

Pounds of forage clippings per acre and grazing production are presented in the following table.

Crop	Date of clipping	Green forage wt. per acre, lbs.	Dry matter per acre, lbs.	Av. ewe and lamb grazing days per acre	Av. gain per ewe, lbs.
Will barley	11-11-64	18,068	4,580	533	3.2
Scout wheat	12-15-64	8,467	3,793	477	2.4
Balbo rye	1-6-64	4,082	3,463	— <sup>1</sup>	—

1. Grazing data not available.

**Results and Discussion:** Table 9 shows average amount of grazing produced by certain crops over a period of years. Each crop listed produced very good grazing results.

**Table 9**  
Grazing production of various crops.

Crop	Planting time	No. of years in average	Season grazed	Av. grazing days per acre
Balbo winter rye	August	3	Fall	597 ewe
Balbo winter rye	August	3	Fall and winter	469 ewe and lamb
Mefmi winter barley	Early April	3	Late May through June	516 ewe
Otis spring barley	Early April	4	Late May to early June	484 ewe
Scout winter wheat	August	1	Fall	477 ewe and lamb <sup>2</sup>
Will winter barley	August	1	Fall	533 ewe and lamb <sup>2</sup>
Buffalograss <sup>1</sup>	(native)	2	Summer and fall	284 ewe

1. Taken from pasture which had been lightly grazed.

2. From Dec. 2, 1964, until lambs were weaned (at 8-10 weeks of age). Nursing ewes grazing cereal crop pasture (Lot 2) increased in weight 6.49 pounds while nursing ewes in dry lot lost weight (Lot 3: -1.31 pounds; Lot 4: -3.22 pounds). Lambs in all lots received the same creep ration.

The following are equations that might be used as "rules-of-thumb" to estimate potentials of cereal crop pasture or other pasture where the average number of grazing days per acre is available.

$$\frac{\text{No. of acres of pasture} \times \text{average grazing days per acre}}{\text{Grazing period (in days)}} = \text{number of ewes that can be grazed for the period}$$

$$\frac{\text{Grazing period (in days)} \times \text{no. of ewes in flock}}{\text{Average grazing days per acre}} = \text{acres of pasture required for flock for period}$$

$$\frac{\text{Acres of pasture available} \times \text{average grazing days per acre}}{\text{No. of ewes in flock}} = \text{period of grazing to expect}$$

## Lamb Feeding Experiments, Garden City, 1964-1965.<sup>1</sup>

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### Lamb and Pretest Treatment

Delivery of 601 finewool, wether feeder lambs was accepted at Menard, Texas, October 8, 1964. Average weight was 68.9 pounds; cost, \$19.25 per cwt. Lambs were shorn (average fleece weight, 3.2 pounds) and shipped 543 miles to Garden City on a triple-deck truck. They arrived October 9, a.m., weighing an average of 66.4 pounds. They were divided into groups of about 50 lambs and fed a ration of medium-quality alfalfa hay and chopped sorghum stubble until started on test.

### Experimental Procedure

Half the lambs were vaccinated October 14 with *Clostridium perfringens* (type D) toxoid for enterotoxaemia. October 22 all lambs, except 50, were drenched with Thibenzole, weighed, implanted with 3 mgs. stilbestrol, and allotted with equal numbers of vaccinated and non-vaccinated lambs in each lot November 2.

