



Production of two-year-old ewes  
by Kenneth L Colman

A THESIS Submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of Master of Science in Animal Industry at Montana State College  
Montana State University  
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**Abstract:**

The purpose of the investigation of these data was to explore the possibilities of relationships existing between the body weights of the ewes during their early life and their subsequent lamb and wool production as two-year-olds. The effects of environmental influences, such as type of birth and age at weaning, on the growth of ewe lambs and their production as two-year-olds were studied.

The growth of two-hundred and fifty-nine ewes was measured by body weights taken at irregular intervals from birth to twenty-three months of age. Records of the individual lamb and wool production of these ewes were tabulated with the body weights.

Results showed that the effect of type of birth and age at weaning, on body weights of ewe lambs was reduced as the lambs progressed toward maturity from weanling age. It was also found that the birth weights, weaning weights, and fall yearling weights of the ewes were significantly related. The fall yearling weight of the ewes was most indicative of two-year-old lamb and wool production. A significant relationship was found between the birth weights of the Rambouillet ewes and the pounds of lamb born per ewe as two-year-olds. The relationship between the birth weights of the Targhee ewes and the pounds of lamb born per ewe was not significant nor was this relationship significant for the birth weights of the Columbia ewes and the pounds of lamb born per ewe.

The early single-born lambs were consistently lighter at birth than the late single-born lambs; however, at weaning time, the early single-born lambs were consistently heavier than the late single-born lambs. The average daily gain of the early single-born lambs and the late single-born lambs was about the same.

The weaning weights of the ewes and their yearling fleece weights were significantly and positively related. The difference between the yearling fleece weights of the ewes and their two-year-old fleece weights was significant, the yearling fleece weights being the heaviest.

It is evident from this study that valuable genetic breeding stock may be lost if suitable precautions are not taken to adjust for environmental conditions affecting the size of ewe lambs at weaning time when most replacements are selected.

According to these data and that published previously by other workers, a sounder method of selecting higher producing replacements is to retain a larger number of ewe lambs at weaning and to make final selections at fall yearling age. Since production factors are closely related to body weight at fall yearling age, the heavier ewes of similar breeding will be better producers than the lighter ewes if selections are made at this age.

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## ABSTRACT

The purpose of the investigation of these data was to explore the possibilities of relationships existing between the body weights of the ewes during their early life and their subsequent lamb and wool production as two-year-olds. The effects of environmental influences, such as type of birth and age at weaning, on the growth of ewe lambs and their production as two-year-olds were studied.

The growth of two-hundred and fifty-nine ewes was measured by body weights taken at irregular intervals from birth to twenty-three months of age. Records of the individual lamb and wool production of these ewes were tabulated with the body weights.

Results showed that the effect of type of birth and age at weaning, on body weights of ewe lambs was reduced as the lambs progressed toward maturity from weanling age. It was also found that the birth weights, weaning weights, and fall yearling weights of the ewes were significantly related. The fall yearling weight of the ewes was most indicative of two-year-old lamb and wool production. A significant relationship was found between the birth weights of the Rambouillet ewes and the pounds of lamb born per ewe as two-year-olds. The relationship between the birth weights of the Targhee ewes and the pounds of lamb born per ewe was not significant nor was this relationship significant for the birth weights of the Columbia ewes and the pounds of lamb born per ewe.

The early single-born lambs were consistently lighter at birth than the late single-born lambs; however, at weaning time, the early single-born lambs were consistently heavier than the late single-born lambs. The average daily gain of the early single-born lambs and the late single-born lambs was about the same.

The weaning weights of the ewes and their yearling fleece weights were significantly and positively related. The difference between the yearling fleece weights of the ewes and their two-year-old fleece weights was significant, the yearling fleece weights being the heaviest.

It is evident from this study that valuable genetic breeding stock may be lost if suitable precautions are not taken to adjust for environmental conditions affecting the size of ewe lambs at weaning time when most replacements are selected.

According to these data and that published previously by other workers, a sounder method of selecting higher producing replacements is to retain a larger number of ewe lambs at weaning and to make final selections at fall yearling age. Since production factors are closely related to body weight at fall yearling age, the heavier ewes of similar breeding will be better producers than the lighter ewes if selections are made at this age.

## INTRODUCTION

The popular method of selecting replacement ewe lambs for future production is limited primarily to the size of the ewe lamb in relation to those from which she is to be selected. In small flocks or in pure-bred flocks, it is feasible to obtain individual records of production which may aid in the selection of replacement ewes.

In commercial production, the first method is relied upon heavily because it is the most convenient. The method, itself, is reasonably reliable, if suitable precautions are taken to correct for factors influencing body size at early ages, which are environmental in nature.

Assuming that the replacements are selected as weanling lambs, probably the most common commercial practice, then environmental factors of importance which affect body weights are, first, the type of birth of the lamb; second, the age of the dam; and third, the age of the lamb at weaning. The folly of selecting replacements from a group of weanling ewe lambs, in which these three factors are not considered independently, becomes obvious. The inherited ability of a ewe lamb to grow may be masked or enhanced by environmental factors.

Generally speaking, the early, single lambs, born to mature ewes would be the first selected replacements. Genetically, these lambs are not superior to younger lambs or to twin lambs. It is essential then to provide an alternate method which will improve selection techniques and still remain practical.

