

# ADVANCES IN REPRODUCTIVE MANAGEMENT TECHNIQUES FOR MORE EFFICIENT AND PROFITABLE LAMB PRODUCTION

Clarence V. Hulet

From about 1960 until 1980, sheep numbers in the U.S. declined steadily from about 35 million down to about 12 million head. The rapid and large decline greatly concerned sheep industry leaders because volume is often critical to efficient marketing, transporting, slaughtering, and merchandising.

In 1981, the national average lamb crop (101%) topped 100% for the first time in history. This occurred in spite of continuing heavy losses to predators. The factors leading to this improved efficiency may be important in turning the sheep industry around and moving increasing numbers to "greener pastures".

Dramatic changes in production efficiency have occurred during this same period of time at the U.S. Sheep Experiment Station in Dubois, Idaho. The percentage of lambs weaned of ewes bred from the entire flock, based on the number of ewes that were 2 yr of age or older, has increased from 96% in 1956 to 156% in 1979.

An analysis of factors leading to this change is very revealing and points the way to producers in the sheep industry to make dramatic changes in production efficiency and profitability.

The key factors included, 1) early puberty and breeding of ewe lambs, 2) much higher lambing (twinning) rate, and 3) better survival rate. Other additional factors of importance include, 1) improved rate and efficiency of gain and 2) marketing lambs (in most situations) at the maximum weight acceptable by the packer.

## EARLY PUBERTY

The studies show that good production can be obtained from ewe lambs even with relatively slow maturing breeds. Optimum results required good nutrition, breeding at the peak of the season, and the use of pregnancy testing with the marketing of nonpregnant lambs.

Lambs thus managed (table 1) produced a good lamb crop and had better lifetime lamb production than did ewes bred

TABLE 1. BREEDING AND SELECTING PREGNANT EWE LAMBS PAYS DIVIDENDS

Age at first lambing	Age of ewe	Ewes lambing	Lambs <sup>a</sup> born	Lambs <sup>a</sup> weaned	Total lambs weaned
	Yr	%	%	%	Lb
1 yr	1	100 <sup>b</sup>	111	83	56
	2	98	143	115	84
	3&>	97	158	134	107
2 yr	1	0	0	0	0
	2	88	102	82	58
	3&>	89	141	115	87

<sup>a</sup>Percentage of lambs born or weaned of ewes retained.

<sup>b</sup>Only pregnant lambs retained.

and managed in the traditional way (with first lamb production at 2 yr of age).

Table 2 (taken from U.S. Sheep Station range production and cost data) shows the big difference in returns (\$19.67) between ewes that are bred and selected to produce a lamb crop at 1 yr of age and those simply maintained as replacements to start production as 2-yr old ewes.

TABLE 2. DOLLARS AND CENTS OF BREEDING EWE LAMBS

Ewe lamb management	Annual maintenance cost <sup>a</sup>	Income <sup>a</sup>		Return above cost
		Wool <sup>b</sup>	Lamb <sup>c</sup>	
Bred	\$42.84	\$18.29	\$29.30	\$ 4.75
Not bred	33.31	18.29	0	-14.92
		Difference		\$19.67

<sup>a</sup>1981 to 82 winter-feeding range operation costs and income from 6 mo of age to 18 mo of age excluding labor costs.

<sup>b</sup>Includes incentive payment, wool sold at \$.74 per lb grease weight.

<sup>c</sup>Lambs weaned and marketed at 165 days, averaging 83 lb at \$.4253 per lb.

Some early-maturing breeds produce well at 1 yr of age with less emphasis on nutrition, selection, and management; these include Finn crosses and other early maturing breeds.

The relative fertility of Rambouillet, Targhee, Dorset x Targhee, Finn x Rambouillet, and Polypay live lambs during three different years is shown in table 3 (Hulet et al., 1983). Nutrition and management were improved each year of

TABLE 3. FERTILITY IN EWE LAMBS

Breed of cross	Percent ewes lambing		
	1971	1972	1973
Rambouillet (R)	4	16	37
Targhee (T)	10	57	73
Dorset x T	35	64	86
Finn x R	92	94	87
Polypay	77	94	97

the study. Rambouillets and Targhees were dependent on improved nutrition and management for satisfactory breeding performance. Finn crosses and Polypays performed like mature ewes in the first year and did quite well, even under very moderate levels of management.

