

alfalfa hay. It produced the slowest and least efficient gain, and cost the most to produce a cwt. gain. Lot 10, fed a ration with no protein supplement, gained slightly faster than lot 11, much more efficiently and at less cost. The standard ration containing both hay and supplement excelled in all respects, except cost per cwt. gain. Gains in lot 10 cost the least.

Wheat pasture did not produce so rapid gains as previously, but its cost per cwt. gain was still lowest.

Only one lamb died (lot 7) throughout the experiment.

Table 34

Whole sorghum grain with alfalfa hay, whole sorghum grain with cottonseed meal, standard ration, and wheat pasture compared with fattening lambs.

Lot no.	8	10	11	12
Treatment	Standard ration	No cottonseed meal	No alfalfa hay	Wheat pasture
No. lambs per lot	50	50	50	50
Days on feed	88	88	88	88
Av. initial wt., lbs.	72.0	71.8	72.5	71.1
Av. final wt., lbs.	106.8	105.2	98.2	97.6
Av. total gain, lbs.	34.8	33.4	25.7	28.5
Av. daily gain, lbs.	.40	.38	.29	.32
Daily feed per lamb, lbs.:				
Whole sorghum grain	1.34	1.34	1.34	.....
Alfalfa hay	.72	.72	.....	.....
Forage sorghum silage	3.62	3.46	4.14	.....
Cottonseed meal	.10	.....	.20	.....
Salt	.017	.02	.02	.....
Ground limestone	.....	.....	.015	.....
Wheat pasture	.....	.....	.....	free choice
Av. lbs. feed per cwt. gain:				
Whole sorghum grain	338.5	352.7	458.4	.....
Alfalfa hay	182.2	189.8	.....	.....
Forage sorghum silage	914.4	911.1	1417.1	.....
Cottonseed meal	25.3	.....	68.5	.....
Salt	4.3	5.4	7.3	6.31
Ground limestone	.....	.....	5.25	.....
Wheat pasture	.....	.....	.....	free choice
Av. feed cost per cwt. gain	\$12.01	\$11.41	\$15.73	\$ 3.24
Av. feed cost per lamb	4.18	3.81	4.04	.92
Cost per lamb start of test	10.44	10.41	10.51	10.31
Av. total cost per lamb	14.62	14.22	14.55	11.23
Av. total cost per cwt.	13.69	13.52	14.81	11.27

Investigations of Milk-fat Lamb Production for Western Kansas (Project 584).

Myron Hillman, Carl Menzies, and Evans Banbury

This project at the Colby Branch Experiment Station is in cooperation with the Department of Animal Husbandry, Kansas State University.

In it 350 fine wool ewes are handled in a typical Kansas early-lambing program. The ewes are bred to purebred Hampshire rams and all lambs are sold in the spring as milk-fat lambs.

General objectives are to determine the value of various management practices, types of pasture, feeds, feed additives and combinations of these to maintain a commercial ewe flock, and to produce milk-fat lambs for a spring market under western Kansas conditions.

Ewe Flushing Test (Spring, 1960)

Experimental Procedure: 150 two-year-old ewes were divided into two groups April 25, 1960, and fed different rations until May 12, or 17 days. One group was given a low-energy ration of 2 pounds of alfalfa hay per ewe per day; the other, a normal ration of 2 pounds alfalfa hay, 3 pounds sorghum silage, and $\frac{1}{4}$ pound whole sorghum grain per ewe per day. May 13 each group was divided into six lots along with 200 yearling ewes. These six lots were fed the following ration 40 days:

Lot 1. Drylot— $\frac{1}{4}$ pound whole wheat, $1\frac{1}{4}$ pounds alfalfa hay and free-choice sorghum silage. (Av. daily ewe silage consumption 5.6 pounds.)

Lot 2. Drylot— $\frac{1}{4}$ pound whole sorghum grain, $1\frac{1}{4}$ pounds alfalfa hay and free-choice sorghum silage. (Av. daily ewe silage consumption 5.6 pounds.)

Lot 3. Cereal crop pasture, $\frac{1}{2}$ pound whole sorghum grain.

Lot 4. Cereal crop pasture.