An applicable method suggested in the past, to limit environmental influence on selection, is to segregate the ewe lambs by type of birth, age of dam (two-year-old or mature), and age at weaning at the time replacements are to be selected. This may be accomplished if the lambs are identified at birth by a series of ear notches or by the use of ear-tags. From each of these groups, the most desirable lambs should be selected as replacements.

With this basic method in mind, this study was made to determine relationships, if any, of two-year-old production to body weights taken at intervals from birth to first lambing, to enhance selection of replacements at an early age.

These data were then studied to see what periods the body weights were the most reliable in predicting future production.

## REVIEW OF LITERATURE

Phillips, et al., (1940) reported that single lambs remain heavier on the average throughout the first year than twin lambs. Corriedale and Rambouillet ram lambs made somewhat greater gains up to weaning than the ewe lambs. The ram lambs made much more rapid gains after weaning than the ewe lambs when given supplemental feeding. There was a decided decrease in rate of gain in both sexes following weaning. The rate of growth of the ewe lambs was low during the remainder of the year due to conditions of management and feeding. The need of adequate feed for range ewe lambs after weaning was emphasized and deemed necessary to develop desired size for reproduction at two years of age.

Hazel and Terrill, (1946) studied the effects of sex, age of dam, type of birth, age at weaning and inbreeding on Columbia, Corriedale, and Targhee lambs. The difference in weaning weight between ram lambs and ewe lambs, single lambs and twin lambs, lambs from two-year-old dams and mature dams were 10.8, 11.7 and 8.7 respectively.

Sidwell and Grandstaff, (1949) studied the lifetime production of four hundred and fourteen Navajo ewes. The two-year-old ewes weaned the lightest lambs, the four to seven-year-old ewes weaned the heaviest lambs and the eight to eleven-year-old ewes weaned intermediate lambs. The weaning weight of the ewe lambs was 4.4 pounds less than ram lambs. Single lambs were 11.2 pounds heavier than twin lambs, and 2.9 pounds heavier than lambs born as twins and raised as singles. A regression coefficient of weaning weight on age at weaning was 0.37 pounds per day.

Kincaid, (1943) observed that with the increasing age of the ewe, from two to six; the birth weight of her lambs increased at an average of 0.63 pounds per year.

Esplin, et al., (1940) reported that greater gains were made by ewe lambs when wintered under farm conditions during their first winter. It was also stated that "the percentage of ewes lambing at two years of age, of those alive at breeding, was 64.7 in the group that was fed and 45.5 in a range-fed group".

Phillips and Dawson (1940) found with Hampshires, Shropshires and Southdowns, that the selection of animals considered suitable for breeding was affected by type and time of birth and birth weight. It was observed that single lambs were preferred to twin lambs, early lambs were preferred to late lambs and lambs heavy at birth were preferred to lambs light at birth in selecting ewe lambs by size. Because these factors were a result of environment, some possible genetic advantages were disregarded.

No consistent differences were found in the survival of single and twin lambs. Early lambs tended to survive better than late lambs. A significantly higher proportion of the lambs heavy at birth survived over the lighter ones. No difference was found in the survival of males and females.

It was also found that type of birth, time of birth and birth weight were related to the weight of the lambs at three months of age. The weight advantages shown favored single, early and heavy lambs, respectively. The effects of these factors on weights were lessened at six months of age and tended to disappear at twelve months of age.

The male lambs were significantly heavier than the female lambs at birth in all but one group. The difference between the ram lambs and ewe lambs became more pronounced with increasing age.

Terrill and Stoehr (1939) noted a steady increase in fertility of ewes up to five years of age. There was also a direct correlation between the change in weight of ewes during breeding and their fecundity. Ewes which gained weight during breeding produced about six percent more twins than did those which lost weight during breeding.

Phillips et al., (1945) reported an increased productive capacity in range ewe lambs wintered in feed lots.

Terrill and Stoehr (1942) found that the fall body weight of yearling ewes, Rambouillets, Corriedales, and Columbias, just prior to breeding was closely related to their lifetime lamb and wool production. The heavier yearlings consistently weaned more pounds of lamb per ewe during their lifetime than did the lighter yearlings. The difference in lamb production between ewes born as singles and as twins was not consistent. There was a variation in lamb production within groups of ewes born as singles and as twins when associated with their yearling body weight. Selection for increased lamb production based on yearling body weight would be about as effective within breeds as between breeds. When considered independently of yearling body weight, the average lifetime body weight of the ewe was inversely related to the pounds of lamb weaned per ewe year. The ewes which were heavier as yearlings had a slight advantage in fleece weights, but the yearling body weight had little effect on fleece lengths.

Dickson and Barnum (1934) reported that Rambouillet yearling ewes made greater summer gains after being wintered on limited rations. Larger lambs in both the limited fed group and the full fed group gained less during the summer than the lighter lambs. There was no difference in the weights, as yearlings, at the end of the summer pasture period for lambs with initial weights up to 79 pounds prior to the winter feeding period, even with the different rations. The lambs with initial weights of 80 to 99 pounds, which were fed better rations during the winter feeding period, retained from four to six pounds of their weight increase as yearlings over those on limited feed. This relationship was maintained by these ewes as two-year-olds.

It was stated that although the lambs with lower initial weights overcame the handicap due to limited winter rations as two-year-olds, the heavier lambs on the same ration maintained a weight advantage to two years of age. This indicates that a heavy ewe lamb will also be a heavy two-year-old.