For good production at 1 yr of age, ewes must be fed following weaning and through breeding for a continuing good growth rate (.25 to .33 lb/day). They also perform better if they are bred separate from mature ewes. Ewe lambs are shy breeders and also do not compete well with mature ewes for feed.

Lambs born early in the lambing season will conceive at a higher rate and will breed earlier in the season than do lambs born late in the lambing season. Ewe lambs always have a shorter breeding season than do mature ewes.

A number of pregnancy testing techniques are sufficiently accurate to be useful in diagnosing pregnancy in ewe lambs. They include: Ultrasound real-time scanners, Scanopreg II, Preg-tone, Pregmatic III, and the Rectal abdominal palpation technique (Fowler and Wilkins, 1982; Trapp and Slyter, 1983; and Stellflug and Hulet, 1983). This is not an endorsement of these products or an exclusion from endorsement of other similar products which may or may not have been tested. These techniques are quite accurate from 60 to 90 days after the rams are taken out of breeding.

### HIGH PROLIFICACY

Of all factors studied at the station, increasing the number of lambs born and reared was found to provide the greatest dollar return to labor-management. However, increasing market weight of each lamb up to 120 lb also had a significant effect on income. Table 4 (Hulet and Ercanbrack, 1983) shows these relationships and emphasizes the great importance of fertility and twinning rate. Thus, the most important thing that can be done to improve the profitability of most operations is to increase the lambing

or twinning rate. The Finn crosses or other prolific breeds of sheep can be of great help in quickly improving twinning rate.

The new Polypay breed (figure 1) has greatly increased the productivity and profitability of our flocks. We have found that the Polypay produces a good lamb crop at 1 yr of age, has a high lambing rate, and has been adaptable to accelerated lambing because of a long breeding season, short gestation, and short postpartum interval.

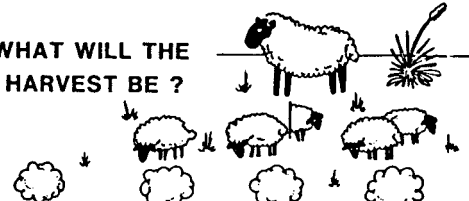
The Polypay was developed by crossbreeding four breeds (figure 2) each of which had important attributes to contribute to a new improved breed of sheep. The breeds were Rambouillet and Targhee (very hardy range breeds with good growth rate, wool quality, and long breeding season); Dorset (having a long breeding season, good carcass quality, and milking ability); and the Finn sheep (with high prolificacy and early puberty). After the initial crosses were made, the new composite breed was selected intensively for: 1) high lifetime prolificacy, 2) good yearling lamb crop, 3) shorter lambing intervals, 4) fast growth rate, and 5) good carcass quality.

Table 5 shows the comparative lamb production of Rambouillet, Columbia, and Polypay yearlings and mature ewes.

## ACCELERATED LAMBING

Accelerated lambing includes lambing at younger ages and breeding more than once per year. Table 6 lists requisites for accelerated lambing. Unless your operation can meet all or most of these requisites, you probably should not try accelerated lambing.

Table 4. WHAT WILL THE HARVEST BE ?



When Lamb Market Weight is...	*Dollar Return To Labor Mgt. Per Ewe is...			
80#	-\$28	\$20	\$44	\$68
90#	- 28	26	53	80
100#	- 28	32	62	92
110#	- 28	38	71	104
120#	- 28	44	80	116

\*Fixed Costs Were Not Taken Into Consideration. ( Based on 860lb wt. Lambs )



Figure 1. Polypay ewe with lambs.

