to the previous spring mating and mated them in the autumn rather than allowing a further twelve months to lapse before mating again. The practice of spring and autumn mating was discontinued in favor of mating only in the spring. Of the eighty-three ewes which were bred following lambing, fifty-five gave birth to lambs,

two others died during pregnancy and twenty-six did not lamb. Breeding and conception occurred as early as the fifth week, (29th to 35th day) after lambing. Ewes conceived during the fifth week after lambing only if they had been running with the ram for at least eight or nine days. There was a higher proportion of conceptions among ewes lambing later and being placed with the rams sooner after lambing. The ewes were in exceptionally good condition and the pasture was lush and palatable.

There were no conclusions drawn from this work because of the conditions and nature of the study. The data, however, suggested that under certain conditions the presence of the male influences estrus phenomena in sheep.

Hammond Jr. (10) working with a group of Suffolk-cross ewes at Cambridge, concluded that lambing one hundred days prior to the beginning of the normal estrual season did not delay the start of the season. The period of lactation anestrus shortened as the season progressed until at, or near the height of the normal breeding season, it was negligible. Lambing after the middle of the season usually prevented the return of estrus until the following year.

Yeates (19) found that lactation anestrus relative to onset of estrus was dependent on date of parturition in relation to entrance into or point of the seasonal breeding cycle. At the beginning of the seasonal cycles duration of lactation anestrus was five to six weeks. Parturition near the middle of the cycle was evidenced by short lactation anestrus. Parturition after the middle of the cycle usually prevented reappearance of estrus until the following year. Five ewes lambing the latter part of October bred back the latter part of January. These ewes had lambed in October as the result of artificial light stimulation and had been placed in the natural environment after lambing. The latent period was not considered to be due to lactation but rather the necessary "threshold period" of light stimulation.

Phillips, et al (15) investigated the possibility of obtaining two lamb crops per year from Karakuls. Their findings confirmed those of Hammond Jr. However, they concluded that the restricted breeding season of the ewes seriously limited the possibility of obtaining two lamb crops a year in practical breeding operations. Three percent of the lactating ewes conceived in the same season whereas the figure was twenty percent for the non-lactating ewes.

Usakova and Fudelj (18) working with Romanov ewes, which normally breed twice a year found that 2.2 percent of 945 ewes failed to breed in July and August, and 31.4 percent of 287 failed to breed in January and February, of the 1937 season. Corresponding figures for 1938 were, 2.6 percent of 869 ewes in July and August, and 21.6 percent of 162 ewes in January and February. For ewes breeding at the winter service the majority came in heat thirty-five to forty days after lambing, (range 10-65).

There is evidence to indicate that ewes frequently do come in heat during lactation and Cole and Miller (5) stated that the vaginal smear studies of lactating ewes indicated that heat during lactation might be rather common.

MATERIALS AND METHODS

Ewes

The data presented here was obtained from observations of an experimental flock belonging to Kansas State College and maintained at the College Sheep Barns. The observations were made from January 12, 1953 to May 19, 1953. However, material from the major experiment, this paper being only one phase, will be cited as is applicable.

The flock included 137 head of western range ewes, consisting of fifty-two head of Blackface crossbred ewes, forty-two head of high-grade Columbia

ewes and forty-three head of high-grade Rambouillet ewes. The Blackface crossbred ewes were derived from the first cross of Hampshire and Suffolk rams on whiteface western range ewes, with the Suffolk cross predominating. The Columbia and Rambouillet ewes were from a State College flock which was maintained under range conditions. The flock was purchased as a unit in the fall of 1951, as spring range lambs. They were shipped to Kansas and were maintained at the College farm. The ewes were bred to lamb as coming two-year olds in the summer and early fall of 1952. Lambing commenced December 26, 1952 and was completed on March 13, 1953.

During the breeding season (July 10, 1952 to October 16, 1952) and up to time of lambing the ewes were run on native grass pasture during the day. At night they were corralled and fed one pound of a grain mixture which consisted of: six parts corn, two parts whole oats, two parts wheat bran, and one part soybean pellets per ewe per day. Hay was provided free choice. The pregnant ewes were pastured until lambing and were fed Milo stover on pasture after the grass became too short for adequate nutrition.

