Reports on Breeding Ewe Lambs

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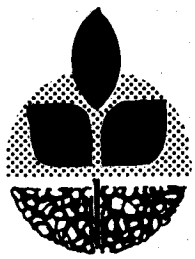

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I. THE INFLUENCE OF AGE AT FIRST LAMBING ON EWE PRODUCTION AND LONGEVITY

M. Vavra, William Hohenboken and R. L. Phillips

Historically, sheep were produced for their wool and lambs were considered a fringe benefit. Most current management situations and prices for lamb and wool, however, dictate that lamb production be the primary source of income and that wool assume a secondary role. Any management practice that increases returns and/or lowers costs of lamb production is therefore to be recommended.

Depending on breed and management conditions, ewes will first experience behavioral estrus at 5 to 17 months of age. Many are potentially capable of breeding at seven months of age and lambing at one year. However, commercial producers do not take advantage of this potential and first breed replacement ewes when they are approximately 19 months of age which means maintaining the ewe for over two years before she produces a significant economic return. Mating ewes to lamb first at one year of age could cut the time interval for keeping a ewe without a dollar return (other than wool) almost in half. If production per ewe at one year of age is high enough and if there are no important detrimental effects on future production and longevity, then the practice of breeding ewe lambs could increase the economic efficiency of sheep production.

The objectives of this study were:

(1) To determine whether lambing at one year of age decreased production at two years of age.

(2) To determine how lambing at one year of age influenced life-long production.

(3) To determine if length of productive life was decreased by lambing at a year of age.

Materials and Methods

This experiment was conducted at the Eastern Oregon Experiment Station at Union using straightbred Columbia and Targhee ewes born during the 1966-through-1970 spring lambing seasons. Each year replacement ewe lambs were selected at weaning based on type of birth (twins were favored) and age-adjusted weaning weight.

They were allowed to graze on irrigated fescue/Ladino clover or orchard grass/alfalfa pastures from weaning through October. The wintering ration was ad libitum grass/legume hay.

Replacement ewes were randomly alloted within breed and twin versus single birth to groups mated to lamb first at one year versus at two years of age. Annual production of lamb and grease wool was recorded for each ewe through 1974 or until she died or was culled from the flock.

For convenience, throughout this report the group bred to lamb at one year of age will be called the "lamb" group; the ewes bred to lamb at two years of age will be called "yearlings".

Numbers of ewes initially selected per birth year, breed and treatment group are shown in Table 1. Of the 282 ewes involved in the experiment, 171 were Columbia and 111 Targhee; and 138 and 144, respectively, were lambed first as lambs versus yearlings.

Ewes were managed as a typical Western, intermountain area farm flock. Only ewes bred at seven to eight months of age were exposed to Cheviot or Dorset rams from September 20 to November 1 each year. For all matings of yearling and older ewes, rams of the same breed as the ewes (Columbia and Targhee) were used with mating from August 15 to November 1. Lambing was from January through March. Lambs were weaned at approximately 90 days of age, although there was some variability from year to year. The different breed and age groups were always managed alike within years, however. Throughout most of the year, both ewes and lambs were run on dryland or irrigated pastures or on hay stubble. Supplemental feeding of hay or hay plus grain was necessary during late gestation and early lactation.

The experiment terminated in 1974. Ewes born in 1966 and bred as lambs had eight potential production years (1967 through 1974). Each later birth year group of ewes had one less year of potential production.

Results and Discussion

Ewe production at two years of age is presented in Table 2. There were no large differences between lamb and yearling groups for the traits measured. Ewe lambs weaned slightly more lambs than did yearlings. This was expected, as the ewe lamb group had already produced a lamb crop and had gained experience as mothers. The increased pounds of lamb weaned by the ewe lamb group was due to the increased number of lambs weaned.

Averaged over both breeds, wool production was little influenced by the added stress of producing a lamb the previous year. However, Columbias from the yearling group produced a pound more wool than did those in the lamb group. Both groups of Targhees produced similar amounts of wool. Results indicate that breeding ewes to lamb at one year of age did not lower prolificacy, lamb-raising ability (in fact it was increased slightly), wool production or body weight during the ewes' second year of production.

Data on cumulative production from 2½ through 8½ years of age are presented in Table 3. Ewes bred to lamb at one year of age had more lambs from 2½ through 4½ production years. By 7½ and 8½ years, the yearling group produced more cumulative lambs. However, ewes in this age group were all born in 1966 so some bias existed. This problem will be discussed in a later section.

Ewe lambs weaned more lambs per ewe than did yearlings through 7½ years of production. For 2½ through 5½ years of production, the average advantage of the ewe lamb group was 0.84 lambs per ewe entering the experiment. The difference decreased as the 7½ year mark was approached. At 7½ years of production the yearling group was favored. Pounds of lamb weaned per ewe followed trends similar to the number of lambs weaned. Ewe lamb breeders produced more pounds of lamb through 6½ years of production. The average ewe lamb advantage was 32.2 lb. cumulative lamb production between 2½ and 5½ production years.

The effect of age at first lambing on wool production differed depending on the birth year group of ewes being examined. Therefore, no firm conclusion on the influence of age at first lambing on wool production can be reached although the average effect in this experiment favored ewes bred first as yearlings. The cumulative advantage varied from 0 to 4.4 lb. at various stages of production.

Percentages of ewe lamb versus yearling ewes entering the experiment and still present after 2½ years through their final potential year of production are plotted in Figures 1 through 5 for 1966 through 1970 birth years, respectively. For 1967, 1968 and 1969, there was no consistent difference between attrition (culling and death rate) of ewes bred first as lambs versus ewes bred first as yearlings. For the 1970 birth year group, yearlings actually had greater losses than ewes bred first as lambs. The difference was not large, however.

The only birth year group for which attrition in the lamb group was greater than attrition in the yearling group was 1966. Three ewes (10 percent) from the lamb group were culled before 2½ years of age. Of these, two were culled because they failed to conceive when mated as lambs. Presumably, a like proportion of the yearling group would have been open and culled had they been mated as ewe lambs. Part of the difference between groups in attrition by 2½ years of age, therefore, resulted from a management decision and was not a treatment

effect of lambing at one year of age.

After 2½ years, the ewe lamb group continued to have greater annual rates of attrition than the yearling group, especially at years 3½ and 6½. Examination of the culling records did not reveal differences between groups in frequencies of deaths, injuries, lambing difficulties or illnesses; but there was a higher frequency of culling of open ewes from the ewe lamb group.

Since 1966 ewes were the first group to enter the experiment, a possible explanation is that Experiment Station personnel were not experienced at that time in management systems for ewes lambing at one year of age. Nutrition may not have been adequate, resulting in lower fertility for the ewe lamb group and higher culling in subsequent production years. If this is the proper explanation, management was apparently altered to alleviate the problem, since culling and attrition rates did not differ between lambs and yearlings for the other birth year groups.