Treatments for the 11 lots follow:

Lot no.	Treatment	How fed
1	Standard ration of sorghum silage, whole sorghum grain, .75 pound sun-cured alfalfa pellets, .10 pound C.S.M.	Hand
2	Sorghum silage in standard ration replaced by corn silage	Hand
3	Mixture of 35% whole sorghum grain and 65% sun-cured alfalfa pellets	Self
4	Pelleted ration of 35% sorghum grain and 65% sun-cured alfalfa	Self
5	Pelleted ration of 26% sorghum grain, 9% animal fat and 65% sun-cured alfalfa	Self
6	Pelleted ration of 32% sorghum grain, 3% animal fat and 65% sun-cured alfalfa	Self
7	Mixture of 35% whole sorghum grain and 65% dehydrated alfalfa pellets	Self
8	Ground mixed ration of 35% sorghum grain and 65% sun-cured alfalfa	Self
9	Pelleted high concentrate ration plus 9% animal fat. (See Table 1)	Self
10	Pelleted high concentrate ration—no added fat. (See Table 1)	Self
11	Same as Lot 4 (pelleted ration of 35% sorghum grain and 65% sun-cured alfalfa)—not drenched for internal parasites	Self

Lambs in Lots 9 and 10 were adjusted to the final rations over a 5-week period. Rations fed in Lots 9 and 10 by periods are listed in Table 1.

All other self-fed lambs received their rations from the start of the test. Those in Lots 1 and 2 were fed twice daily starting with 15 pounds whole sorghum grain, 18 pounds sun-cured alfalfa pellets and 2.5 pounds cottonseed meal poured on top and mixed with 75 pounds silage to each lot of 50 lambs per feeding. This amounted to a starting daily ration per lamb of .60 pound sorghum grain, .72 pound alfalfa, .10 pound cottonseed meal and 3 pounds silage. Amounts of cottonseed meal and alfalfa remained constant throughout the test. Sorghum grain was in-

<sup>1</sup>Contribution No. 529, Department of Animal Husbandry, Kansas State University, Kansas Agricultural Experiment Station, and No. 77, Garden City Branch Agricultural Experiment Station.

Table 10  
Rations fed in Lots 9 and 10 by periods.

	Lot no.	% sorghum grain	% fat	% sun-cured alfalfa	% C.S.M.	% ground limestone
First 2 weeks	9	41	9	50		
	10	50		50		
Third week	9	51	9	40		
	10	60		40		
Fourth week	9	50	9	30	10	1
	10	59		30	10	1
Fifth week	9	60	9	20	10	1
	10	69		20	10	1
Remainder of test	9	70	9	10	10	1
	10	79		10	10	1

creased at the rate of 2 pounds per feeding every 2 days until each feeding reached 36 pounds (1.44 pounds per lamb per day). Silage was added or reduced, depending on consumption. Salt and heated water were available in all lots.

Because of rapid gains and heavy weight of lambs, the experiment was concluded January 25 after an 84-day test. Two hundred twenty-four of the heaviest and fattest lambs were marketed then.

Heavy death losses due to enterotoxemia among unvaccinated lambs made them good subjects to determine the value of antitoxin and bacterin injected late in the feeding period, to prevent death losses from enterotoxemia. Previously unvaccinated lambs were divided into three lots of 44 lambs each. Lot 1 lambs were vaccinated with antitoxin. Lot 2 lambs remained unvaccinated and Lot 3 lambs were vaccinated with bacterin. A fourth lot was composed of lambs vaccinated at start of original test. Similar rations were fed to all lots.

Feed prices, processing charges, and miscellaneous costs were:

	Per ton
Alfalfa hay .....	\$27.00
Dehydrated alfalfa pellets .....	38.00
Sun-cured alfalfa pellets .....	34.00
41% cottonseed meal .....	72.00
Corn silage .....	8.00
Sorghum silage .....	7.00
Ground limestone .....	16.50
Salt .....	20.00
Sorghum grain .....	1.95 per cwt.
Animal fat .....	7.50 per cwt.
Grinding .....	4.00 per ton
Grinding and pelleting .....	7.00 per ton
	Per head
Thiabendazole drench .....	.17
Vaccination	
Toxoid .....	.10
Bacterin .....	.10
Antitoxin .....	.25

Results are reported in Tables 11, 12, and 13.

Table 11  
Hand-fed and self-fed rations for fattening lambs, October 11, 1964, to January 25, 1965—84 days.