After lambing the ration consisted of one and one-half pounds of a grain mixture consisting of: six parts whole corn, two parts wheat bran, and one and one-half parts soybean pellets, with one to three pounds of hay and two pounds of corn or sorghum silage. This ration was continued until the lambs were weaned.

As the ewes lambed they were taken out of the flock and placed alone with their lambs in individual pens for a period of twenty-four to forty-eight hours, after which they were moved to the "drop flock", i. e. the flock made up of ewes with suckling lambs at their side. The ewes with their lambs were run in two groups to provide better care and attention. All ewes, with

the exception of ewes with twin lambs, lambing up to and including February 4, were run in Group I (lambing dates from December 26, 1952 to February 4, 1953). The ewes with twins and those lambing February 5, and thereafter were placed in Group II (lambing dates from February 5, 1953 to March 13, 1953). Group I contained fifty-three ewes and their lambs and Group II contained sixty-two ewes and their lambs. Twenty-two ewes did not lamb and were used as partial controls.

The Columbia and Blackface crossbred ewes gained weight and condition during the suckling period while the Rambouillet ewes barely maintained themselves, and some probably lost weight. This fact is mentioned, in that it may aid in interpreting the results.

Rams

Three mature, vasectomized, Rambouillet rams were used to determine and indicate ewes in heat. The first ram was placed with the Group I ewes on January 12, 1953. The other two rams were added on February 6, 1953: one with the ewes that hadn't lambed and one with the Group II ewes. The rams were periodically shifted from one group to another as an added effort to maintain libido and ascertain all ewes exhibiting estrus. Rams are commonly thought not to exhibit preferential breeding, but McKenzie and Terrill (13) reported finding ewes in full estrus which could not "entice" a specific ram; the ram being fully functional with other ewes.

The rams were fitted with breeding harnesses and acclimatized (Thermal) oil chalk, for the purpose of observing heat and ascertaining service. The chalk was changed every twelve to fourteen days, with three different colors of chalk being used. This method had its' limitations in that the chalk did not always remain soft enough to mark, especially if the wool was damp.

After the first two or three days the rams became accustomed to being with the ewes and settled down, molesting only those ewes which attracted them. Daily observation of the different groups seemed to indicate more breeding activity than the records show, and it is possible that some ewes in estrus were missed because of the overly hard chalk during cold weather.

From observation of rams in range herds and farm flocks it would appear that the ewe attracts the ram in some manner before accepting coitus. Apparently the rams are attracted to the ewes by the olfactory sense (1) as vaginal and perineal swabs from ewes in heat, when applied to pregnant ewes, make them attractive to the rams. Range rams will not tease ewes which do not stimulate this olfactory sense nor will they tease a ewe shortly after she has been bred by another ram.

EXPERIMENTAL RESULTS

Of the 115 head of ewes which produced lambs, fifty-two head or 45.2 percent were observed to show heat during lactation. Estrus occurred on an average of sixty-five days from the average date of lambing for the entire group. The fifty-two head of ewes exhibiting estrus consisted of, sixteen head (42%) of Rambouillet ewes (thirteen head in Group I and three head in Group II); eighteen head (44%) of Blackface crossbred ewes (nine head in Group I and nine head in Group II); eighteen head (50%) of Columbia ewes (four head in Group I and fourteen head in Group II). The average lambing date for the Rambouillet ewes was January 17, with an average of ninety-one days from average date of lambing to average date of first heat. For the Blackface crossbreds the average date of lambing was February 1, with an average of fifty-nine days from average date of lambing to average date of first heat. Average lambing date for the Columbia ewes was February 10, with

an average latent period of fifty-five days.

Among the Rambouillet and Blackface crossbred ewes the latent period of the Group I ewes was approximately double that of the Group II ewes. In the Columbia ewes there was very little difference between the two groups. The Group I ewes bred an average of eleven to twelve weeks post-partum (range 1 to 12 weeks), while the Group II ewes bred an average of six to seven weeks after lambing (range 1 to 12 weeks). (For a break down of the above figures, see Table 1, page 9, and Tables I, II and III of the appendix).