It seems valid to conclude that under certain conditions of management (that experienced by the 1966 birth year group, for example), mating ewes to lamb at one year of age might decrease longevity. It is certainly possible, though, to manage ewe lambs such that their rate of attrition is not altered, as evidenced by results in the four remaining birth year groups.

Summary and Conclusions

In this study, Columbia and Targhee ewes at the Eastern Oregon Experiment Station, Union, were randomly divided within breed and birth year to groups mated to lamb first at one or at two years of age. Objectives of the experiment were to determine whether age at first lambing affected performance at two years of age, whether and how much it affected cumulative lamb and wool production throughout life, and whether it affected longevity of the ewes.

Mating ewes to lamb at one year of age did not decrease the number of lambs born or weaned, the pounds of lamb weaned or the pounds of wool produced by the ewes as two-year-olds. In fact, the early mated group was higher for number and pounds of lamb weaned. Ewe weight at 2½ years of age was not affected. Results clearly indicated that it was possible to mate ewe lambs without hurting their production the following year.

Lambing ewes at one year of age increased their cumulative production of lambs and pounds of lamb at least through 6½ years of age. Cumulative wool production was little affected by age at first lambing, but ewes lambed first at two years of age had slightly higher lifetime wool production.

In the first group of ewes to enter the experiment, attrition was higher for ewes bred as lambs than it was for ewes bred as yearlings. In the other four birth year groups, there was no consistent difference in attrition between the two age at first lambing groups.

Mating ewes to lamb first at one year of age can increase cumulative lamb production without decreasing production at two years of age, cumulative wool production or longevity.

Table 1. Number of ewes per birth year, breed and age at first lambing treatment group.

Birth Year	Breed	Age at First Lambing	
		Lamb	Yearling
1966	Columbia	16	24
	Targhee	15	6
1967	Columbia	11	12
	Targhee	11	12
1968	Columbia	18	17
	Targhee	8	8
1969	Columbia	17	20
	Targhee	10	13
1970	Columbia	18	18
	Targhee	14	14

Table 2. Age at first lambing effects on ewe production at two years of age.

Effect	No. of Lambs Born	No. of Lambs Weaned	Lb. of Lambs Weaned	Lb. of Wool Produced	Ewe Weight (lb.)
Ewe lamb breeders	1.31	1.14	83.3	11.2	160.5
Yearling breeders	1.31	1.02	75.0	11.5	159.4

Table 3. Effect of age at first lambing on cumulative lamb and wool production per ewe entering the experiment from 2½ through 8½ years of production.

	2½	3½	4½	5½	6½	7½	8½
Number of lambs born							
ewe lamb breeders	2.1	3.3	4.3	5.1	5.6	6.2	5.4
yearling breeders	1.3	2.4	3.5	4.3	5.2	6.3	7.0
Number of lambs weaned							
ewe lamb breeders	1.8	2.7	3.5	4.1	4.5	5.0	4.4
yearling breeders	1.0	1.8	2.7	3.4	4.1	4.8	5.5
Pounds of lamb weaned							
ewe lamb breeders	104.7	174.8	242.1	287.7	315.7	347.0	300.5
yearling breeders	70.5	143.3	202.6	264.3	313.6	377.0	438.7
Pounds of wool produced							
ewe lamb breeders	20.7	31.5	37.5	40.1	44.8	50.5	46.7
yearling breeders	20.5	30.4	37.5	42.3	49.2	54.2	60.0

Figure 1. Percentages of 1966 ewes mated first as lambs vs. mated first as yearlings still present after 2 1/2 through 8 1/2 years of production.

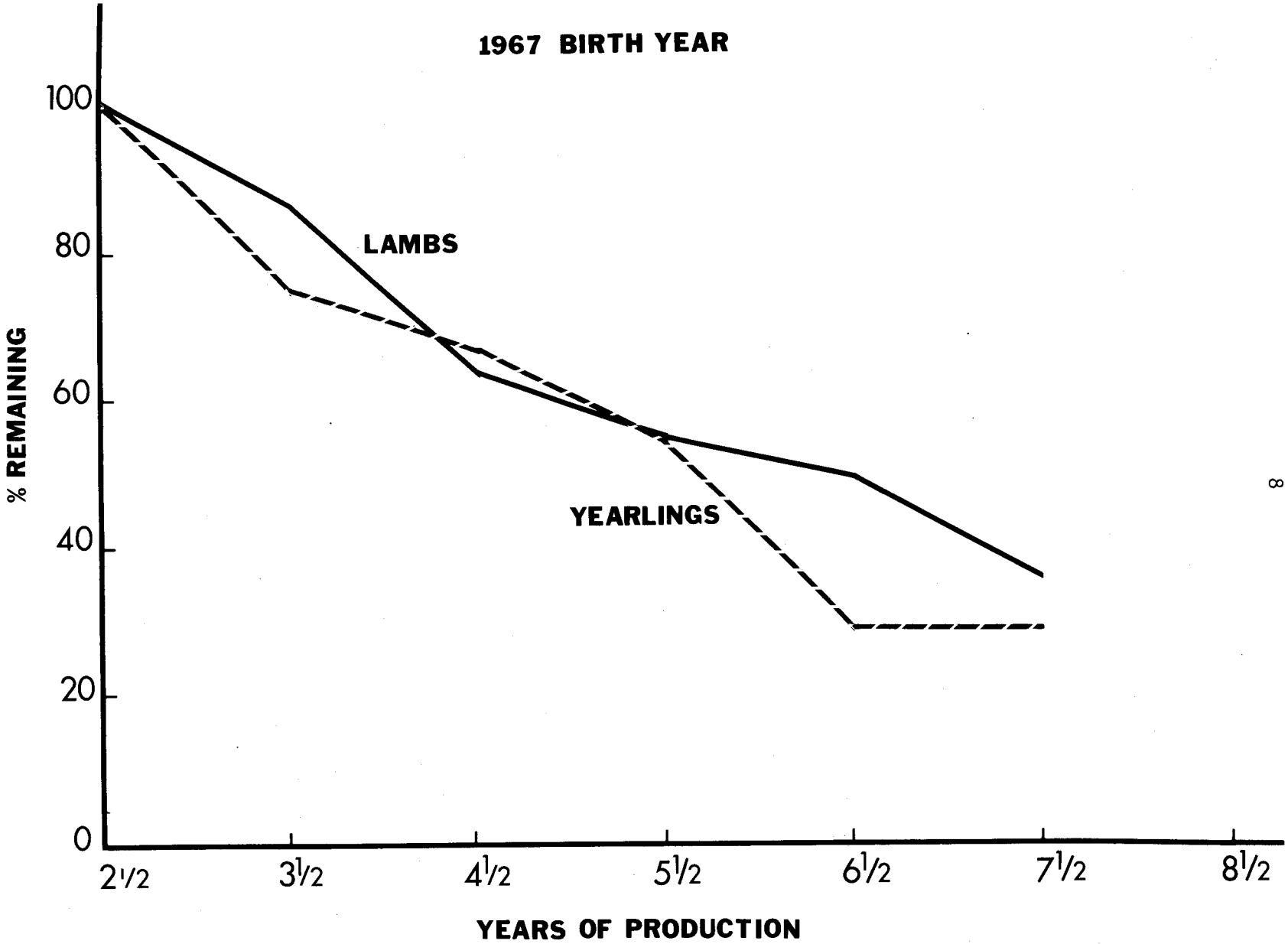

Figure 2. Percentages of 1967 ewes mated first as lambs vs. mated first as yearlings still present after 2 1/2 through 7 1/2 years of production.