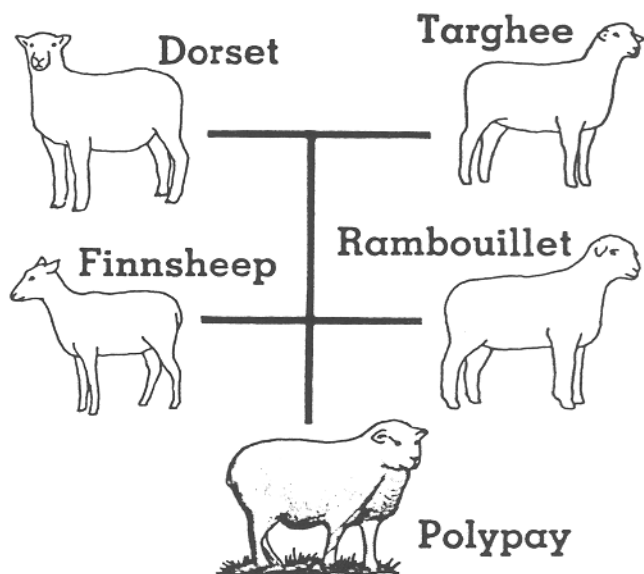


Figure 2. Breed crossing scheme used in developing the Polypay.

TABLE 5. COMPARATIVE LAMB PRODUCTION ON HERDED RANGE

Lambing age	Breed	Lambing %	Weaning %
12 mo	Rambouillet	106	18
	Columbia	104	10
	Polypay	135	90
Mature	Rambouillet	160	122
	Columbia	162	102
	Polypay	207	164

TABLE 6. ACCELERATED LAMBING REQUISITES

1. Only for experienced producers
2. Economical local feed source
3. Early puberty
4. High prolificacy
5. Long breeding season

Accelerated lambing can lead to a better distribution of fresh lamb supply, more efficient use of facilities, reduced ewe maintenance cost per lamb, and reduced seasonality of labor requirements.

A number of factors can affect the success of accelerated lambing. First, day length controls breeding season in most breeds of sheep, with greater breeding activity during seasons with short days; sheep will breed only during this season. This season can be changed by controlling light. Some breeds, such as the Dorset, Rambouillet, and Polypay have longer breeding seasons than do other breeds; and the more southern breeding locations have increasingly longer seasons. When rams are put with ewes during the transition period between the nonbreeding and breeding season, the ewes are stimulated to breed earlier in the season than they would otherwise. This can be very important, especially when artificial lights or hormones cannot be used to stimulate out-of-season breeding. In the station studies, sterilized or aproned rams were put with the ewes about 15 days before breeding was scheduled to begin. The fertile rams were put in when the sterile rams were removed.

By breeding very early in the season, a lamb crop can be produced, the lambs early weaned, and the ewes rebred before the end of the natural breeding season. This system has been found to work quite well in the Russ Beattie Poly-

pay flock in Idaho (table 7). Mr. Beattie has been averaging about 300% lambs weaned of ewes in the flock each year since he started this program.

TABLE 7. ACCELERATED LAMB PRODUCTION<sup>a</sup>

Year	No. of ewes	No. ewes lambing	Lambs raised to market age	
			No.	%
<u>1979</u>	64			
Winter		64	112	175
Fall		43	70	163
Annual			182	284 <sup>b</sup>
<u>1980</u>	104			
Winter		101	207	205
Fall		47	131	196
Annual			338	335 <sup>b</sup>

<sup>a</sup>Polypay sheep on Russ Beattie ranch, Idaho.

<sup>b</sup>Percentage raised to market weight/yr/ewe.

In accelerated programs without light or hormone treatments, the station has found that ewes breed back during the winter breeding period much more successfully if lambs are early weaned. If the lambs are born in December, they should be weaned at weekly intervals in January, when they average about 33 days of age. In other words, each week all lambs 30 to 36 days of age will be weaned, then the ewes will be put back into breeding within 2 or 3 days.

For producers who have appropriate facilities and can economically manage sheep using this method, table 8 shows a successful technique for controlling breeding using light-tight barns and artificial light.

TABLE 8. LIGHT-CONTROLLED BREEDING

Time	Light schedule	
	Hr light	Hr dark
40 days		
Before breeding	8	16
After breeding	16	8

Source: Rowett Institute, Scotland.