Lot 5. Buffalograss pasture, $\frac{1}{2}$ pound whole sorghum grain.

Lot 6. Buffalograss pasture.

Two Hampshire rams were turned with each lot at night from May 28 to June 21, 1960. Rams were rotated to a new group twice each week. June 22, the end of the flushing period, all six lots were turned together and grazed during the day on buffalograss pasture. All 12 rams were turned with ewes each night until September 1.

Results and Discussion

Table 35 gives results of pre-flushing two-year-old ewes, and of flushing on weight gain of two-year-old and yearling ewes.

Table 35
Effect of pre-flushing and/or flushing on weight gain or loss.

Lot no. and ration	No. of ewes	2-year-old ewes		2-year-old and yearling ewes	
		Av. pre-flushing wt. loss per ewe, lbs.	Av. flushing gain per ewe, lbs.	No. of ewes	Av. flushing gain per ewe, lbs.
Lot 1				58	16.7
Low energy	13	-11.9	20.9		
Normal	12	-8.1	20.1		
Lot 2				59	16.0
Low energy	13	-11.3	21.4		
Normal	12	-7.3	16.8		
Lot 3				58	12.8
Low energy	13	-12.9	12.1		
Normal	12	-7.3	12.4		
Lot 4				58	10.6
Low energy	12	-12.5	9.1		
Normal	13	-6.3	6.6		
Lot 5				58	16.2
Low energy	12	-11.8	18.2		
Normal	13	-9.4	17.3		
Lot 6				59	14.6
Low energy	12	-11.9	15.0		
Normal	13	-8.2	12.4		
All lots					
Low energy	75	-12.0	16.2		
Normal	75	-7.8	14.2		

Ewes on the low-energy pre-flushing ration lost an average of 4.2 pounds each more than ewes fed the normal ration, but gained an average of 2 pounds more than the normally fed ewes during the flushing period. Gain response to flushing by yearling ewes is not shown separately but is included with the two-year-old ewes in the righthand column of Table 35.

Table 36 gives lambing performance of two-year-old ewes fed two different pre-flushing rations.

Two-year-old Ewe Lambing Performance

Pre-flushing treatment	No. ewes	No. ewes lambing	Total lambs	No. single lambs	No. twin lambs	% lamb crop
Low energy	75	74	98	50	48	131
Normal	75	73	92	54	38	124

There was no general difference in cumulative percentages of ewes lambing in a given time. About 90% of the two-year-old ewes lambing within the first 30 days of lambing season. Lambing data are not given separately for two-year-old and yearling ewes for the six different flushing lots. Table 37 gives the combined performance.

Table 37

Lambing performance for two-year-old and yearling ewes

Lot no.	No. of ewes	No. ewes lambing	Total lambs	No. single lambs	No. twin lambs	% lamb crop
1	58	53	59	47	12	101.7
2	59	58	65	51	14	110.2
3	58	54	70	38	32	120.7
4	58	53	59	47	12	101.7
5	58	56	63	49	14	108.6
6	59	57	67	47	20	113.6

Cumulative percentage ewes lambing by periods after first lamb birth, October 22, 1960

Lot no.	10	20	30	40	100
1	15.5	36.2	82.8	89.7	91.4
2	18.6	40.7	84.8	91.5	98.3
3	20.7	46.6	81.0	82.8	93.1
4	10.3	22.4	69.0	81.0	91.4
5	31.0	55.2	84.5	91.4	96.6
6	17.0	33.9	81.4	84.8	96.6

Ewes in Lot 3 had more twins and produced more lambs. Five ewes in each of lots 1 and 4 failed to lamb, perhaps from causes other than treatment. There was little difference in cumulative percentage of ewe lambing after the first 40 days of lambing season. Ewes in lot 4 were later than other lots during the early part of the lambing season.

Ewe Pre-lambing Treatment Test (Fall 1960)

Experimental Procedure: The 350 ewes were divided into three lots according to age and prior treatment September 27, 1960, and fed as follows until October 31, or lambing, whichever came first.