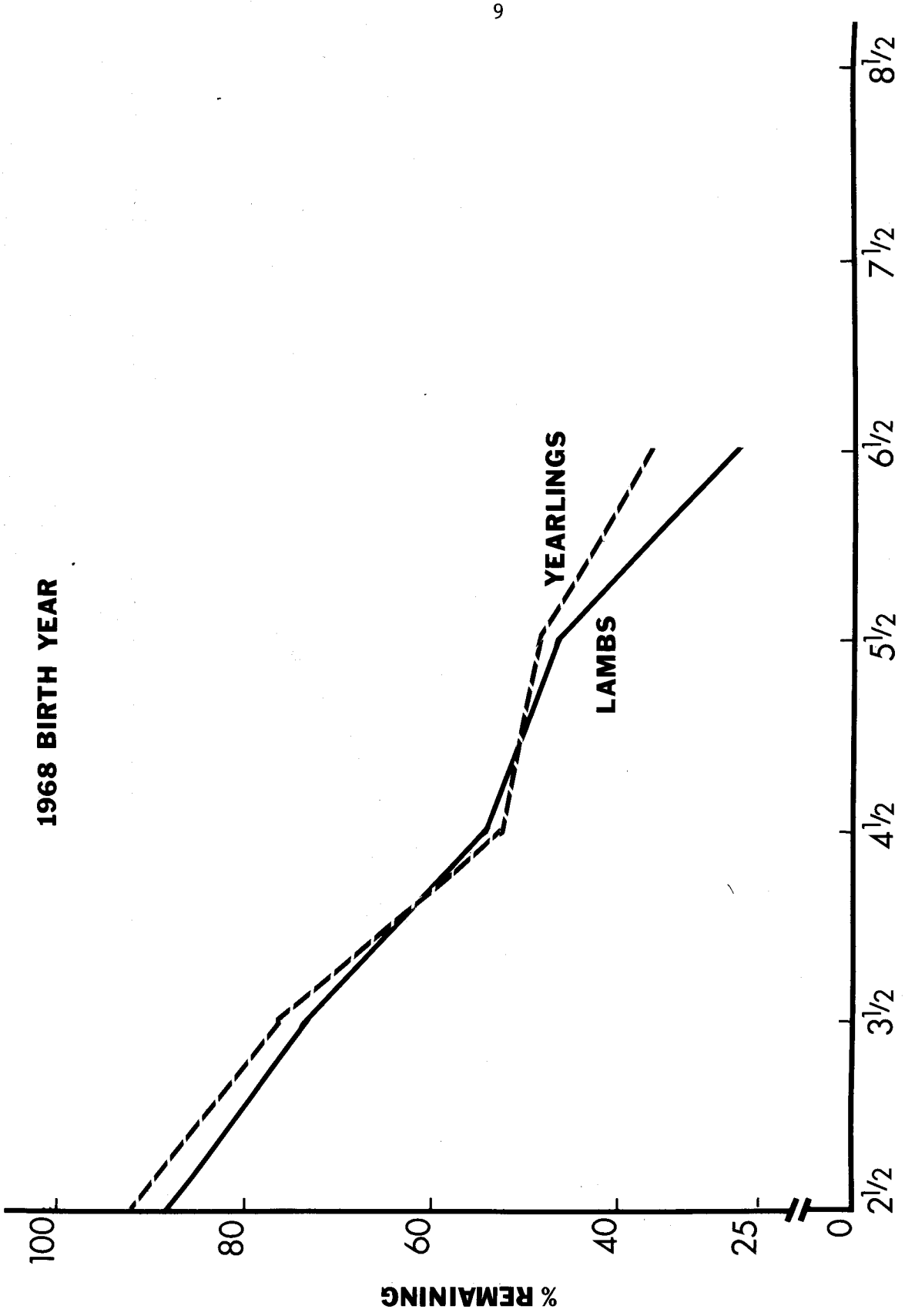

Figure 3. Percentages of 1968 ewes mated first as lambs vs. mated first as yearlings still present after 2 1/2 through 6 1/2 years of production.