#### EARLY WEANING

When early weaning lambs, it is important to have the lambs on a high-protein (16% to 18%), high-energy (65% concentrate) creep feed that will be used after weaning. This can be changed to a lower protein, higher roughage diet within 2 wk to 3 wk to reduce feed costs. The ewes should

be taken off feed and water a day before weaning and started back slowly onto feed and water a day after weaning to reduce the chances of acute mastitis. They are then brought up to a flushing condition for breeding.

It has not been necessary to early wean summer-born lambs to get the ewes to rebreed. Therefore, at this season of year, weaning is done at about 50 to 60 days of age, when lambs will do well on a simple low-cost diet such as barley or corn and alfalfa pellets or hay.

## **RAM FERTILITY**

Ram fertility is critical in accelerated lambing operations. Semen testing by a competent technician is recommended. If this service is not available or practical, the producer should carefully examine the testes. Make sure that the testes are well developed (have good size), are relatively firm (not soft or flacid), and are free from lesions (swellings, irregular enlargements, knots, hard spots, etc.). The testes should be relatively uniform in size, condition, and feel. When the sheep are breeding during hot weather, shear the rams a couple of weeks before breeding; if possible, breeding should be done under cool, shady conditions. Provide plenty of water. In unusually hot weather, it would be wise to put the ram with the ewes only at night if this is practical.

## **RATE AND EFFICIENCY OF GAIN, AND MARKETING TIPS**

Early-weaned lambs gain very efficiently on high-protein, high-energy diets. Rate of gain should be maximized to obtain the most efficient gains. Selection for rate of gain to market weight can lead to genetic improvements in efficiency of gain.

In most situations, if the parent breeds are large (e.g., Rambouillet ewes bred to Suffolk rams), the greatest overall efficiency of production will be realized by marketing lambs at the heaviest weights acceptable without price discounting by the buyer or packing company.

Although taste panels have clearly demonstrated that ram lambs have highly acceptable quality from the standpoint of taste, tenderness, and juiciness and are about 20% more efficient than ewe lambs (Mendenhall and Ercanbrack, 1979; Santer et al., 1977), they are usually price-discounted by lamb trade buyers. However, if lambs are marketed directly to the consumer, it would be very profitable to keep ram lambs intact.



## CONCLUSIONS

Profitability of lamb production can be increased by carefully studying and applying those management tools that can lead to much greater production efficiency. Emphasize better and earlier production from ewe lambs, higher twinning rate, better lamb survival, improved growth rate and efficiency, and the marketing of bigger high-quality lambs.

## REFERENCES

- Ercanbrack, S. K. and C. V. Hulet. 1980. Feeding and breeding ewe lambs for optimum productivity. U.S. Sheep Station Short Course. Idaho Falls, Idaho.
- Fowler, D. G. and J. F. Wilkins. 1982. The identification of twin bearing ewes with real time ultrasound and its potential use in sheep and wool production. Wool Tech. & Sheep Brdg. 30:111.
- Hulet, C. V. 1975. Effects of feed, breed, and year in pregnancy in ewe lambs. Theriogenology. 2:15.
- Hulet, C. V. and S. K. Ercanbrack. 1983. Increasing market lamb production efficiency. Sheep & Goat Handbook. Westview Press, Inc., Boulder, CO. 3:407.
- Hulet, C. V., S. K. Ercanbrack and A. D. Knight. 1983. Development of the Polybay breed of sheep. J. Ani. Sci. 57:In press.
- Mendennall, V. T. and S. K. Ercanbrack. 1979. Influence of carcass weight, sex, and breed in consumer acceptance of lamb. J. Food Sci. 44:1063.
- Santer, E. A., J. A. Jacobs and C. E. Robinson. 1977. Effect of carcass weights on taste panel score and shear values of lamb roast. Univ. of Idaho Agr. Exp. Sta., Misc. Series 41:89.
- Stellflug, J. N. and C. V. Hulet. 1983. Pregnancy diagnosis in sheep: A review. Intr. J. of Goat & Sheep Res. (In press.)
- Trapp, M. J. and A. L. Slyter. 1983. Pregnancy diagnosis in the ewe. J. Anim. Sci. 57:1-5.