The progressive increase in fleece weights from smaller ewes to larger ewes indicated a relationship of the two factors. The winter feed treatments had little effect on the yearling fleece weights except from the lambs weighing over 90 pounds.

There was some indication that the full-fed ewes had a higher grease content in their fleeces, and that there was actually little difference in scoured fleece weights.

Phillips (1936) found that Southdown lambs weighing six pounds or

over have a better chance of survival than those lambs weighing less than six pounds at birth. He found that thirty-two percent of the lambs weighing less than six pounds were born dead or died within a month after birth, compared to only seven percent in the lambs weighing over six pounds at birth. The heavier lambs at birth made greater gains during their first year of life than lambs which were light at birth.

In a later paper, Phillips (1937) reported a difference of 8.3 pounds in weight at four months of age for lambs weighing under and over 8.0 pounds at birth and a difference of 9.4 pounds at one year of age, favoring the heavier lambs at birth.

Kiser and Christgan (1940) separated a group of Shropshire ewes according to their type of birth, into two groups, twins and singles. If the ewe did not produce lambs of the type of birth for which she was selected she was culled. After six lamb crops, they concluded that a higher level of production was maintained in the twin group, although there was a question as to whether the difference was genetic. It was believed that the method of selecting stud rams offset the effectiveness that may have been accomplished in the ewe selection.

Henderson (1953) showed that with Romney lambs raised from birth to fifty-two weeks of age on contrasting planes of nutrition, future total wool production of the lambs depended on body size and that the early plane of nutrition of the lambs did not permanently affect the efficiency of the processes of wool growth. Good feeding was important to allow maximum growth.

Short (1955) reported that most secondary wool follicles are initiated prior to birth and although they mature post-natally, any adverse pre-natal environment would probably restrict the number of secondary follicles initiated. Since these follicles mature shortly after birth, between seven and twenty-eight days, the number of producing follicles may be permanently affected by early post-natal environment. Reduction in future wool production could be the result of adverse environment at this early age.

Jones, et al., (1944) reported that fiber diameter of wool produced by Rambouillet ewes during the first year of life average slightly but significantly finer than the fleeces produced during subsequent years. The fiber diameter remained relatively unchanged after the first year. It was also reported in this study that the correlations of grease fleece weights and body weights were highly significant.

Hazel and Terrill (1946, 1947) found that yearling single ewes and ewes from mature dams had heavier grease fleeces, more clean wool and longer staple length than twin yearling ewes and ewes from two-year-old dams. The yearling ewes from mature dams had heavier bodies than the yearling ewes from two-year-old dams.

Lambert et al., (1938) obtained results indicating useful predictive values of certain weanling characteristics for yearling fleece characteristics, namely staple length, and percent clean wool, but not for density or fineness of fiber.

## MATERIALS AND METHODS

The data used in this study were obtained from records kept on the purebred ewe band owned by the Montana Agricultural Experiment Station. The band consists of three breeds--Rambouillets, Targhees, and Columbias. There are six slightly inbred lines of Rambouillets, five lines of Targhees, and three lines of Columbias. There is also a group of high-grade Columbias.

The band was lambed during April and May of 1949; the lambs were weighed, docked and ear-tagged within twelve hours after birth. A system of ear-tagging was used for identification of lambs by breed, age, line within a breed and the individual lamb. This was accomplished by using a letter and four numbers, for example, T9230. The "T" indicates the breed, Targhee; the "9" indicates the year, 1949; the "2" indicates the line and the "30" is the individual lamb's number.

As the lambs were weighed and ear-tagged, a number was painted on the ewe and her lamb for identification as they were moved through the "doubling up pens". Three sets of doubling up pens were used, one set for mature ewes with single lambs, one set for mature ewes with twin lambs, and one set for two-year-old ewes and their lambs.

The ewes and lambs were moved to the spring range in groups of two hundred to two hundred and fifty head, the ewes with early singles in one band, the ewes with early twins in another band, followed by a band of late singles and a band of late twins. These bands remained separated until shearing time, the first week in June.

The lambs were weighed July 7, 1949, two days before the band was moved to the forest grazing allotment. The lambs were weighed and weaned the 26th of August, then moved to a fall pasture. The ewe lambs to be held for replacements remained on pastures until supplemental feeding was necessary. The ewe lambs were used in a feeding experiment designed to determine the comparative value of cottonseed meal pellets made from two different processes, the Solvent process and the Hydraulic process, during the first winter.

As yearlings, the ewes were moved to the spring range with the dry band. At shearing time, during the first week in June, the fleece from each ewe was weighed and graded. The band was moved to the summer range about a month later.

About three hundred head of replacement ewe lambs were held until September 20, 1950. At this time they were culled. This culling was based on body weight, type and the important factors of wool production. Two hundred and fifty-nine of the original three hundred head of fall yearlings were weighed and added to the breeding band.

The band remained on the fall range until breeding time, the second week in November. At breeding time, the Rambouillet ewes were put into breeding pens according to their line of breeding. Two or more sires were used in about one-half of the breeding pens, depending upon the number of ewes in the line. The general procedure was to have the first set of rams in their respective pens for a period of eight days; because breeding harnesses with chalk were used, the marked ewes were removed

before the second set of rams were put in the pens. The second set of rams remained in the pens for the next ten-day period. As the marked ewes were taken from the breeding pens they were put with Hampshire rams. All of the marked ewes were exposed to black-faced rams for a period of eight to eighteen days. The ewes were then put with Targhee rams for an eight-day period to allow two full heat periods for breeding.