Lot no.	No. of ewes	Treatment
7	117	Buffalograss pasture, $\frac{1}{4}$ pound whole sorghum grain.
8	117	Buffalograss pasture, $\frac{3}{4}$ pound whole sorghum grain.
9	116	Rye pasture, $\frac{1}{4}$ pound whole sorghum grain.

Results and Discussion

Ewes grazed on rye pasture, lot 9, produced both single and twin lambs that were heavier at birth than ewes in lot 7 or 8. As in 1959 the difference narrowed as lambing season progressed and pre-lambing treatment became farther removed from date of lambing. Ewes fed $\frac{3}{4}$ pound or $\frac{1}{4}$ pound whole sorghum grain on buffalograss pasture produced lambs that weighed about the same at birth.

Table 38
Lamb creep rations, consumption, feed cost, and gains during 1960-1961.

November 3, 1960, to June 20, 1961.

Lot no.	1	2	3	4	5	6
Ration	Sorghum grain, alfalfa hay	Roller complete barley, alfalfa hay	Sorghum grain, alfalfa hay	Sorghum grain, alfalfa hay	Sorghum grain, alfalfa hay	Complete pelleted 45% sorghum grain, 55% alfalfa hay
No. lambs per lot	59	57	57	55	54	62
Total lamb days	978.4	960.1	859.7	964.0	953.1	940.8
Av. lamb birth wt., lbs.	9.6	9.9	9.8	9.8	9.9	9.7
Av. lamb market wt., lbs.	101.0	102.4	106.5	102.2	100.4	104.3
Av. total gain, lbs.	91.4	92.5	93.7	92.4	90.5	95.1
Av. daily gain, lbs.	.54	.55	.62	.56	.52	.60
Av. market age, days	170.0	168.1	156.6	165.5	173.8	158.3
Av. daily feed consumption, lbs.	1.28	1.21	1.21	1.28	1.34	.....
Sorghum grain	.57	.68	.30	.22	.13	.....
Alfalfa hay	.....	1.21	.....	.39	.34	.....
Roller barley	.....	.03	.....	.....	.....	2.16
Dehydrated alfalfa pellets	.....	.....	.....	.....	.....	.....
Complete pellets	.....	.....	.....	.....	.....	.....
Av. lbs. feed per cwt. gain:						
Sorghum grain	239	.....	195	229	257	.....
Alfalfa hay	106	123	49	39	25	.....
Roller barley	.....	219	.....	70	65	349
Dehydrated alfalfa pellets	.....	.....	.....	.....	.....	.....
Complete pellets	.....	.....	.....	.....	.....	.....
Lbs. feed per cwt. gain	345	347	244	338	347	349
Av. feed cost per cwt. gain	\$4.82	\$5.36	\$3.37	\$5.43	\$5.48	\$8.03
Av. feed cost per lamb to market	\$4.39	\$4.98	\$3.27	\$5.03	\$4.97	\$7.63

1. Lot 2, rye pasture only to Jan. 5, supplement until removed from rye pasture Jan. 28 to Feb. 24; with access to whole sorghum grain creep and alfalfa hay following adjustment after Jan. 5. Access to heavily grazed rye pasture from Feb. 24 to May 1.

2. Lot 4, Whole sorghum grain, dehydrated alfalfa pellets, and access to alfalfa hay in creep after March 6.

Average lamb birth weights, lbs.

Lot no.	First 10 lambs 10-28-60	First 20 lambs 11-8-60	First 60 lambs 11-15-60	All single lambs	Twin lambs
7	8.6	9.5	9.8	10.1 (86 lambs)	7.7 (23 sets)
8	9.2	9.6	9.9	10.2 (93 lambs)	8.3 (15 sets)
9	10.1	10.4	10.5	10.6 (100 lambs)	8.5 (14 sets)

Lamb Feeding Tests (1960-1961, Winter)

Experimental Procedure: To study the value of various feeding rations in fattening suckling lambs for spring market, ewes and lambs were divided into six lots (lots 1 to 6) as nearly as possible according to lamb age and prior ewe treatment. Following lamb birth approximately one week was taken to adjust ewes to feed and lambs before placing them into their respective lots. Lambs were docked with elastic bands when one to two days old and knife castrated when six to seven days old.