Lot no.	1	2	9	10	4	11
Treatment	Standard sorghum silage	Standard worn silage	Pelleted high-concentrate, 9% fat	Pelleted high-concentrate, to fat	Pelleted 85% sorghum grain, 65% alfalfa hay	Pelleted 85% sorghum grain, 65% alfalfa hay, not drenched
No. lambs	48	43	48	45	46	48
Av. initial wt., lbs.	64.6	66.5	65.8	67.3	66.6	62.8
Av. final wt., lbs.	107.9	111.6	104.1	103.3	111.8	108.0
Av. total gain, lbs.	42.4	45.1	38.3	36.0	45.2	45.2
Av. daily gain, lbs.	.50	.54	.46	.43	.50	.54
Vaccinated	.53	.55	.45	.45	.61	.54
Unvaccinated	.47	.53	.46	.40	.60	.53
Daily feed per lamb, lbs.:						
Whole milk	1.32	1.32	...	...	...	...
Sorghum silage	4.53	...	...	...	...	...
Corn silage	...	4.78	...	...	...	...
Alfalfa hay	.72	.72	...	...	...	...
41% C.S.M.	.10	.10	...	...	...	...
Pellets	...	...	3.22	3.65	4.68	4.36
Salt	.019	.022	.025	.024	.023	.025
Feed per cwt. gain, lbs.:						
Whole milk	264.0	241.4	...	...	...	...
Sorghum silage	926.0	...	...	...	...	...
Corn silage	...	885.1	...	...	...	...
Alfalfa pellets	144.0	133.3	...	...	...	...
41% C.S.M.	26.9	18.4	...	...	...	...
Pelleted ration	...	...	709.3	780.3	780.0	807.4
Salt	3.5	4.1	4.4	5.6	3.8	4.6
Av. feed cost per cwt. gain <sup>1</sup>	\$11.60	\$11.28	\$19.51	\$15.59	\$14.94 <sup>2</sup>	\$15.47
Av. feed cost per lamb	\$ 4.92	\$ 5.09	\$ 7.37	\$ 5.61	\$ 7.57 <sup>2</sup>	\$ 6.96
Enterotoxemia deaths:						
Vaccinated	0	0	0	0	1	0
Unvaccinated	2	7	2	5	3	2
No. slipping wool	3	0	0	22	6	15

1. Does not include cost of sublethal implants, Thiabendazole drench, or enterotoxemia vaccination.

2. Costs increase to \$15.27 and \$7.71 when cost of drenching is included.

Table 12  
Self-fed rations for fattening lambs, October 11, 1964, to January 25, 1965—84 days.

Lot no.	8	3	7	4	5	6
Treatment	Ground-mixed: 35% sorghum grain, 65% alfalfa hay	Mix: 32% whole sorghum grain, sun-cured alfalfa pellets	Mix: 35% whole sorghum grain, 65% dehydrated alfalfa pellets	Pelleted: 35% sorghum grain, 65% alfalfa hay	Pelleted: 30% sorghum grain, 9% fat, 61% alfalfa hay	Pelleted: 32% sorghum grain, 3% fat, 65% alfalfa hay
No. lambs	45	44	47	46	47	49
Av. initial wt., lbs.	66.2	65.7	65.4	66.6	65.4	64.3
Av. final wt., lbs.	105.8	115.0	108.6	117.3	115.9	115.8
Av. total gain, lbs.	39.5	49.3	43.2	50.7	50.5	51.5
Av. daily gain, lbs.	.47	.59	.51	.60	.60	.61
Vaccinated	.48	.58	.50	.61	.64	.62
Unvaccinated	.47	.60	.53	.60	.57	.61
Daily feed per lamb, lbs.:						
Mix or pellets	3.92	4.35	3.82	4.68	4.09	4.23
Salt	.016	.028	.025	.023	.025	.025
Feed per cwt. gain, lbs.:						
Mix or pellets	8.34	7.37	7.49	7.80	6.81	6.93
Salt	3.4	4.7	4.9	3.8	4.2	4.1
Av. feed cost per cwt. gain <sup>1</sup>	\$14.72	\$13.23	\$14.41	\$14.94	\$16.47	\$14.41
Av. feed cost per lamb <sup>1</sup>	\$ 5.83	\$ 6.52	\$ 6.23	\$ 7.57	\$ 8.32	\$ 7.44
Enterotoxemia deaths:						
Vaccinated	1	0	0	1	0	0
Unvaccinated	6	5	2	3	2	1
No. slipping wool	4	6	3	6	0	2