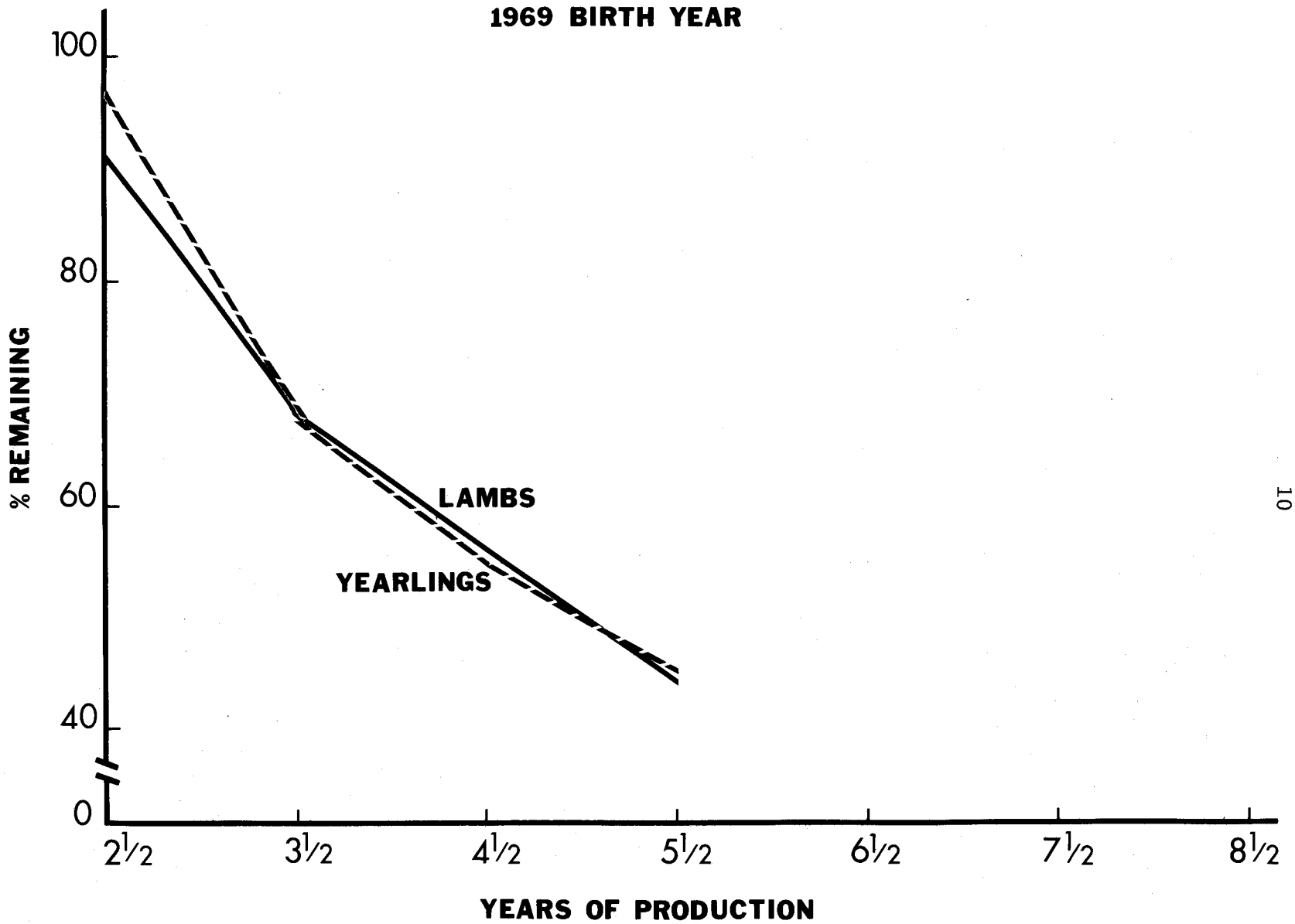

Figure 4. Percentages of 1969 ewes mated first as lambs vs. mated first as yearlings still present after 2 1/2 through 5 1/2 years of production.

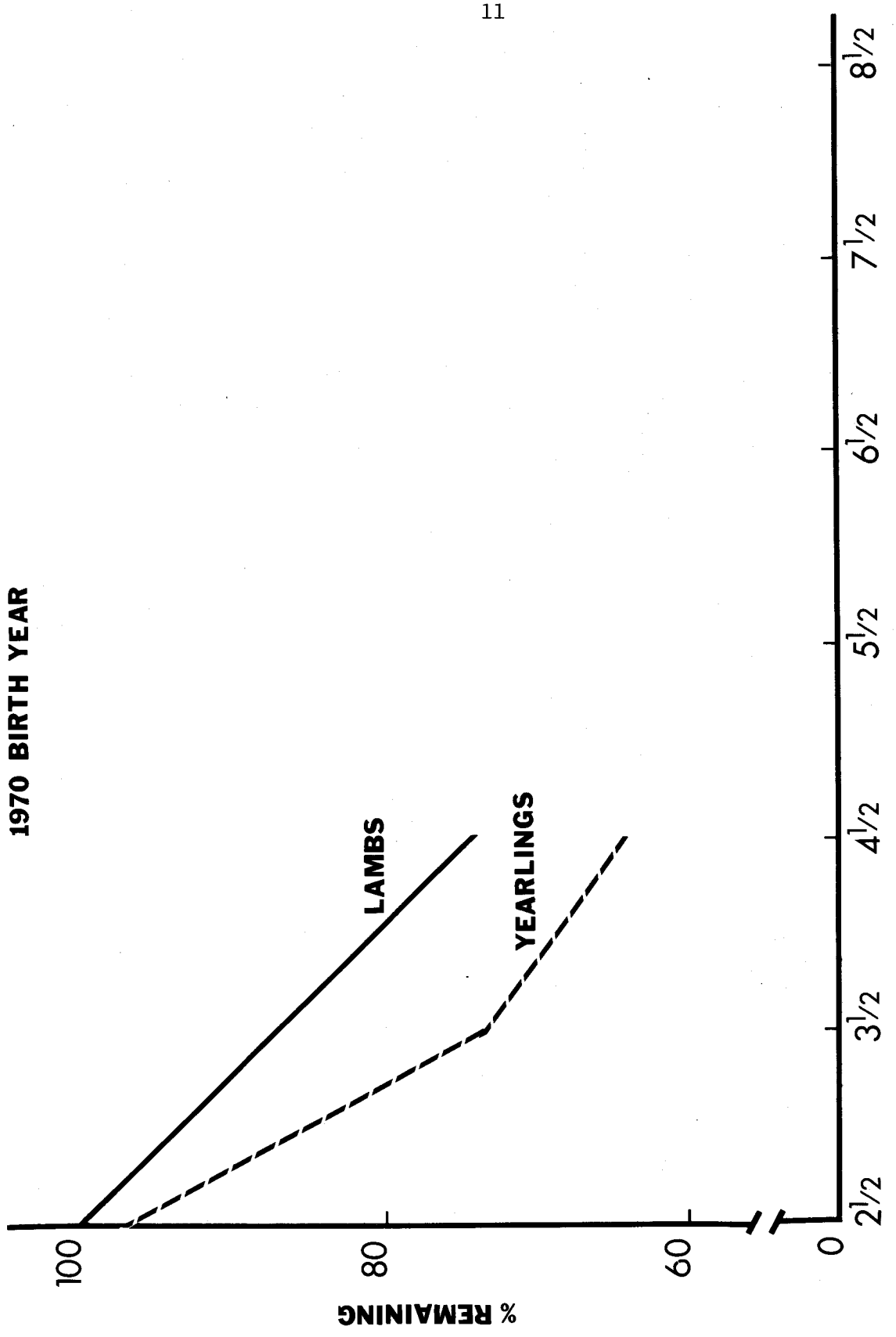

Figure 5. Percentages of 1970 ewes mated first as lambs vs. mated first as yearlings still present after 2 1/2 through 4 1/2 years of production.

II. Ewe Lamb Fertility as an Indicator of Future Productivity

M. Vavra, J. M. Levine, R. L. Phillips and William Hohenboken

Data for this study were taken from the larger experiment described in the previous section. Ewes bred as yearlings to lamb at two years of age were ignored. Ewes bred as lambs to lamb at one year of age were categorized as to whether they did or did not lamb when given that first opportunity. Subsequent production through four years of age was compared between those ewes which lambed as yearlings and those which did not. Objectives were to determine whether the ability to lamb at one year of age was predictive of subsequent attrition, reproduction, lamb production and wool production.

Materials and Methods

Population and Management. A total of 139 ewes was exposed to rams at about seven months of age. Of these, 75 were Columbia, and 64 were Targhee. Sixty-seven percent of the Columbias and 58% of the Targhees lambed successfully at one year of age (Table 4).

Production records were kept from 1966 through 1974. Because of the small number of ewes initially present per group (Table 4) and subsequent death and culling, data were analyzed only for the second through fourth production years of each birth group.