Ewes, daily nursing rations: sorghum silage, 1 pound whole sorghum grain and 1½ pounds alfalfa hay were the same in lots 1, 2, 5, and 6. Lot 3 animals were on rye pasture. When not on rye their ration was the same as lots 1, 2, 5, and 6. In lot 4, the ewes were fed sorghum silage, 1 pound whole sorghum grain, and 1½ pounds of dehydrated alfalfa pellets (17% protein with 100,000 units of vitamin A guaranteed per pound).

The lamb creep rations are listed in Table 38. Dehydrated alfalfa pellets were the same as those fed to ewes in lot 4.

Feed prices

	Per ton
Whole sorghum grain	\$27.00
Alfalfa hay	30.00
Dehydrated alfalfa pellets	50.00
Barley	28.00
Rolling of barley, \$15 per cwt.	34.50
45% sorghum grain, 55% alfalfa hay, pelleted	46.00
Processing	7.50
Bags	2.00
Delivery	2.00

The average sale age by lots varied from 156.6 days (lot 3) to 173.8 days (lot 5).

Highest average daily lamb gains were produced in lot 3 that received rye pasture and lot 6, on the all-pelleted ration. Those two reached market weight 12 to 15 days sooner than lambs on other rations. Lamb lots 1, 2, 4, and 5 made similar average daily gains.

Although lambs in lot 5 on an all-pelleted ration gained faster than any except those in lot 3, the cost per 100 pounds gain was considerably higher in lot 6 than in any other lot.

In costs to produce 100 pounds gain the value for the rye pasture (lot 3) was omitted. Comparing lot 3 with lot 1 indicates that the rye pasture replaced 2,983 pounds of sorghum grain and 2,946 pounds of alfalfa hay (or rye pasture was worth \$1.45 of the total feed cost to produce 100 pounds of gain). Lambs in lot 3 were given rye pasture only to January 5. They were then adjusted to a creep of whole sorghum grain plus alfalfa hay. From January 23 to February 24, they were removed from rye pasture. After February 24, the lambs again had access to heavily grazed rye pasture plus creep feed to May 1.

Ewe Flushing Test—Spring 1961

Experimental Procedure: 344 ewes were divided into two groups (A and B) April 24, 1961, and fed different rations 17 days until May 11. Group A was given a low-energy ration while group B was on a normal ration. Rations are given following the tables.

May 11, 1961, lots A and B were divided equally into six lots and adjusted to flushing rations until May 14. From May 14 to June 22 (40 days) the six lots were fed different flushing rations.

Twelve Hampshire rams were used to breed the ewes. Breeding season started May 22, eight days after the ewes were placed on the different flushing rations. The twelve rams were divided into six pairs and were with the ewes during nights but removed each morning. Each pair of rams was rotated to a different ewe lot twice weekly. At the end of the flushing period, June 22, all ewes were turned together and grazed on buffalograss pasture. All rams were turned with the entire flock each night until the end of the breeding season, September 1.

Results and Discussion

Summary of pre-flushing lots¹ (April 24 to May 11, 1961)²

Lot no.	No. of ewes in lot	Av. ewe wt., lbs. 4-24-61	Av. lbs. ewe wool clip 5-2-61	Av. ewe wt., lbs. 5-11-61	Av. loss or gain, lbs.
A	172	124.6	10.0	112.6	-2.0
B	173	121.9	10.1	115.8	+4.0

1. Lot A, 2 lbs. alfalfa hay only.

Lot B, 2 lbs. alfalfa hay; ¼ lb. whole sorghum grain; and 3 lbs. silage, 2. 17 days.

Lot A, which received the low-energy ration during pre-flushing, lost an average of 2 pounds per ewe, while lot B (normal ration) gained 4 pounds per ewe. The ewe loss in weight was much greater the spring of 1960 than the spring of 1961, with identical rations each year. In 1960, the low-energy ration group lost 12 pounds per ewe while the normal ration group lost 7.8 pounds per ewe. The final variation between lots was practically the same for both years. Lot A, fed the low-energy ration during pre-flushing, gained 4.1 pounds more per ewe during the flushing period than lot B.