1. Does not include cost of silage, implants, Thibenzole drench, or enterotoxemia vaccination.

Table 13  
Death losses and performance of lambs not vaccinated or vaccinated with enterotoxemia antitoxin, bacterin or toxoid, January 29 to March 2, 1965—32 days.

Lot no.	1	2	3	4
Treatment	Vaccinated with antitoxin 1/29/65	Not vaccinated	Vaccinated with bacterin 1/29/65	Vaccinated with antitoxin 10/14/64
No. lambs	44	44	44	176
Initial wt., lbs.	103.2	103.2	102.9	103.2
Final wt., lbs.	116.7	117.8	115.2	117.4
Av. daily gain, lbs.	.42	.46	.38	.44
Death losses <sup>1</sup>	1	7	2	2

1. Urinary calculi was cause of death for lamb dying in Lot 1. All death losses in Lots 2 and 3 were caused by enterotoxemia. Cause of death was not recorded for those dying in Lot 4.

#### Observations

Enterotoxemia killed 46 lambs (43 unvaccinated and 3 vaccinated). Losses occurred in all lots, with considerable variation among lots. Vaccination did not affect rate of gain.

Extreme wool slippage was observed in the 1963-64 tests, so wool slippage in this year's tests was recorded. A total of 61 lambs fell in that category. Approximately equal numbers of vaccinated and unvaccinated lambs slipped wool and only 7 of the 61 died. Added fat seemed to protect lambs. Greatest slippage occurred in Lot 10 fed the high-concentrate ration without fat, and in Lot 11 whose lambs had not been drenched. Resistance of lambs not drenched probably was down.

Lambs in all lots made rapid and efficient gains. As in past years, those hand-fed silage rations made cheaper gains than those self-fed mixed or pelleted rations.

Corn silage was more palatable and produced slightly faster and cheaper gains than sorghum silage.

Lambs fed high-concentrate rations (90% concentrate in final ration) consumed less feed, made slower, more expensive gains but required less feed per unit gain compared with lambs in Lot 4 fed a 35% concentrate ration. Adding 9% animal fat to the high-concentrate ration increased gains slightly, reduced death losses and prevented wool slippage. It did not improve efficiency of gain, and at \$7.50 per cwt., increased feed costs considerably. Somewhat in contrast, adding 3% or 9% fat to the 35% concentrate and 65% hay ration materially reduced the amount of feed required to produce a unit of gain, but did not affect rate of gain. Efficiency was nearly the same for both lots.

Among self-fed lots receiving 35% sorghum grain and 65% alfalfa prepared in different forms, best overall performance (rate gain, efficiency, and cost) was made by Lot 3 lambs fed the mixture of whole sorghum grain and sun-cured alfalfa pellets. Lambs in Lot 4 gained equally fast, but the \$7 per ton charge for pelleting increased feed costs. Dehydrated alfalfa pellets produced slower and more expensive gains than sun-cured pellets. The ground-mixed ration produced slowest, least efficient gains.

Treatment of this particular group of lambs with Thibenzole appeared to be beneficial, since untreated lambs in Lot 11 consumed less feed and made slower, less efficient gains.