Results and Discussion

Within breeds and birth years, the attrition rate for ewes that failed to lamb at one year of age was greater than for ewes that did lamb at one year of age (Figure 6). It is unclear why this was so, since an examination of culling records did not reveal differences between groups in specific causes of death and culling. A possible explanation is that most of the ewe lambs who were unsound or disease susceptible may have failed to lamb at one year of age. If that were true, the experimental design would have placed ewes more likely to die or to be culled in the group that did not lamb at one year of age. Table 4 shows the mean weights of the two groups for each birth year at the start of the breeding season. Ewes able to lamb at one year of age were equal to or heavier than ewes unable to lamb in each birth year, ranging from equal weights for the 1968 group to 10.4 lb. heavier for the 1966 birth year group. The 1966 ewes also showed the most extreme difference of attrition rates in favor of the early lambers. In support of this interpretation, other research has documented the tendency for range ewe lambs not showing estrus their

first fall to be culled slightly more intensively in subsequent years than ewes which did exhibit estrus.

Production per Ewe Present at Lambing. The effect of lambing or not lambing at one year of age on wool production varied between Columbia and Targhee ewes. Per ewe present at lambing, there was a positive association of early fertility and subsequent lamb production for Columbia ewes, and this did not take into account the extra lamb crop produced at one year of age by the early lambers (Table 5). Columbia ewes which lambed at one year of age weaned 24.2 lb. more lamb over three production years than later lambing Columbias. There was no association between early fertility and subsequent lamb production in Targhee ewes, with only 0.5 lb. more lamb weaned by the early lambers. For both breeds there was a slight negative association between lambing at one year of age and subsequent wool production.

Production per Ewe Entering the Experiment. Differences between management systems and between breeds in attrition rate influenced production of lamb and wool per ewe entering the experiment, since zeros were entered for production of all ewes once they died or were culled. Within breeds, early lambing Columbias had a large advantage in subsequent lamb production, while early lambing Targhee ewes had only a slight advantage (Table 6). Early lambing Columbias weaned 1.4 more lambs weighing 107.7 more lb. than later lambing Columbias. They also produced 8.2 more lb. of wool for the second through fourth production years. Early lambing Targhees weaned only 13 lb. more lamb but produced 1.6 fewer lb. of wool than later lambing Targhees on a cumulative basis.

Discussion. The results obtained for Columbia ewes are in general accord with a study of whiteface range ewe lambs done at Dubois, Idaho. In that experiment Targhees showed a positive association of early estrus and lamb production through three production years but none thereafter, while Columbias showed a small but steadily increasing association through five production records. Rambouillets exhibiting estrus as lambs showed the greatest advantage in lamb production traits per ewe present at lambing. Over five production years, Targhee and Columbia ewes exhibiting estrus their first winter but not bred to lamb at one year of age weaned 24.0 and 42.1 lb. more lamb, respectively, than Targhees and Columbias which did not exhibit estrus their first winter.

In a study with a flock of New Zealand Romney ewes, positive correlations between number of ewe lambs showing estrus and lamb production for the next three lambings were found. Another study reported that Romney ewes exhibiting estrus their first year under New Zealand hill pasture conditions produced 0.6 more lambs over four lambings (two through five years) than Romney lambs which did not exhibit estrus. In the same experiment, Border Leicester x Romney ewes exhibiting estrus their first year produced 0.7 more lambs over

four lambings than ewes of the same breeding which showed no estrus as ewe lambs.

In a study of estrus in range ewe lambs in Idaho 13.9% of Targhees and 9.6% of Columbias showed estrus during their first winter. This contrasts with an average of 57% of Targhees and 67% of Columbias able to conceive during their first year in this experiment. Ewe lambs at the Union Station were on a higher plane of nutrition than the ewe lambs in the Idaho experiment, particularly from weaning until breeding time, and this should account for the difference in fertility between the two groups.

There is general agreement among research workers on the positive association of ewe lamb estrus or reproduction and subsequent lamb production. These results suggest the possibility of establishing a simple selection procedure for identifying ewe lambs with superior inherent lamb-producing ability when production conditions or management decisions do not permit lambing at one year of age. Vasectomized rams equipped with marker harnesses could be placed in the lamb flock and crayons changed each 16 days. Lambs exhibiting estrus their first year could then be selected as replacement ewes. In estimating relative efficiencies of selection techniques the selection for number of ewe lamb estruses should be 1.4 times as efficient as direct selection for fertility over three lambings, as reported by research findings.

Table 4. Number of ewes and percent fertility per breed and birth year group and average weight at the beginning of mating.

Birth year	Columbia			Targhee			Average Weight lb.	
	No. of yes[a]	No. of no[a]	Percent fertility	No. of yes[a]	No. of no[a]	Percent fertility	Yes	No
1966	9	7	56	8	7	53	104.6	94.3
1967	9	2	82	5	6	46	101.1	100.2
1968	10	7	59	6	2	75	110.8	110.8
1969	8	4	67	10	7	60	122.7	119.4
1970	14	5	74	8	5	62	116.1	110.8
TOTAL	50	25	67	37	27	58		

[a]Yes and no denote ewes able to lamb at one year of age and ewes unable to lamb at one year of age, respectively.

[b]Average weight of ewe lambs at the beginning of mating their first fall.

Table 5. Effects of ability vs. inability to lamb at one year of age and of breeds on ewe productivity per ewe present at lambing.

	Overall Average	Columbia		Targhee	
		Yes	No	Yes	No
Number of lambs born					
2[b]	1.3	1.3	1.1	1.3	1.6
3	1.4	1.5	1.3	1.4	1.4
4	1.6	1.6	1.3	1.7	1.7
C	4.7	4.5	4.2	4.7	5.3
Number of lambs weaned					
2	1.2	1.2	.9	1.1	1.3
3	1.2	1.4	1.2	1.2	1.0
4	1.3	1.4	1.0	1.5	1.3
C	4.0	4.1	3.7	4.1	4.2
Pounds of lamb weaned					
2	82.2	85.9	64.3	81.9	96.5
3	91.9	104.2	95.4	87.0	80.8
4	97.8	110.1	77.1	115.4	88.5
C	301.8	305.3	281.1	310.6	310.1
Pounds of fleece weight					
2	11.7	12.1	12.2	11.1	11.2
3	12.2	12.9	12.1	12.2	11.8
4	11.9	12.7	12.1	10.9	11.8
C	35.0	35.7	36.1	33.5	34.7

[a]Yes and no denote ability or inability to lamb at one year of age, respectively.

[b]2nd, 3rd, 4th production years and cumulative observed through fourth production year.

Table 6. Effects of ability vs. inability to lamb at one year of age and of breeds on ewe productivity per ewe entering the experiment.

	Overall Average	Columbia		Targhee	
		Yes	No	Yes	No
Number of lambs born					
2[b]	1.3	1.3	1.1	1.3	1.6
3	1.1	1.3	.9	1.1	1.2
4	1.0	1.3	.6	1.1	.9
C	3.5	4.0	2.7	3.6	3.7
Number of lambs weaned					
2	1.1	1.1	1.0	1.1	1.2
3	.9	1.2	.7	.9	.7
4	.8	1.2	.5	.9	.7
C	2.8	3.6	2.2	2.9	2.7
Pounds of lamb weaned					
2	79.7	81.1	64.5	77.8	95.4
3	70.7	95.6	55.7	70.0	61.5
4	63	91.6	40.3	70.9	49.1
C	213.4	268.3	160.6	218.9	205.9
Pounds of fleece weight					
2	11.5	11.5	12.3	10.8	11.5
3	9.5	11.2	6.8	9.7	9.9
4	7.5	9.9	5.5	6.8	7.5
C	28.4	32.6	24.4	27.3	28.9

[a]Yes and no denote ability or inability to lamb at one year of age, respectively.