As was stated previously a vasectomized ram was placed with the Group I ewes on January 12, and with the pregnant and Group II ewes on February 6. The first ewe to exhibit estrus in the pregnant ewe group did so on February 10, this ewe subsequently proved to be without lamb. First estrus among the lactating ewes occurred on February 28, with heat being shown by both a Blackface crossbred and a Columbia ewe. The first Rambouillet to exhibit estrus did so on March 3. This would not indicate that the presence of or association with a ram influences the mating instinct or onset of estrus.

Breeding activity among the Group I ewes was sporadic with none occurring for approximately six weeks after the ram was placed with the ewes. This period was well within the limits prescribed as the normal breeding season for the breeds of sheep common to the United States (4) (13) (19). In Group II breeding activity occurred during the sixth and seventh week after lambing, and during the period of the year which many consider to be at or beyond the limits of the normal breeding season.

The literature would indicate that with ewes losing their lambs because of abortion or stillbirth there is a tendency to come in heat again quite soon, there being no suppression of estrus due to lactation. The observations were made of normal estrus in a Merino ewe seventeen days (16) and twenty-one

Table 1. Compilation of lambing and estrus data.

	RAMBOUILLETS LACTATING			BLACKFACE CROSSBREDS LACTATING			COLUMBIAS LACTATING					
	GROUP I : GROUP II : ALL : DRY : DRY : DRY : DRY : DRY : DRY	GROUP I : GROUP II : ALL : DRY : DRY : DRY : DRY : DRY	GROUP I : GROUP II : ALL : DRY : DRY : DRY : DRY : DRY	GROUP I : GROUP II : ALL : DRY : DRY : DRY : DRY	GROUP I : GROUP II : ALL : DRY : DRY : DRY : DRY	GROUP I : GROUP II : ALL : DRY : DRY : DRY : DRY	GROUP I : GROUP II : ALL : DRY : DRY : DRY : DRY	GROUP I : GROUP II : ALL : DRY : DRY : DRY : DRY	GROUP I : GROUP II : ALL : DRY : DRY : DRY : DRY			
No. of Ewes Tested	27	11	38	5	22	19	41	11	16	20	36	6
No. of Ewes exhibiting estrus	13	3	16	2	9	9	18	7	4	14	18	6
Percentage of Ewes exhibiting estrus	48	27	42	40	41	47	44	64	25	70	50	100
Average Dt. of lambing* (month and day)	1/9	2/8	1/17		1/13	2/20	2/1		1/23	2/15	2/10	
Average No. of days from lambing to first heat	100	51	91		76	42	59		53	56	55	
Average date of first heat period* (month and day)	4/20	4/11	4/18		3/30	4/4	4/1		3/19	4/13	4/7	
Range (month and day)	3/23 5/19	3/26 5/12	3/23 5/19		3/7 5/19	3/15 5/7	3/7 5/19		3/16 4/2	3/10 5/19	3/10 5/19	

*Base Periods:

Lambing:

Rambouillet-December 26, 1952
Blackface crossbred-December 27, 1952
Columbia-December 30, 1952

First Heat:

Rambouillet-March 3, 1953
Blackface crossbred-February 28, 1953
Columbia-February 28, 1953

days (17) after the birth of a stillborn lamb. The four ewes which lost their lambs in this experiment do not substantiate this idea and the appearance of first estrus in these ewes was approximately the same as for the lactating ewes.

Of the twenty-two head of dry ewes that were used as partial controls in this experiment, fifteen head or 68.18 percent exhibited estrus. The first ewe to show heat did so on February 10, with signs of cyclic heat being apparent among these ewes until May 19. The heat periods were not consecutive. However, those that were recorded were multiples of 16 to 17 days. There seems to be no explanation of the occurrence of only one heat period among the majority of the lactating ewes.

Of the last eleven ewes to lamb, six of them were in heat the day previous to lambing. The marking was sufficiently prominent to indicate with little doubt, that the ewes did accept the ram. This is an interesting observation which has not been previously made in other similiar studies.