Vaccination of lambs with *Clostridium perfringens* antitoxin or bacterin after 87 days on feed was beneficial in preventing death losses from enterotoxemia. Two lambs receiving bacterin died from enterotoxemia during the 32-day test period; however, these deaths occurred within 7 days following vaccination. These lambs probably did not have enough time to build up immunity. Antitoxin gives immediate protection.

while it usually takes about 2 weeks for immunity to develop following vaccination with bacterin. There was very little difference in feed lot performance of vaccinated and nonvaccinated lambs.

**Heritabilities, Genetic and Phenotypic Correlations Between Carcass and Live Animal Traits in Sheep.**

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Data were collected on 91 lambs of known breeding born during the fall, 1963. The lambs were from ewes in the original fine-wool flock and were sired by 10 performance-tested Hampshire rams (see 1963 Feeders' Day Report for ram performance data). This was the ewe's fifth lamb crop.

All lambs were creep fed a pelleted ration of 45% dehydrated alfalfa, 45% sorghum grain, 7.5% molasses, and 2.5% soybean oil meal. The ration contained 10 to 15 mgs. aureomycin per pound. Half the male lambs were castrated and half were left intact. Lambs were weaned and weighed at 65 days of age. When they weighed approximately 95 pounds, they were sheared and these measurements obtained: length of right fore cannon, circumference of right fore cannon, length of rump, width at second lumbar vertebra, and circumference of right rear leg. All lambs were then slaughtered and various quality factors influencing carcass grade were scored by a representative of the Federal Grading Service. Loin-eye area, fat thickness, and weight of trimmed wholesale cuts were obtained; the racks were dissected into fat, lean, bone, overflow and intercostal muscle, and the loins were sent to the home economics department for additional analyses.

Data are currently being collected on the sixth lamb crop sired by performance-tested Hampshire rams (see 1964 Feeders' Day Report for performance data). The lambs are being handled as the 1963 lamb crop was except that a sonoray machine is being used to estimate depth of fat cover and loin-eye area at the 12th rib of lambs before slaughter.

**Results and Discussion**

Uncorrected data for 1963-64 lambs are reported in Table 14, and those for 1964-65 lambs in Table 15. Effect of lamb sex on growth performance is reported in Table 16. Effects of sex on carcass data are reported on page 21.

Variation was only 21 days between sire groups in age of 1963-64 lambs at slaughter. Although data have not been statistically analyzed, there appears to be some correlation between rate of gain of sires and their lambs. However, ram 10, the slowest gaining one, sired lambs that gained somewhat faster than lambs of several rams that gained faster during the performance test.

There was considerable variation in average loin-eye area among sire groups.

Twin lambs gained considerably slower than singles. Ram lambs gained faster than wethers, and ewe lambs made the slowest gains.

**Table 14**  
Uncorrected data for 1963-64 lambs.<sup>1</sup>

Ram no.	2	3	4	5	6	7	8	9	10
Ram A.D.G., lbs. <sup>2</sup>	.64	.74	.70	.56	.69	.73	.54	.63	.47
No. single lambs	5	8	8	6	2	5	8	4	3
No. twin lambs	6	2	2	0	0	6	2	6	0
Av. 65-day weaning wt., lbs.:									
Single lambs	61.4	59.0	53.1	55.4	65.0	61.0	55.6	60.5	63.7
Twins	45.5	42.5	47.0	.....	.....	44.2	42.5	48.7	.....
Av. slaughter wt., lbs.	54.3	59.5	59.0	58.4	58.5	57.4	56.0	57.1	58.3
Av. age at slaughter:									
Single lambs	117.2	122.1	122.2	129.9	113	110.8	128.5	132	118
Twins	152.4	146.0	145.5	.....	.....	149.6	139.0	135.7	.....
Av. wt. per day of age at slaughter:									
Single lambs	.81	.81	.80	.76	.87	.88	.74	.73	.83
Twins	.61	.70	.69	.....	.....	.65	.70	.72	.....
Av. loin-eye area	2.01	2.03	2.30	2.34	2.58	2.34	2.33	2.23	2.38

1. Not corrected for sex or birth weight.

2. Data made on performance test.