Due to watering and feeding problems, the Targhee and Columbia ewes were herded on the range during the day and cut into their respective pens at night for breeding. A number was painted on the individual ewes to facilitate the separation of the lines at night. The management of the rams was similar to that of the Rambouillets.

The band remained on the fall range until the middle of December. On the 20th of December, the ewes were weighed and divided at random into four equal groups. The groups were equalized as nearly as possible by age, breed and weight for the winter feeding experiment.

The groups of ewes were separated each morning during the period of December 20, 1950 to March 27, 1951, and fed as shown in Table I.

The ewes were not separated into groups for feeding during the ten days prior to lambing to eliminate possible injury to the ewes during the chute cutting operation. During this ten-day period and lambing, the ewes were fed one-half pound of the 20% protein pellet per head per day and hay.

The ewes started lambing the first week in April. The ewes and lambs were managed in a manner similar to the methods previously discussed for the ewes when they were lambs.

Table I. Winter feeding program for ewes for 1950-1951

Group	Feed per head per day	
I	Alfalfa hay <u>ad lib.</u>	No pellets until 30 days before lambing. Then 1/2 pound of 20% protein pellets.
II	Alfalfa hay <u>ad lib.</u>	1/3 pound of 20% protein pellets.
III	Alfalfa hay <u>ad lib.</u>	1/3 pound of 1/2 20% protein pellet and 1/2 dehydrated alfalfa pellet.
IV	Alfalfa hay <u>ad lib.</u>	1/3 pound of dehydrated alfalfa pellet.

The composition of the supplemental concentrates is shown in Table II, according to the groups.

Table II. Composition of concentrates

Ingredient	Group number			
	I	II	III	IV
		%	%	%
Barley	---1/	21.95	10.98	---
Oats	---	21.95	10.98	---
Dried molasses beet pulp	---	21.95	10.98	---
Soybean oil meal	---	29.27	14.63	---
Cane molasses	---	4.88	2.44	---
Dehydrated alfalfa	---	---	50.00	100.00
		100.00	100.00	100.00

1/ Group I received a commercial 20% protein pellet.



two-year-old fleece grade, two-year-old fleece length, ewe index (as a lamb), date of birth of lamb, type of birth of lamb, live lamb, sex, card number, birth weight of lamb, lamb loss, sire of lamb, weight of lamb on forest, weight of lamb off-forest, lamb index, cottonseed meal lot (first winter for ewes), and dehydrated alfalfa lot (second winter for ewes).

A code system was set up to reduce the number of necessary columns, and also to get data on the work sheet, which was not itself a number or numbers. The code was as follows:

Ewe number-----The ear-tag number of the ewe.

Sheep number---All ewes received a code number starting at 9000 and ending at 9258.

Breed-----Rambouillet (1), Targhee (2), Columbia (3).

Line-----	Rambouillet -	2000 (02)	6000 (06)
		3000 (03)	7000 (07)
		5000 (05)	8000 (08)
	Targhee -	0 (00)	6 (06)
		2 (02)	8 (08)
		4 (04)	
	Columbia -	0 (00)	4 (04)
		2 (02)	4K (09)

Type of birth--Single (1), twin (2), triplet (3), dry (4), slink (5), born twin, raised single (9).

Date of birth--(ewe) Year and day of year.

Weights-----All weights are actual weights in pounds.

Fleece grade---Fine (1), 1/2 blood (2), 3/8 blood (3), 1/4 blood (4), low 1/4 blood (5).

Fleece length--Staple (1), french (2), clothing (3).

Date of birth--(lamb) Day of year.

Sire-----H2025 (1), H2046 (2), K3003 (3), etc.

Card number-----(1) Single or first lamb. 1/  
 (2) Second lamb.

Live lambs-----(1) Single, alive.  
 (2) Twins, both alive.  
 (3) Single, grafted to another ewe.  
 (4) Single, lamb died.  
 (5) Single, lamb died, another grafted on.  
 (6) Single, born dead.  
 (7) Twins, born dead.  
 (8) Twins born, one alive, one dead.  
 (9) Twins born, one died.  
 (10) Twins born, one died after on forest.  
 (11) Twins born, both died.  
 (12) Twins born, one grafted to another ewe.  
 (13) Twins born, lambs died, another lamb grafted to her.

Lamb loss----- (0) Not lost.  
 (1) At birth.  
 (2) In lambing book.  
 (3) Before on-forest.  
 (4) While on-forest.  
 (9) Slink.

Sex-----Ewe (1), Ram (2).

Index-----Actual index for both ewe and lamb.

The data were transferred from the Master IBM work sheets to the regular IBM cards. Each card contained the entire record of one ewe from her birth to the weaning weight of her first lamb.

Standard IBM procedure was used in sorting the cards and tabulation of data.

1/ Each ewe that gave birth to two lambs had two different cards, one for each lamb. The ewe data was put on both cards.

## RESULTS AND DISCUSSION

Growth of the Ewes from Birth to Twenty-three  
Months of Age

Records of the growth of two hundred and fifty-nine purebred ewe lambs selected for replacement ewes in the band, were collected and analyzed in an effort to associate some factors of growth or development with the subsequent production of the ewes as two-year-olds.