For the purpose of this experiment it is assumed that all of the ewes reported herein were lactating during the entire period. Individual ewes were checked at different times throughout the period and in no instance did any of them show that the lambs had ceased suckling. The lambs were placed on a "creep" as soon as the ewes joined the different Groups and remained on the "creep" beyond the period covered by this paper.

DISCUSSION

An explanation of the preceding events may be partially accounted for by nutrition and climatic conditions. As evidenced by this study breeding activity was apparently more prevalent during periods when the days were warm and sultry. Reference to the Tables contained in the Appendix will

indicate that greater breeding activity occurred during the periods of, March 13 to 31 and May 7 to 19. These periods were recorded as being warm and sultry. The mean temperature (maximum and minimum) for the period March 13 to 31 was 50° F which was 5° above the mean temperature for the entire month. The high temperature reading for the month was 83° F on March 20. The mean temperature for the month of May was 63.79° F. Elpatjevskii (6) found a reduction in the number of ewes coming into estrus in wet, cold or stormy weather. Hammond Jr. (10) stated that with the passage of the seasons and the accompanying variation in length and intensity of daylight there are fluctuations in temperature and rainfall which surely influenced reproductive activity, if not directly, then by their effect on nutrition. Morrison (14) stated that the plane of nutrition can delay or prevent the occurrence of heat, and conception in the normal ewe. Usakova and Fudelj (18) concluded that the winter mating season lasted over two months due to insufficient feeding, especially during the previous suckling period. Live weight and fertility were also affected by feeding. As stated the Rambouillet ewes were in poor flesh during the greater part of the experimental period while the Blackface crossbred and Columbia ewes were in high condition. This may explain some of the inconsistencies of the data. A very fat condition may be more detrimental than a very thin condition, but both should be avoided (11).

A factor relative to the longer indicated lactation anestrus in the Rambouillet ewes may be that they were actually experiencing a quiescent ovarian period during January, February and March, accompanied by a return to normal cyclic estrus in late April and May. The quiescent period is an observational hypothesis (3) based on the lambing percentages of western range herds (predominantly Rambouillet), in which the practice of breeding during late December and January is a standard procedure. The return of normal

cyclic estrus in April and May has been shown by Bell (2) working with Rambouillet ewes at State College, New Mexico. It is possible that those ewes coming into estrus earlier in the fall also tend to go into anestrus later in the spring. This may be significant (13).

Experimental evidence would indicate that the appearance of estrus in these ewes was followed by ovulation (3), the heat being a normal manifestation. Young (20) reported that workers have observed ovulation without heat especially near the beginning and end of the breeding season, but there is less certainty about the occurrence of heat without ovulation. Marshall, (12) stated that in every case when a ewe was killed after estrus and observed, a corpus luteum was found. Grant (8) reported that not one of the 400-500 mature ewes examined at the abattoir during the normal breeding season failed to show corpora lutea. McKenzie and Terrill (13) noted that two ewes which came into heat without ovulation were again in heat 4 and 4.5 days later when ovulation did occur. The conclusion can be made (20) that in the ewe normal heat does not occur without ovulation or at least in the absence of changes which normally lead to ovulation.

SUMMARY AND CONCLUSIONS

Out of a flock of 137 head of western range ewes, 115 head bred and conceived during the period of July 10, 1952 to October 16, 1952. Lambing began December 26, 1952 and was completed March 13, 1953. The 115 head of ewes and their lambs were placed in two groups, based on date of lambing. Group I was made up of ewes lambing from December 26 to February 4. Group II ewes lambed from February 5, to March 13, 1953.

Fifty-two head of the ewes or 45.2 percent exhibited estrus on an average of sixty-five days after lambing. The Group I ewes bred an average of eleven

to twelve weeks following lambing and the Group II ewes an average of six to seven weeks after lambing. The Rambouillet ewes had an average latent period of ninety-one days, the Blackface crossbreeds fifty-nine days and the Columbia ewes an average of fifty-five days.

