

## Optimum Nutrition of the Young Lamb for Maximum Growth and Lean Production

Robert L. Noble, L. E. Walters, Allen D. Tillman and Eldon Nelson

If the sheep industry is to supply a greater percentage of red meat to the consuming public, more efficient systems of production of meatier lambs must be developed. Fortunately, sheep respond to very intensive methods of production and one means of intensifying lamb production in recent years is earlier weaning. For such a program to work, the young lamb must have optimum nutrition from birth to slaughter. It is imperative, if early weaning is to be successful, that lambs consume considerable creep feed and to attain near maximum growth during the pre-weaning period, as well as to continue this rapid growth during the post-weaning phase.

The purposes of this study were (1) to develop rations for the early, weaned lamb, during both the pre- and post-weaning periods, that will produce an efficient conversion of ration energy to an acceptable carcass and (2) to study the deposition of lean, fat, and bone tissue by lambs from approximately 60 pounds to 100 pounds when self-fed rations vary considerably in energy (T.D.N.) level.

### Procedure

Forty lambs from ewes having singles were selected for the study; the ewes were either Rambouillet or Rambouillet x Dorset crosses. The lambs were sired by Hampshire, Suffolk, or Dorset rams and were born on October 21  $\pm$  2 days.

When lambs were two weeks old, they were allotted on the basis of birth weight, weight at 2 weeks, type of birth, sex, and breed of sire to one of two rations; a *standard ration* which contained 55 percent concentrates, 45 percent roughage, and an estimated T.D.N. content of 63 percent (moderate energy level); and an *all-concentrate* ration which contained 95 percent concentrates, 5 percent roughage, and an estimated T.D.N. content of 78 percent. The compositions of these rations are shown in Table 1.

The study was divided into two phases, a 45-day creep-feeding and a post-weaning phase. During the first phase, ewes and lambs grazed wheat pasture during the day but at night the ewes and lambs were penned in dog-proof lots. The ewes were fed one pound of ground milo per head daily and the lambs had access to one of the self-fed creep rations. Milk production of the ewes was measured on the 35th and 60th days of lactation. Weights were taken every 14 days and feed consumption records were calculated at this time. Four lambs from each group were slaughtered at weaning. Carcasses were weighed, ribbed, cut into wholesale cuts, and then physically separated into fat, lean, and bone to establish initial carcass composition for subsequent growth and development studies.

TABLE 1. Percentage Composition of the Rations

Ingredients	"Standard"	"All Concentrate"
Ground alfalfa hay	45.0	5.0
Steamed rolled milo	39.5	69.0
Soybean oil meal	10.0	15.0
Molasses	5.0	5.0
Wheat bran	-	5.0
Sodium chloride	0.5	0.5
Calcium carbonate	-	0.5
Vitamins A and D <sup>1</sup>	+	+
Antibiotics <sup>2</sup>	+	+
<b>Chemical composition</b>		
Dry matter	88.7	88.7
Crude protein	15.8	15.2
Crude fiber	17.7	4.3
Est. T.D.N.	63	78
Calcium	.75	.70
Phosphorus	.24	.30

<sup>1</sup>Each pound of feed contained 400 I.U. of vitamin A and 50 I.U. of vitamin D.

<sup>2</sup>Each pound of feed supplied 10 mg. of chlortetracycline.

During the post-weaning phase, the remaining 16 lambs per treatment were divided into four groups of four per group and continued on their respective rations. The group-fed lambs were weighed off the experiment as they reached a live weight 100 pounds. The lambs were shrunk for eight hours and re-weighed. During this period the lambs were shorn. Immediately following slaughter, weights were collected on the following: complete digestive tract, contents of the rumen, pelt, and head, heart and liver. The carcasses were then chilled for 48 hours, weighed, ribbed and measured using standard procedures.

The following carcass information was obtained: weight of the chilled carcass, rib eye area and fat thickness, 12th rib, yield of streamlined trimmed hind saddle (flank off), and yield of trimmed lean cuts (leg, loin, rib and shoulder). The streamlined hind saddle and the lean cuts were trimmed to  $\frac{1}{4}$  inch of finish. After these measurements were taken, physical separations of fat, lean, and bone were made. Samples of the lean tissue were then ground and analyzed for either extract and moisture using standard procedures.

## Results

**Creep Feeding Phase**—The average daily gains of the lambs of both groups were very satisfactory during this period. Although the lambs fed the "All Concentrate" ration gained slightly faster, this is perhaps due partly to the greater milk yield of their dams during the middle of the lactation period. Creep-feed consumption was essentially the same for both groups.

The carcass information on the lambs slaughtered at the end of the creep-feeding phase is shown only to establish initial carcass information for subsequent growth and development comparisons. As the animals

ate only an average of 36-38 pounds of feed per lamb, it is doubtful if ration had any major effect on carcass composition during the 45-day creep feeding period.

**Post Weaning Phase**—The average daily gains of the lambs of both groups was quite satisfactory, however, there was wide range (.35 to .79 lbs. per day) in average daily gains within both groups. Perhaps this indicates the potential for improvement in growth rate which can be made by selection.