The growth of these ewe lambs was measured by body weights taken at irregular intervals from birth to twenty-three months of age. Dates of weighing conform to approximate dates which might be convenient and practical for the commercial range operator.

The body weights of the ewes, from birth to twenty-three months of age, are shown in Table III, by breed and lines within the breeds.

The line of breeding had little effect on the growth rate of the Rambouillet ewe lambs. The ewe lambs in the 8000 line were slightly heavier at birth than the other five lines. The 8000 line lambs maintained this advantage for seven months; however, the advantage was lost before the lambs reached twenty-three months of age.

The line of breeding had an effect on the rate of growth of the Targhee ewe lambs. The ewe lambs in the 0 line were the lightest of the five lines from birth to twenty-three months of age, with only one exception, when, at one year of age, they were slightly heavier than the lambs in the 2 and 4 lines. The ewe lambs in the 8 line were the heaviest of the five lines from birth to twenty-three months of age. At birth, the ewe lambs in the 0 line weighed 8.5 pounds compared to ewe lambs in the 8

Table III. Growth of ewes as shown by body weights

Date weighed	Rambouillet lines					
	2000	3000	5000	6000	7000	8000
Birth	9.5	9.6	9.5	10.0	9.2	12.0
July 7, 1949	46.3	49.2	49.8	50.3	47.6	51.1
Aug. 26, 1949	67.8	71.3	71.9	72.2	71.2	73.3
Dec. 1, 1949	82.7	85.1	85.7	84.3	84.3	86.7
April 5, 1950	100.5	97.6	103.1	102.1	97.8	101.6
Sept. 20, 1950	118.7	120.6	121.5	122.0	122.8	123.0
Dec. 20, 1950	122.5	125.9	123.8	126.1	125.2	124.2
Mar. 27, 1951	127.9	129.2	127.5	130.1	131.1	125.4

Date weighed	Targhee lines				
	0	2	4	6	8
Birth	8.5	9.6	9.0	9.4	10.4
July 7, 1949	45.3	47.8	51.1	49.5	52.5
Aug. 26, 1949	66.1	71.3	73.3	72.7	76.0
Dec. 1, 1949	80.9	81.7	83.7	85.8	92.0
April 5, 1950	95.2	94.5	94.7	99.1	108.5
Sept. 20, 1950	121.4	123.5	126.4	129.9	130.3
Dec. 20, 1950	121.0	121.0	124.7	128.5	131.1
March 27, 1951	122.1	125.3	127.0	129.9	138.5

Table III con't.

Date weighed	Columbia lines			
	0	2	4	4K
		Pounds		
Birth	10.4	9.6	10.0	9.1
July 7, 1949	54.8	53.5	59.0	46.2
Aug 26, 1949	77.8	77.6	83.3	73.4
Dec. 1, 1949	87.4	90.0	94.3	80.0
April 5, 1950	105.4	107.3	110.7	97.9
Sept. 20, 1950	132.6	130.2	133.0	126.1
Dec. 20, 1950	132.0	127.6	133.5	124.1
March 27, 1951	135.8	133.7	134.8	129.9

line that weighed 10.4 pounds at birth. The weight of the ewes in the 0 and 8 lines was 122.1 pounds and 138.5 pounds respectively at twenty-three months of age.

The 0 line of Columbia ewe lambs were the heaviest of the four lines at birth and at twenty-three months of age. The ewe lambs in this line were not consistently heavier than the other lines throughout the period, however. The ewe lambs in the 4K line were consistently the lightest of the four lines from birth to twenty-three months of age. The lambs in the 0 line weighed 10.4 pounds at birth compared to the lambs of the 4K line that weighed 9.1 pounds at birth. The weight of the ewes at twenty-three

of age for the O and 4K lines were 135.8 pounds and 129.9 pounds, respectively. The 4K line is not a purebred line.

The average body weight of the ewes in the different lines within breeds have been combined and are shown in Table IV.

Table IV. Growth of Rambouillet, Targhee, and Columbia ewes as shown by body weights

Date weighed	Age in mo.	Rambouillet avg. lbs.	Targhee avg. lbs.	Columbia avg. lbs.
Birth	0	9.5	9.4	9.4
July 7, 1949	2	49.2	49.1	49.2
Aug. 26, 1949	4	71.3	71.6	75.1
Dec. 1, 1949	7	84.9	84.6	83.3
April 5, 1950	11	101.4	98.3	101.1
Sept. 20, 1950	16	121.3	125.7	128.0
Dec. 20, 1950	19	124.4	124.7	126.2
Mar. 27, 1951	23	128.4	128.2	131.5

The Columbia ewe lambs were approximately 4.0 pounds heavier at weaning than were the Rambouillet or Targhee lambs. The weaning weight advantage shown by the Columbias diminished during the first winter feeding period, but was apparent again through the grazing season, from April to September. During the second fall, the weights of the Columbia ewes dropped, contrary to weights of the Rambouillet ewes. The Targhee ewes

also dropped in weight during the second fall, but less than did the Columbia ewes.