[b]2nd, 3rd, 4th production years and cumulative observed through fourth production year.

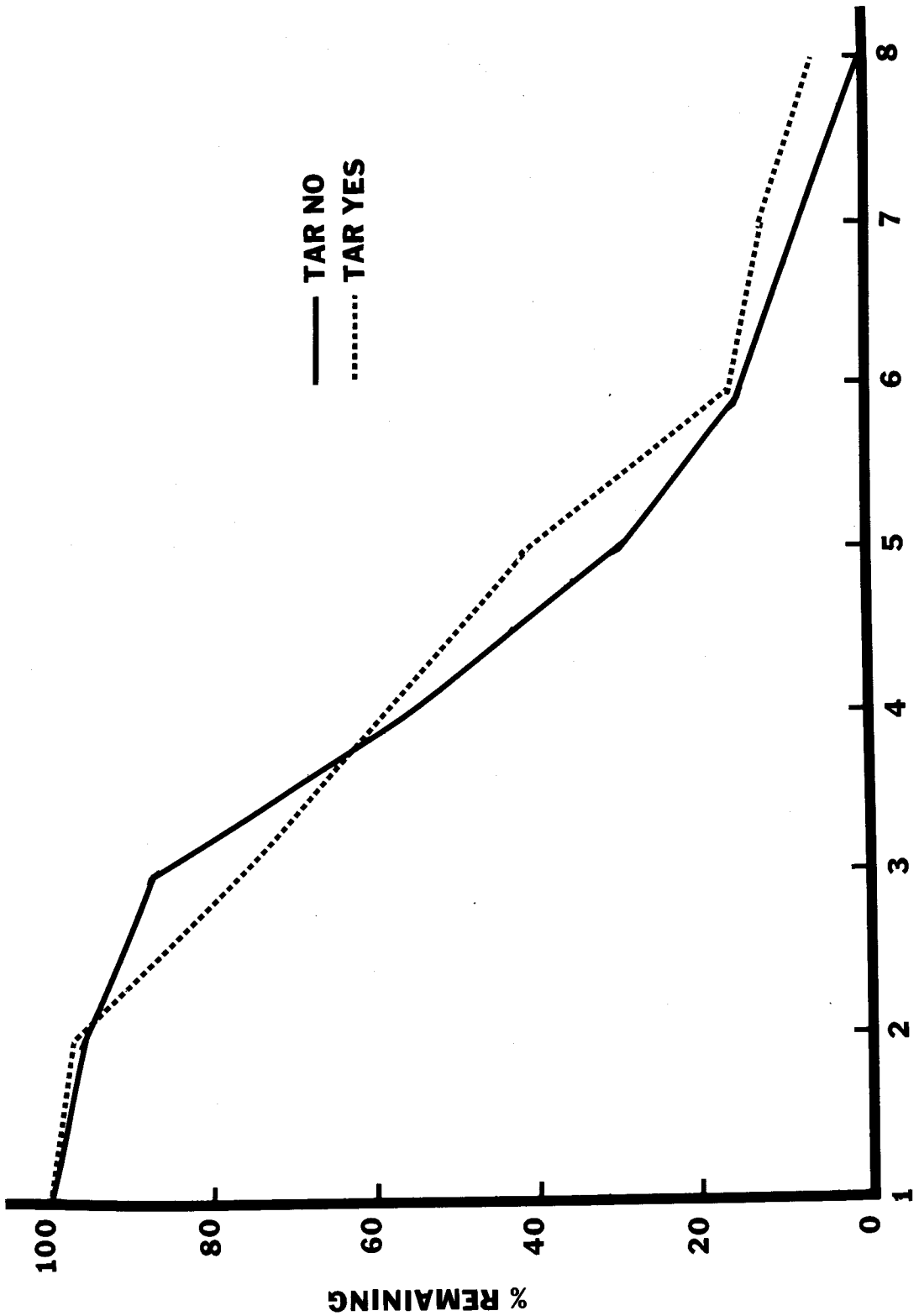

Figure 6. Percent of ewes remaining per breed x ability (yes) vs. inability (no) to lamb at 1 year of age subclass after each sequential year of production. Tar stands for Targhee. Data are pooled over birth year groups.