This study would indicate that nutrition and climate are important factors relative to the reappearance of the estrual phenomena in the lactating ewe. During the course of the experiment the Blackface crossbred and Columbia ewes became highly fleshed with the Rambouillet ewes barely maintaining body weight and in some instances probably losing weight. Forty-two percent of the Rambouillet ewes bred during lactation, with forty-four percent of the Blackface crossbred and fifty percent of the Columbia ewes coming in heat while suckling lambs. The most breeding activity was shown during periods that were recorded as being warm and sultry. The first period (March 13 to 31) having a mean temperature 5° above the mean for the month. The second period occurring in May when the mean temperature for the month was 63.79° F.

It is possible that the Rambouillet ewes were experiencing a quiescent ovarian period during January, February and March with a return to normal cyclic estrus in April and May. This condition has been shown by other workers (3).

The data presented here does not allow any definite conclusions concerning the extent of lactation anestrus. It does, however, point up the fact that the effect and extent of lactation anestrus may demand closer scrutiny as regards the reproductive phenomena. The data does present a few major points which may be brought forth. As concerns this specific experiment, it would seem that temperature and atmospheric conditions along with an optimum level of nutrition are factors which influence or prolong lactation

anestrus (return to estrus), either during or after the normally accepted breeding season. Hafez (9) concluded that sexual activity occurred mostly when the length of daylight was twelve hours or less and that the breeding season of sheep is controlled by genetic factors (breed) and environmental factors; length of daylight being a major factor which overrides other factors such as atmospheric temperature, humidity, rainfall and nutrition. In attempting interpretation of variations observed (10), light might be responsible. However it has been shown that light and nutrition may run parallel in their variation and nutritive changes alone may sometimes provide satisfactory explanation. It would also appear (this may be very closely related to the above statement) that those ewes lambing later came on heat sooner, there being a shorter period of estrus suppression due to lactation. It is possible that the shortened period was in part due to a closer association with the ram.

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BIBLIOGRAPHY

1. Adsell, S. A.
Patterns of mammalian reproduction, New York: Comstock Pub. Co., 1946.
2. Bell, T. Donald
Breeding studies in Rambouillet ewes and lambs, New Mexico A and M.,
Press Bul., 1943.
3. _____
Oral communication, 1953.
4. Cole, H. H., G. H. Hart and R. F. Miller
Studies on the hormonal control of estrous phenomena in the anestrus
ewe. *Endocrinology* 36:370, 1945.
5. Cole, H. H., R. F. Miller
The changes in the reproductive organs of the ewe with some data
bearing on their control. *Amer. Jour. of Anat.* LVII 39-97, 1935.
6. Elpatjevskii, D.
The influence of meteorological factors on the manifestation of heat in
sheep. *Ovcevodstvo* No. 7 32-34, 1943. Original not seen. *Abst. Anim.*
Breeding Absts. II 323, 1930.
7. Granger, W.
Conception in lactating ewes. *Austr. Vet. Jour.* 23(6):143, 1947.
8. Grant, R.
Cited by W. C. Young. Observations and experiments on mating behavior
in female mammals. *Quart. Rev. Biol.* 16:135, 1941.
9. Hafez, E. S. E.
The influence of environment and heredity on the breeding season of
the ewe. *Experientia* 7(9) 353-54, 1951. Original not seen. *Abst.*
Biol. Absts. 5889 Mar. 1952.
10. Hammond, John, Jr.
On the breeding season in sheep. *Jour. of Agric. Sci.* 34:98, 1944.
11. Kamlade, W. G.
Sheep science. New York: J. B. Lippincott Co., 1947.
12. Marshall, F. H. A.
Cited by W. C. Young. Observations and experiments on mating behavior
in female mammals. *Quart. Rev. Biol.* 16:135, 1941.
13. McKenzie, F. F., C. E. Terrill
Estrus, ovulation and related phenomena in the ewe. *Mo. Agric. Expt.*
Sta. Res. Bul. 264, 1937.