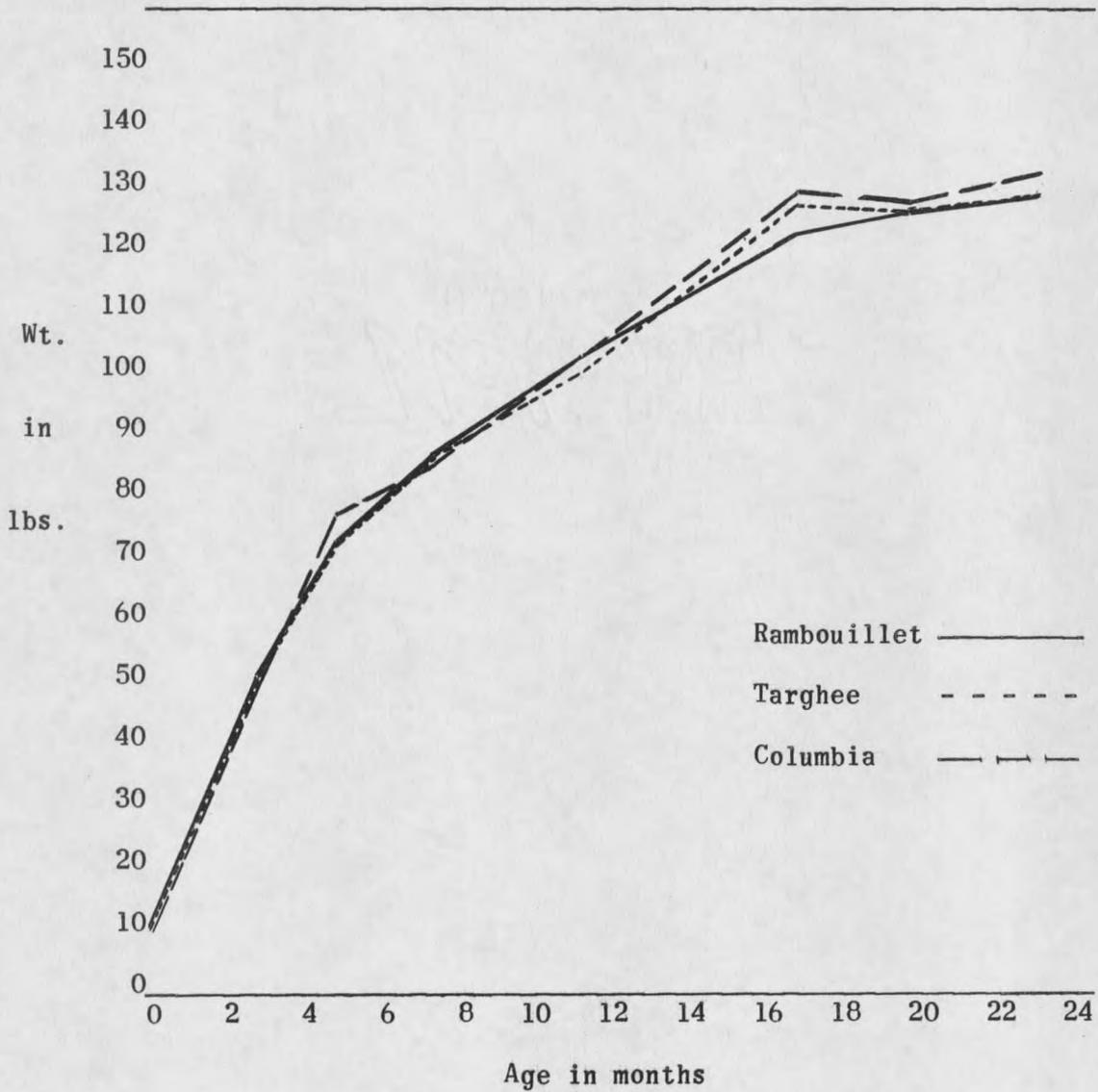


Figure 2. The growth of the Rambouillet, Targhee, and Columbia ewes from birth to twenty-three months of age. See Table IV.

Table V. Growth of Rambouillet lines by type of birth

Line Type	2000				3000			5000	
	1	2	9 <u>1</u> /	1	2 <u>1</u> /	9	1	2	9
Date weighed	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Birth	10.8	8.0	6.2	10.6	9.8	8.4	10.0	8.8	8.3
July 7, 1949	50.9	38.6	44.0	50.6	45.0	48.5	51.7	43.3	49.0
Aug. 26, 1949	72.2	59.8	68.0	72.8	67.0	70.5	73.7	66.7	71.4
Dec. 1, 1949	85.8	78.0	78.0	84.4	83.0	86.5	86.3	82.7	86.3
Apr. 5, 1950	102.4	97.4	98.0	95.8	96.0	100.2	103.9	99.7	103.6
Sept. 20, 1950	120.9	115.8	114.0	117.6	131.0	121.8	121.4	121.9	121.3
Dec. 20, 1950	124.4	119.0	123.0	124.2	131.0	126.8	123.9	122.9	124.4
Mar. 27, 1951	130.4	124.6	122.0	129.2	136.0	127.5	128.4	128.1	123.4

Line Type	6000			7000			8000		
	1	2	9	1	2 <u>1</u> /	9	1	2	9 <u>1</u> /
Date weighed	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Birth	11.1	8.0	9.2	9.7	9.2	7.2	12.1	---	11.2
July 7, 1949	54.0	45.5	47.0	51.9	42.0	35.5	53.8	---	35.0
Aug. 26, 1949	75.9	69.0	68.5	76.4	62.0	57.5	76.8	---	52.0
Dec. 1, 1949	88.4	82.5	79.5	89.2	74.0	75.0	88.7	---	75.0
Apr. 5, 1950	106.6	98.0	97.5	102.3	86.0	90.0	103.7	---	89.0
Sept. 20, 1950	125.1	115.5	120.0	127.4	115.0	110.5	124.8	---	112.0
Dec. 20, 1950	129.4	123.0	122.8	129.0	116.0	116.5	125.0	---	120.0
Mar. 27, 1951	133.9	122.5	127.5	136.7	117.0	118.5	126.0	---	122.0

1/ One ewe.