Summary of ewe flushing lots¹ (flushing period, 5-14-61 to 6-22-61)²

Ewe flushing lot no.	No. of ewes	Av. total gain per ewe, lbs.	Av. daily gain (40-day flushing period), lb.
1	58	17.3	.433
2	57	9.9	.248
3	56	8.0	.200
4	57	8.0	.200
5	57	11.1	.278
6	57	12.1	.303

1. Rations during flushing period:

Lot 1, ¼ lb. whole sorghum grain, full feed of alfalfa hay. (Average daily alfalfa hay consumption per ewe, 4.8 lbs.)

Lot 2, ¼ lb. whole sorghum grain, 1½ lbs. alfalfa hay, full silage. (Average daily silage consumption per ewe, 5.5 lbs.)

Lot 3, ½ lb. whole sorghum grain, cereal crop pasture.

Lot 4, Cereal crop pasture only.

Lot 5, ½ lb. whole sorghum grain, buffalograss pasture.

Lot 6, Buffalograss pasture only.

2. Weighed May 11, allowed to adjust to flushing ration until May 14.

During the flushing period ewes in lot 1 gained decidedly more than those on any other ration tested. Lot 3 and 4 ewes were the low gainers during the flushing period. This was also true in the spring of 1960. Supplementing cereal crop pasture or buffalograss pasture with ½ pound of whole sorghum grain did not increase ewe gains over pasture only in 1961, contrary to 1960 results. An explanation for the difference is not apparent. Gains in general were lower for 1961 spring flushing than for the 1960 spring flushing period. Summaries will be made after the 1961-62 lambing season to determine the effects of the different flushing treatments used in 1961 upon lambing dates and lambing percentages, which will then be reported in the 1962 annual report.

Summary of ewe flushing performance as affected by pre-flushing treatment (flushing period, 5-14-61 to 6-22-61)*

Ewe flushing lot ²	Ewe pre-flushing lot ²	No. of ewes	Av. total gain per ewe, lbs.	Av. daily gain (40-day flushing period), lb.
1	A	29	19.2	.480
	B	29	15.4	.385
2	A	29	11.4	.275
	B	28	8.4	.210
3	A	29	10.2	.255
	B	37	5.4	.135
4	A	29	11.9	.298
	B	38	4.0	.100
5	A	28	13.1	.328
	B	29	9.3	.233
6	A	28	12.9	.323
	B	29	11.3	.283
All lots	A	172	13.1	
	B	170	9.0	
Flushing increase for pre-flushing A ration +4.1				

1. Weighed May 11, allowed to adjust to flushing ration until May 14.

2. Rations during flushing period:

- Lot 1. $\frac{3}{4}$ lb. whole sorghum grain; full feed of alfalfa hay. (Average daily alfalfa hay consumption per ewe, 4.8 lbs.)
 Lot 2. $\frac{3}{4}$ lb. whole sorghum grain; $1\frac{1}{4}$ lbs. alfalfa hay; full silage. (Average daily silage consumption per ewe, 5.5 lbs.)
 Lot 3. $\frac{3}{4}$ lb. whole sorghum grain, cereal crop pasture.
 Lot 4. Cereal crop pasture only.
 Lot 5. $\frac{3}{4}$ lb. whole sorghum grain, buffalograss pasture.
 Lot 6. Buffalograss pasture only.

3. Daily rations during pre-flushing:

- Lot A. 2 lbs. alfalfa hay only.
 Lot B. 2 lbs. alfalfa hay; $\frac{3}{4}$ lb. whole sorghum grain; 2 lbs. silage.

Lamb Feeding Tests (1961-1962, Winter)

Experimental Procedure: To study the value of various feeding rations in fattening suckling lambs for spring market, ewes and lambs were divided into six lots (lots 1 to 6) as nearly as possible according to lamb age and prior ewe treatment. Following lamb birth, approximately one week was taken to adjust ewes to feed and lambs before placing them into their respective lots. Lambs were docked with elastic bands when one to two days old and knife castrated when about five to seven days of age.