14. Morrison, F. B.
Feeds and feeding. Twentieth Edition. New York: Morrison Pub. Co.
15. Phillips, R. W., R. G. Schott, and V. L. Simmons
Seasonal variations in the occurrence of conceptions in karakul sheep.
Jour. of Anim. Sci. 6(2) 123, 1947.
16. Quinlan, J., G. S. Mare
17th Rep. Dir. Vet. Ser. Anim. Ind. S. Afr. 1931. Original not seen.
Jour. of Agric. Sci. 39(1) 1-43, 1949.
17. Roux, L. L.
Onderstepoort Jour. Vet. Sci. 6:465, 1936. Original not seen. Jour.
Agric. Sci. 39(1) 1-43, 1949.
18. Usakova, S. A., T. N. Fudelj
Trud. jaroslavsk. oblast. opyt. Stanc. Zivotn p. 93. Original not
seen. Abst. Anim. Breeding Absts. 14:236, 1941.
19. Yeates, N. T. M.
The breeding season of the sheep with particular reference to its
modification by artificial means using light. Jour. of Agric. Sci.
39(1) 1-43, 1949.
20. Young, W. C.
Observations and experiments on mating behavior in female mammals.
Quart. Rev. Biol. 16:135, 1941.

APPENDIX

Table 1. Group I ewes.

Lambing December 26, 1952 to February 4, 1953

Tag No.	Date Lmbd.	Dt. of first heat after	Days Lmbg. to Brdg.	Av. No. of days to first heat (from base)*	Av. No. of days to lambing (from base)*
B-7	1/16	2/28 3/7	43	0	20
B-8	1/20	3/13	51	13	24
B-14	1/17	3/29	70	29	21
B-18	12/27/52	4/7	100	38	0
B-31	1/10	5/19	128	80	14
B-35	1/3	4/19	105	50	7
B-40	1/15	4/12	86	43	19
B-42	1/18	3/13	53	13	22
B-49	1/23	3/7 3/23 4/12	42	7	27
C-24	1/25	3/16	49	16	26
C-32	1/16	4/2	75	33	17
C-36	1/20	3/26 4/5	64	26	21
C-43	1/31	2/28	27	0	32
R-5	12/29/52	4/25 5/11	116	53	3
R-6	2/3	5/7	93	65	39
R-8	1/24	5/19	120	77	29
R-16	12/28/52	5/14	137	72	2
R-18	1/16	4/7	81	35	21
R-21	12/28/52	5/19	142	77	2
R-26	12/26/52	3/3 5/2	67	0	0
R-27	1/17	5/7	110	65	22
R-28	12/28/52	4/7 4/25	100	35	2
R-32	1/19	3/29	68	26	24
R-33	1/13	4/9 4/23	85	37	18
R-34	1/16	5/5	109	63	21
R-38	1/1	3/23	80	20	6

*Base Periods:

Lambing:

Rambouillet-December 26, 1952

Blackface crossbred-December 27, 1952

Columbia-December 30, 1952

First heat:

Rambouillet-March 3, 1953

Blackface crossbred-February 28, 1953

Columbia-February 28, 1953

Table 2. Group II ewes.

Lambing February 5, 1953 to March 13, 1953

Tag No. :	Date Lmbd. :	Dt. of First heat after :	Days Lmbg. to Brdg. :	Av. No. of days to first heat (from base)* :	Av. No. of days to lambing (from base)* :
B-4	2/25	3/26 4/19	28	26	60
B-5	2/15	3/27	39	27	50
B-15	3/1	5/7	66	68	64
B-17	2/20	3/27	34	27	55
B-24	2/21	3/17	24	17	56
B-30	2/8	4/5	55	36	43
B-38	2/16	3/15	26	15	51
B-43	2/17	5/7	78	68	52
B-45	3/1	3/29	28	29	64
C-2	2/10	5/7	86	68	42
C-6	2/7	4/2	53	33	39
C-8	2/5	3/26	47	26	37
C-17	2/10	5/10	89	71	42
C-20	2/15	4/1 5/14	44	32	47
C-22	2/5	3/27	48	27	37
C-28	3/13	3/19	5	19	73
C-31	2/10	5/19	98	80	42
C-33	2/16	3/10	21	10	48
C-35	2/16	5/14	87	75	48
C-37	2/22	4/19	56	50	54
C-39	2/18	3/13 5/7	23	13	50
C-40	2/23	4/19	55	50	55
C-44	2/19	5/7	76	66	51
R-11	2/18	3/27	37	24	54
R-17	2/13	5/12	88	70	49
R-22	2/25	3/26	29	23	61

*Base Periods:

Lambing:

Rambouillet-December 26, 1952
 Blackface crossbred-December 27, 1952
 Columbia-December 30, 1952

First heat:

Rambouillet-March 3, 1953
 Blackface crossbred-February 28, 1953
 Columbia-February 28, 1953

Table 3. Ewes which lost lambs at birth.