Table VI. Growth of Targhee lines by type of birth

Line Type	1	0 2	9	1	2 2	9	1	4 2	9
Date weighed	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Birth	8.8	8.1	8.3	10.1	8.0	8.0	9.1	9.0	8.9
July 7, 1949	48.5	38.9	49.3	49.8	37.0	46.7	52.2	45.0	55.0
Aug. 26, 1949	69.2	59.5	71.7	72.6	66.3	68.7	74.8	66.7	75.0
Dec. 1, 1949	80.9	79.5	83.5	82.5	78.0	81.0	85.8	76.0	81.5
Apr. 5, 1950	93.8	94.2	102.0	94.5	97.0	89.5	94.8	87.7	105.0
Sept. 20, 1950	120.0	124.5	119.8	124.7	119.5	120.3	127.3	121.7	127.0
Dec. 20, 1950	119.9	121.9	122.8	122.0	119.0	116.3	125.4	120.0	127.0
Mar. 27, 1951	117.2	128.1	125.8	121.6	125.2	118.0	127.2	122.7	132.0

Line Type	1	6 2	9 <u>1</u> / 2	1	8 2	9
Date weighed	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Birth	10.2	8.8	6.6	10.6	9.1	---
July 7, 1949	52.9	46.8	40.0	52.8	50.0	---
Aug. 26, 1949	75.9	71.0	59.0	76.5	72.7	---
Dec. 1, 1949	89.7	82.6	74.0	92.4	89.7	---
Apr. 5, 1950	102.9	96.6	85.0	109.0	105.0	---
Sept. 20, 1950	134.6	127.6	109.0	130.0	132.0	---
Dec. 20, 1950	134.0	124.6	110.0	130.8	133.3	---
Mar. 27, 1951	133.1	128.4	115.0	138.2	140.0	---

1/ One ewe.

Table VII. Growth of Columbia lines by type of birth

Line Type	1	0 2 <u>1</u> /	9	1	2 2	9 <u>1</u> /
Date weighed	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Birth	10.8	8.6	---	10.1	---	5.6
July 7, 1949	57.8	43.0	---	55.0	---	43.0
Aug. 26, 1949	81.2	64.0	---	78.9	---	67.0
Dec. 1, 1949	90.8	74.0	---	90.5	---	86.0
Apr. 5, 1950	110.2	86.0	---	107.8	---	104.0
Sept. 20, 1950	136.2	118.0	---	130.2	---	130.0
Dec. 20, 1950	135.0	120.0	---	127.9	---	125.0
Mar. 27, 1951	142.5	109.0	---	135.9	---	134.0

Line Type	1	4 2 <u>1</u> /	9	1	4K 2	9
Date weighed	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Birth	10.2	9.5	---	9.3	8.8	8.4
July 7, 1949	61.3	52.0	---	45.8	52.5	46.2
Aug. 26, 1949	85.5	79.0	---	73.3	81.5	70.6
Dec. 1, 1949	93.0	97.0	---	79.2	100.5	76.0
Apr. 5, 1950	108.0	116.0	---	96.0	126.0	97.2
Sept. 20, 1950	128.3	147.0	---	124.9	146.5	125.0
Dec. 20, 1950	128.3	149.0	---	122.3	152.5	122.0
Mar. 27, 1950	133.0	140.0	---	127.6	166.0	128.2

1/ One ewe.

The greatest spread in average weights of the three breeds at a particular time was at approximately sixteen and one-half months, when the Columbia ewes weighed 128.0 pounds; the Targhees, 125.7 pounds; and the Rambouillets, 121.3 pounds; a difference of 6.7 pounds between the Columbias and Rambouillets.

The growth curve of the Rambouillets, Targhees, and Columbias was quite similar for the twenty-three month period. The Columbia ewes were four pounds heavier at weaning time, which could be important if the lambs were to be marketed at that time. The Columbias were 6.7 pounds heavier in the fall, as yearlings.

Type of birth has been designated by the numbers 1, 2, and 9, which will be used throughout this paper. Type 1 refers to lambs born single and raised single; type 2 refers to lambs born twin and raised twin; and type 9 refers to those lambs which were born as twins and raised as singles. The type 9 classification are any lambs which were born as a twin and did not have a mate living at weaning time. In the tables presented herein, Tables V, VI, and VII, for example, the type 9 lambs have been classified by themselves. In such cases, all birth weights and some of the "on-forest" weights actually include the average weights of twin lambs, which means that all lambs in this classification are not raised as singles from birth to weaning.