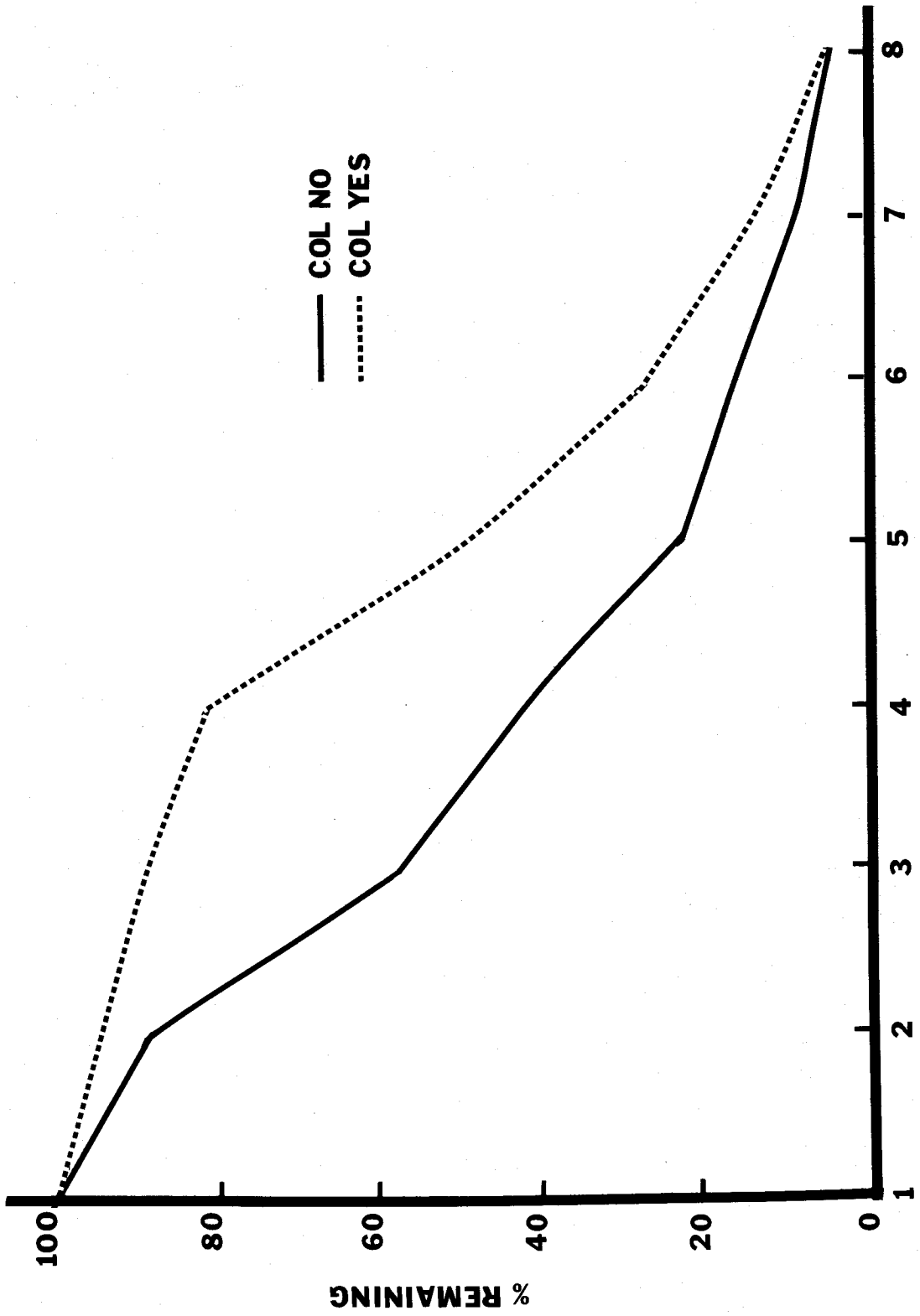

Figure 7. Percent of ewes remaining per breed x ability (yes) vs. inability (no) to lamb at 1 year of age subclass after each sequential year of production. Col stands for Columbia. Data are pooled over birth year groups.

III. Factors Affecting Puberty and Reproduction

William Hohenboken, Rose Mary Cedillo, M. Vavra and R. L. Phillips

An earlier section of this bulletin reported that breeding eastern Oregon farm flock Columbia and Targhee ewes to lamb at one year of age resulted in greater lifetime lamb production without affecting adversely their production of lamb and wool from ewes at two years of age. It was also shown that ewes able to lamb at one year of age had higher future lamb production than ewes which failed to lamb at that time when given the opportunity.

When a manager decides that mating of ewe lambs is appropriate for his operation, he then needs to know techniques that will make it work as efficiently as possible.

Factors Affecting Puberty and Lambing Rate

For ewes to mate and conceive as lambs, they must have reached sexual maturity. That is, they must be having fertile estrous cycles by the appointed time of mating. Factors known to influence puberty, measured as the first behavioral estrus, and/or lambing rate of ewe lambs include season, age, weight, weight change during mating, breed and mating system.

Season. Sheep are seasonal breeders. Their mating activity begins as day length decreases past the first day of summer (about June 21). Breeds vary in the time of summer or autumn when ewes first become sexually active and in the length of their breeding season. Fine wool breeds tend to cycle early and for an extended period of time; coarse wool breeds and those developed in northern latitudes tend to cycle later and for a shorter length of time. Ewe lambs begin cycling somewhat later than mature ewes of the same breed; and their mating season is shorter in duration. Some breeds and crosses have their peak of sexual activity and reproductive efficiency bracketing the shortest day of the year, about December 22. Other breeds and crosses peak earlier than the shortest day. Targhees, for example, have the highest twinning rate from October matings.

Each breed in a locality has a fairly specific, repeatable calendar time when seasonal mating activity begins; and ewes will not begin cycling before that time, even if they are otherwise mature enough, healthy enough and heavy enough. There also will be specific times at which each breed type will peak and end their mating season.

Age. The age at first behavioral estrus generally varies from five to 17 months. Age at puberty varies between breeds and is affected by the time of birth and by the level of feeding.

Samples from the scientific literature of the average age at first estrus are presented in Table 7. It is evident that lambs from a variety of breeds and breed crosses, raised in a variety of locations, can cycle before they are eight months of age.

The date of birth has an important effect on age at first estrus. Lambs born early in the season will cycle earlier in the year than later born lambs. They will, however, be heavier in body weight and older in average age.

Higher levels of feeding both pre- and post-weaning, through their effect on body weight, lower the age at first estrus. Also, single lambs cycle at a younger age than twins or triplets, because they tend to be heavier at any given age at least through eight months.

Weight. Several workers have reported that ewes of a breed or breed cross at a given time during the breeding season must pass a specific threshold of body weight before they are physiologically capable of exhibiting estrus. For Suffolk crossbred ewes a threshold of 88 pounds early in the breeding season decreased gradually to 73 pounds by late December. Other workers have argued that sheep begin cycling once they reach a fixed percentage of their adult weight. Since, however, this percentage has varied in different breeds and experiments from 33% to 80%, most research workers have agreed that no such biological constant exists.

Average weight at first estrus, which would be higher than the threshold (minimum) weight, from several experiments is summarized in Table 7. From these figures, it is apparent that most ewe lambs reach puberty between 80 and 100 pounds live weight.

Weight Change During Mating. Nutritional flushing, i.e., having ewes on a rising level of feed intake and gaining weight going into the mating season, is known to increase fertility and twinning rate of mature ewes. The effects of flushing on ewe lambs has not been studied extensively. Limited work suggests that higher levels of feeding will aid conception rate (measured as the number of ewes lambing per 100 ewes bred) and survival of single embryos. Flushing has not, however, aided the survival rate of twin embryos or had much effect on twinning rate.

Apparently, most ewe lambs of most breeds are capable of carrying only a single lamb to parturition, regardless of whether they have a high frequency of twin ovulations. This is fortunate since the high mortality of twin lambs born to ewe lambs and the lactation stress to a ewe lamb of raising twins makes them a liability rather than an asset for most producers.

Breed. Differences among breeds and breed crosses in age and weight at puberty are summarized in Table 7. Several experiments have reported breed differences in lamb production from ewe lambs. Some of these results are summarized in Table 8. In addition, lamb production of Columbia vs. Targhee ewe lambs was described earlier in this bulletin.

From examination of the table, the following conclusions are warranted: Rambouillets and breeds such as the Targhee and Corriedale which have a high percentage of fine wool breeding are not the best candidates for production systems lambing ewes first at one year of age. Too small a proportion of these ewes conceive and lamb. The same is true, under western Oregon conditions at least, of Romney and North Country Cheviot crossbred ewes. Finn sheep crossbreds are very high in both fertility percent and twinning rate. The advantage is carried through to a larger number of lambs weaned per ewe lambing and per ewe exposed to mating and to greater gross income per ewe bred.

Mating System. Crossbred ewes cycle at a younger age and exceed straightbred ewes for fertility and prolificacy and for total pounds of lamb weaned. Under western Oregon conditions, crossbred ewe lambs exceeded straightbred contemporaries by 25% for fertility, 10% for prolificacy, 0% for lamb survival, 8% for average lamb weaning weight and 30% for pounds of lamb weaned per ewe exposed to the ram.