Tag No. :	Date :	Dt. of first heat after :	Days Lmbg. to Brdg. :	Av. No. of days to first heat (from base)* :	Av. No. of days to lambing (from base)* :
B-36	1/10	3/17	58	18	14
C-30	2/1	3/14 4/1	40	15	33
C-38	1/3	4/24	110	56	4
R-41	2/21	3/27 5/19	32	24	57

*Base Periods:

Lambing:

Rambouillet-December 26, 1952
 Blackface crossbred-December 27, 1952
 Columbia-December 30, 1952

First heat:

Rambouillet-March 3, 1953
 Blackface crossbred-February 28, 1953
 Columbia-February 28, 1953

DRY EWES

Tag No.	Breeding Date	First heat (from base)*
B-3	3/16 4/1	34
B-11	5/14	93
B-12	3/29	47
B-33	3/5 3/14 3/29	23
B-37	2/25 3/16	15
B-48	4/2	51
C-3	2/10 3/16	0
C-9	5/14	93
C-12	4/2 4/23	51
C-45	3/17	35
R-36	3/16 5/12	34

*Base Period: February 10, 1953

A STUDY OF THE EXTENT OF LACTATION ANESTRUM
IN WESTERN RANGE EWES

by

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B. S., Utah State Agricultural College
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AN ABSTRACT OF A MASTER'S THESIS

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ABSTRACT

Practical and economical methods of obtaining greater production from our domestic animals has been of major interest since the beginning of history. That the reproductive phenomena of the domestic sheep has received wide attention is apparent from the literature compiled in the various scientific journals.

This paper concerns a limited study of a single phase of the reproductive phenomena of the sheep, the problem of the suppression of estrus due to lactation, or lactation anestrus. The major questions being, is it possible to obtain two lamb crops per year from the same flock of ewes and/or is it necessary to wean the lambs in order for the ewe to exhibit heat.

It would seem that the two big problems confronting the commercial sheep breeder are: extent of the normal breeding season and the length or duration of lactation anestrus. In breeds of sheep common to the United States the normal breeding season generally extends over a six months period from September to March. It is apparent that with a gestation period of approximately twenty-one weeks, that the period of lactation anestrus can not be over five or six weeks if two lamb crops per year are to be obtained from the same ewe. Also it is necessary that the ewe breed early in the normal breeding season (September) in order to lamb before the end of the season and allow sufficient time for the reappearance of estrus.

In this study 137 head of western range ewes were used. They were purchased in the fall of 1951 and have been maintained at the College since then. They bred during the period from July 10, 1952 to October 16, 1952. Lambing began December 26, 1952 and was completed March 13, 1953. The ewes were divided into two groups based on lambing dates. Group I was made up

of those ewes lambing from December 26, to February 4. Group II included those ewes lambing from February 5 to March 13. Vasectomized rams were used to determine and indicate the occurrence of heat in the lactating ewes.

Forty-five and two tenths percent of the lactating ewes exhibited heat. The Group I ewes bred an average of eleven to twelve weeks following lambing with a range of one to twelve weeks. The Group II ewes bred an average of six to seven weeks following lambing with a range of one to twelve weeks. The greatest amount of breeding activity occurred in the Group II ewes, among ewes which had lambed four to six weeks previous and during a period of warm, sultry days during the middle of March. The majority of those ewes exhibiting estrus showed only one heat period and there seems to be no apparent explanation of this.

The study indicated that nutrition, and climatic conditions have an affect on the breeding activity of sheep and the duration of lactation anestrus.