The weights shown in Table III are average weights for the lines; however, the ratio of the types of births within lines varies considerably as shown in Table VIII, thus the average weight of the line may be raised

Table VIII. Number of ewes by breed, line, and type of birth

Rambouillet	2000	3000	5000	6000	7000	8000	Total
Type 1	9	5	27	8	7	6	62
Type 2	5	1	7	2	1	-	16
Type 9	1	4	7	6	2	1	21
Total	15	10	41	16	10	7	99
Targhee	0	2	4	6	8		Total
Type 1	13	21	14	7	20		75
Type 2	8	4	3	5	3		23
Type 9	4	3	2	1	-		10
Total	25	28	19	13	23		108
Columbia	0	2	4	4K			Total
Type 1	4	8	3	27			42
Type 2	1	-	1	2			4
Type 9	-	1	-	5			6
Total	5	9	4	34			52
Grand total							259

1/ The number of ewes given in this table is the total number of ewes within the given classification; however, in working with sheep that are managed under range conditions, some of the sheep are lost from time to time, and are not weighed, therefore some of the average weights given in this paper are computed from fewer numbers of sheep than are shown in this table.

or lowered, depending upon the number of single born lambs in the line compared to the number of twin born lambs.

Considerable variation was found in the average weights of the ewes within lines, between the three types of births as shown in Tables V, VI, and VII. The relationship of the weights of the ewes of the different types of births, within lines, varies from one date to another.

The lambs born as singles (type 1) had weight advantages of varying amounts in all lines of the three breeds over the lambs born as twins. In most cases they retained this advantage until twenty-three months of age. The two major exceptions to this condition occurred in the Targhee 0 line and the Columbia 4K line. At twenty-three months of age, the type 2 and type 9 ewes of the Targhee 0 line had a weight advantage of 10.9 pounds and 8.6 pounds respectively over the type 1 ewes of this line.

The type 2 and type 9 ewes of the Columbia 4K line had weight advantages of 38.4 pounds and 0.6 pounds respectively over the type 1 ewes at twenty-three months of age. The large advantage shown in the type 2 ewes was apparently due to individuals, since there were only two ewes of this type in the 4K line. The number and weight of the fetuses in the ewes may have had some effect on the differences in weight between the three types of ewes.

Commercial application of selection based on body weights would depend upon two factors of significant importance; (1) the earliest stage of maturity when body weights could be correlated to production, and (2) a time that the sheep could be handled and weighed with the greatest

economy and practicability for the producer.

The time of culling, or selection of replacements varies from one ranch to another; however, most commercial operators must make some selection at weaning time, whether further selections are made at a later age or not. Some operators may carry an excess of ewe lambs to fall yearling age, then make their final selection along with the culling of the ewe bands. For this reason, the weaning weight of the ewe lambs and their weight at fall yearling age have been correlated with their two-year old production.

The average birth weight of the Rambouillet type 1, type 2 and type 9 lambs were 10.5, 8.6, and 8.5 pounds respectively as shown in Table IX. The weight differences between the types were magnified by weaning time, when the lambs were approximately four months old. The type 1 lambs averaged 74.3 pounds; the type 2 lambs, 64.0 pounds; and the type 9 lambs, 68.0 pounds; at weaning. When the Rambouillet ewes reached sixteen and one-half months of age, or fall yearling age, the difference in average weight of the three types of birth was reduced to approximately 3.3 pounds. The type 1 ewes weighed 122.5 pounds compared to 119.3 and 119.2 pounds respectively in types 2 and 9.

The type 1 Targhee lambs weighed 9.8 pounds at birth compared to 8.1 pounds for the type 2 and type 9 lambs. At weaning time, the type 1 lambs weighed 73.6 pounds; the type 2 lambs, 65.8 pounds; and the type 9 lambs weighed 69.4 pounds. The difference between the type 1 lambs and the type 2 lambs was 4.2 pounds, with the type 2 lambs being the lightest.

At fall yearling age, the type 1 Targhee ewes weighed 126.7 pounds and the type 2 ewes, 124.9 pounds, a difference of 1.8 pounds. The type 9 ewes weighed 120.3 pounds, 6.4 pounds lighter than the type 1 ewes and 4.6 pounds lighter than the type 2 ewes.

Table IX. Weights of ewes by breed and type of birth

Breed Type	Rambouillet			Targhee			Columbia		
	1	2	9	1	2	9	1	2	9
Date weighed	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Birth	10.5	8.6	8.5	9.8	8.1	8.1	9.7	9.0	7.9
July 7, 1949	52.0	42.1	46.1	51.2	42.8	47.9	49.7	50.0	45.7
Aug. 26, 1949	74.3	64.0	68.0	73.6	65.8	69.4	75.8	76.5	69.8
Dec. 1, 1949	86.9	80.7	82.4	86.2	80.8	81.4	83.2	93.0	77.7
Apr. 5, 1950	103.2	97.7	99.0	99.2	95.8	98.0	100.2	113.5	98.3
Sept. 20, 1950	122.5	119.3	119.2	126.7	124.9	120.3	127.2	139.5	125.8
Dec. 20, 1950	125.4	121.8	123.4	125.7	123.2	120.4	125.0	143.5	122.5
Mar. 27, 1951	130.2	126.1	124.7	128.7	128.5	123.6	130.5	145.2	129.1

The average birth weight of the Columbia type 1, type 2, and type 9 lambs were 9.7 pounds, 9.0 pounds, and 7.9 pounds respectively. The type 1 Columbia ewes weighed 75.8 pounds at weaning, the type 2 ewes weighed 76.5 pounds, and the type 9 ewes weighed 69.8 pounds. The type 2 ewes were 0.7 pounds heavier than the type 1 ewes, and the type 9 ewes were 6.0 pounds lighter than the type 1 ewes at weaning. At fall yearling age, the type 1

















































































































































































































































