Table 7. Average Age and Weight at First Behavioral Estrus for Ewe Lambs

Breed	Location	Average age at puberty (days)	Average weight at puberty (lb.)
Clun Forest	Wales	224	73
Clun Forest	Wales	244	86
Suffolk crosses	Ireland	239	99
Rambouillet, Columbia, Targhee and Dorset x Rambouillet crosses	Idaho	218	96
Finn x Rambouillet	Idaho	189	91
Finn crosses	Nebraska	219	88
Rambouillet crosses	Nebraska	238	97
Suffolk crosses	Nebraska	234	111
Hampshire crosses	Nebraska	225	92
Dorset crosses	Nebraska	230	85
Targhee crosses	Nebraska	231	91
Corriedale crosses	Nebraska	240	96
North Country Cheviot, Dorset, Finn or Romney x Suffolk crossbred ewes	Oregon	200	85
North Country Cheviot, Dorset, Finn or Romney x Columbia crossbred ewes	Oregon	210	82

Table 8. Fertility and Prolificacy of Ewe Lambs from Various Breeds and Crosses

Breed	Fertility[a]	Prolificacy[b]
Idaho Study		
Rambouillet	52	81
Targhee	64	86
Columbia	72	111
Dorset x Targhee	79	79
Finn x Rambouillet	75	123
Nebraska Study		
Suffolk	59	122
Hampshire	55	101
Rambouillet	31	100
Dorset	56	100
Targhee	38	116
Corriedale	33	111
Rambouillet x Dorset	92	107
Rambouillet x Targhee	51	100
Rambouillet x Corriedale	62	101
Finn x Rambouillet	83	142
Finn x Dorset	74	184
Finn x Targhee	95	157
Finn x Corriedale	90	136
Finn x Columbia	90	134
Oregon Study		
Hampshire	75	108
Suffolk	35	100
Willamette[c]	57	100
Hampshire x Suffolk	74	100
Suffolk x Hampshire	63	107
Hampshire x Willamette	74	109
Willamette x Hampshire	47	129
Suffolk x Willamette	79	133
Willamette x Suffolk	57	125
Oregon Study		
N.C. Cheviot x Columbia	32	113
N.C. Cheviot x Suffolk	43	118
Dorset x Columbia	37	122
Dorset x Suffolk	46	123
Finn x Columbia	67	161
Finn x Suffolk	77	163
Romney x Columbia	18	125
Romney x Suffolk	44	104

[a] Ewes lambing per 100 ewes bred.

[b] Lambs born per 100 ewes lambing. For the Idaho study, it includes only live lambs.

[c] The Willamette was developed at Oregon State University of 50% Columbia, 25% Dorset Horn and 25% Border Cheviot ancestry.

IV. Management Recommendations

Based upon our own experience and upon research results from the United States, the British Isles and New Zealand, the following recommendations are drawn:

1. Plan the mating season for when you are certain that your breed type of ewe lamb will have begun seasonal estrous cycling. For conditions in the Pacific Northwest, mating ewe lambs before October 1 is not recommended, and November mating for March lambing will generally give better results.

2. Management and nutrition should be such that ewe lambs gain 0.5 pounds a day or more from weaning through the breeding season.

3. Unless they are very well grown out, ewe lambs should not be mated until they have reached an average age of seven to eight months. For medium to large sized breeds and crosses, lambs below 80 pounds at the start of the mating season should not be saved for replacement ewes.

4. Replacement ewe lambs should not be selected solely on body weight. Saving only the heaviest potential replacements will favor early born lambs over late born lambs, which is good, but it will also favor singles over twins and triplets, which is not desirable. Replacements should be selected preferentially from heavy twins and triplets, then from heavy singles. This will put selection emphasis on twinning rate and growth rate and should provide ewes heavy enough to cycle their first fall.

5. Ewes should be fed during mating to gain weight, or at least to maintain their body weight if they are already grown out.

6. Choose a mating system that is compatible with land, feed and equipment resources, management skills and goals for raising sheep. Systematic crossbreeding should increase lamb production from breeding ewe lambs. For producers whose goal is the efficient and economical conversion of forage and harvested feed into lamb for the slaughter market (as opposed to seed stock production), crossbreeding often will be the mating system of choice.

7. Likewise, breeds or breed crosses should not be chosen primarily for their productivity as ewe lambs. Rather, breeds should be chosen first for their adaptability to physical and management conditions, then for their ability to produce lamb and wool efficiently in the total management program (as ewe lambs and as mature ewes). Once the breed choice has been made, determine whether the type chosen can perform economically when bred as ewe lambs. If the choice

is a fine wooled breed, or a late maturing one such as the Cheviot, Lincoln or Romney, ewe lamb breeding may well be an uneconomical venture.

8. Many experiments have indicated that ewe lambs have a shorter length of standing heat and that they are less likely to seek out and court a ram than are mature ewes. The chances of their being detected in estrus and mated successfully will be increased by:

a. Mating them separately from the mature ewes.

b. Using a larger number of rams per 100 ewes than would be necessary with mature ewes.

c. Using experienced rams but not rams so large there would be danger of injuring the ewes during mating.

d. Mating in confinement or at least in a small enough pasture to prevent ewes being missed by the rams.

9. Even if recommendations 1, 3, 4 and 7 are followed, there will be a larger percentage of open ewes from ewe lambs than from mature ewes. The expense of carrying open ewe lambs through the winter could be prevented by mating from 30 to 40% more replacements than actually needed. Then, the ewe lambs may be pregnancy tested after the end of the breeding season. Those that are open can be marketed as slaughter or feeder lambs, and they will still be young enough to fetch lamb, not mutton, prices. Also, the late fall lamb markets are usually stronger than those earlier in the fall.

10. Mating ewe lambs to rams of breeds with smaller mature size (Cheviot, Dorset, etc.) should reduce the incidence of difficult births.

11. Feeding during gestation should allow for the growth of the fetus and for continued growth of the ewe lamb. Overfeeding of ewes with single lambs, however, particularly in late gestation, can cause difficult births from heavy lamb birth weights.

12. At the Experiment Station ewe lambs normally begin lambing about the time the mature ewes are finishing. This is done to allow more management time for lambing difficulties and more time for ewe/lamb pairs to "mother-up" in lambing jugs. There is also some question as to the ability of ewe lambs to cycle early in the normal mating season when the mature ewes are bred. This method of operation adds to the length of the lambing season but distributes labor requirements. Young ewes should spend a week or more with the mature ewe drop band prior to lambing to get used to the routine around the lambing shed.

13. Post-lambing, yearling ewes should be managed separately from mature ewes with lambs. In this way, adequate nutrition can be provided and observation of both ewes and lambs is easier. Yearling ewes will not produce as much milk as mature ewes so it is advantageous to have a creep available to the lambs as soon as possible to improve lamb performance.

14. It would generally be wise to allow ewe lambs to raise only single lambs. Extra lambs from multiple births can be grafted to another ewe or sold or raised as orphans.

15. Lambs born to the ewe lambs should be weaned at from six to eight weeks of age. This will allow the ewe sufficient time for recovery from the strain of lactation and for growth prior to the next mating season.