The average pounds of lean, fat, and bone tissue produced by the lambs which were slaughtered at a constant weight of 100 pounds is shown in Table 2. Although the two rations varied 40 percent in roughage content and 15 percent in energy level, only small differences were noted in carcass composition and pounds of tissue (lean - fat - bone) produced. The data on individuals indicate that there was a rather small range in the amount of lean produced but considerably wider range in the amount of fat produced.

It is interesting to note (Figure 1) that as the lambs increased in weight from approximately 57 to 100 pounds, the lean produced increased only 42.52 percent whereas the fat product increased by over 150 percent.

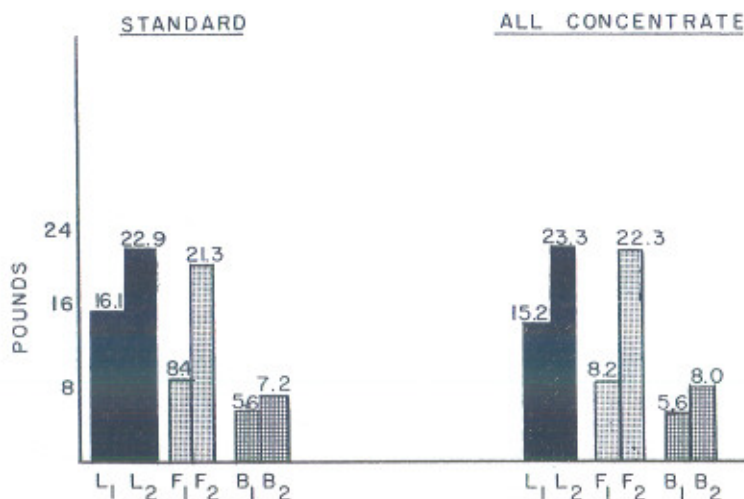


Figure 1.  $L_1F_1B_1$  denotes pounds of lean, fat and bone respectively for lambs slaughtered at weaning time (approximately 57 pounds).  $L_2F_2B_2$  denotes pounds of lean, fat and bone respectively for lambs slaughtered at the end of post-weaning phase (approximately 100 pounds).

TABLE 2. Summary of Results

	"Standard"	"All Concentrate"
<b>Creep Feeding Phase</b>		
<b>Production Data</b>		
Number of lambs	20	20
Birth weight (lbs.) 10/21 $\pm$ 2 days	10.3	10.4
Initial wt. (lbs.) creep feeding phase	21.0	21.5
Milk production of the dams		
35th day of lactation (lbs.)	2.8	3.2
60th day of lactation (lbs.)	1.0	1.0
Weaning wt. (lbs.) 12/21—(60 days of age)	57.7	59.8
Gain per lamb (lbs.)	36.7	38.3
Average daily gain (lbs.)	.82	.85
Feed per lamb (lbs.)	36.0	37.6
<b>Carcass Data (Averages for 4 lambs per treatment)</b>		
Live wt.	57.00	58.60
Cold carcass wt.	30.40	29.20
Fat thickness, 12th rib (ins.)	.12	.08
Kidney knob (lbs.)	1.10	1.00
Rib eye area, 12th rib (sq. in.)	2.15	2.00
Streamlined trimmed hind saddle (lbs.)	11.40	10.70
Trimmed lean cuts (lbs.)	20.70	20.70
Pounds of tissue		
lean	16.13	15.23
Fat	8.38	8.18
Bone	5.58	5.58
<b>Post Weaning Phase<sup>1</sup></b>		
<b>Production Data</b>		
Initial weight (lbs.)	55.8	56.5
Final weight (lbs.)	100.6	101.0
Average daily gain (lbs.)	.55	.59
Number of days on feed	83.0	80.0
Feed per day (lbs.)	3.27	3.16
Feed per wt. gain (lbs.)	606.0	543.0
Pounds of feed per pound of lean produced <sup>2</sup>	39.3	31.8
Pound of T.D.N. per pound of lean produced <sup>2</sup>	24.7	24.8
Ratio of acetic:Propionic acid	1:3.1	1.1:7
<b>Carcass Data<sup>3</sup></b>		
Cold carcass wt. (lbs.)	52.00	54.40
Fat thickness, 12th rib (in.)	0.29	0.31
Kidney knob (lbs.)	2.41	2.93
Rib eye area, 12th rib (sq. ins.)	2.20	2.40
Streamlined trimmed hind saddle (lbs.)	17.30	17.50
Trimmed lean cuts (lb.)	29.90	30.60
Pounds of tissue		
Lean	22.92	23.30
Fat	21.30	22.33
Bone	14.07	14.95

<sup>1</sup>Four lambs died, all concentrate group, urinary calculi.

<sup>2</sup>During the post-weaning phase only (assuming 16 lbs. of lean per lamb at 57 lbs.)

<sup>3</sup>Averages for 16 lambs, standard ration; 12 lambs "all concentrate" ration.

## Summary

Although the lambs fed the "all concentrate" ration, gained slightly faster, required less feed per wt. gain, had higher dressing percentages, and a more narrow ratio of acetic to propionic acid in the rumen fluid, the average pounds of lean produced and the pounds of energy (TDN) required to produce a pound of acceptable lean (all carcasses graded choice and above) were essentially the same for both groups.