The lot treatments were:

Lot no.	Nursing ewe daily ration	Lamb ration creep
1	1 lb. whole sorghum grain $1\frac{1}{4}$ lbs. alfalfa hay Full silage	Whole sorghum grain Alfalfa hay
2	1 lb. whole barley grain $1\frac{1}{4}$ lbs. alfalfa hay Full silage	Whole barley grain Alfalfa hay
3	1 lb. whole sorghum grain $1\frac{1}{4}$ lbs. alfalfa hay Full silage	Whole sorghum grain Wheat hay
4	1 lb. whole sorghum grain $1\frac{1}{4}$ lbs. alfalfa hay Full silage	Complete pelleted ration (45% ground sorghum grain and 55% ground sun-cured alfalfa hay) Alfalfa hay
5	Rye pasture (when not on rye fed same as lot 1)	Rye pasture (when weather permitted) Whole sorghum grain Alfalfa hay

$\frac{3}{4}$ 1 lb. whole sorghum grain $1\frac{1}{4}$ lbs. alfalfa hay Full silage	Whole sorghum grain Alfalfa hay (Weaned lambs at 8 to 10 weeks of age)
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Results of the above tests now in progress will be summarized as completed, and reported in the 1962 annual report.

Corn, Sorghum Grain, Wheat, Rye and Barley Each as a Concentrate in Complete Pelleted Rations Compared with a Standard Nonpelleted Sorghum Grain and Alfalfa Hay Ration for Self-feeding Fattening Lambs (Project 236).

Myron Hillman, D. Richardson and R. F. Cox

This test duplicates one last year, which was designed to study various grains in complete pelleted rations compared with a standard nonpelleted ration. Previous work has shown that a complete pelleted ration composed of 30 to 40 percent concentrate produced faster, more efficient lamb gains than a nonpelleted ration of the same composition.

Experimental Procedure

The 144 fine-wool type wether lambs used in these tests were obtained at Clovis, N.M., October 28. They were shorn and drenched with a commercial fine particle-size Phenothiazine drench. November 16, the lambs were ear tagged, weighed, divided into six lots of 24 lambs each and self-fed the following rations for 65 days.

- Lot 1. 35% sorghum grain and 65% alfalfa hay, pelleted.
 Lot 2. 35% corn and 65% alfalfa hay, pelleted.
 Lot 3. Mixed nonpelleted ration of 45% ground sorghum grain and 55% chopped alfalfa hay.
 Lot 4. 35% barley and 65% alfalfa hay, pelleted.
 Lot 5. 35% wheat and 65% alfalfa hay, pelleted.
 Lot 6. 35% rye and 65% alfalfa hay, pelleted.

All lambs were implanted with 3 mgs. of stilbestrol¹ at start of test. In addition to the above ration each lot received 5 lbs. of chopped alfalfa hay each day. Salt was supplied free choice.

The grain used in rations was purchased in bulk. The sorghum grain used in lot 3 was run through a coarse screen grinder. Hay used in the pellets was average quality, first cutting, ground through $\frac{1}{4}$ -inch screen. The hay used in lot 3 was of the same quality, but chopped.

Feed prices and processing charges used in determining feed cost per cwt. gain were: sorghum grain, \$1.70 per cwt.; corn, \$1.08 per bu.; barley, \$.96 per bu.; wheat, \$1.95 per bu.; rye, \$.93 per bu.; baled alfalfa hay, \$15 per ton; grinding hay, \$5 per ton; chopped hay for lot 3, \$3 per ton; grinding grain for lot 3, \$2 per ton; grinding grain, mixing and pelleting rations, \$6 per ton. With prices and charges indicated, feed costs per ton for each lot were: Lot 1, \$30.90; lot 2, \$32.51; lot 3, \$29.30; lot 4, \$32.93; lot 5, \$41.75; lot 6, \$30.62. These are bulk prices; if bags were used, they would increase cost \$2 to \$3 per ton.

Results and Discussion

Results are shown in Table 39. There was little difference in rate of gain among lambs fed different pelleted rations. Lambs fed wheat consumed more feed per head daily, gained faster, and gained most efficiently of all. However, gains on the wheat ration cost most because of high wheat prices.

Lambs in lot 3, fed the loose ration, consumed less feed per head daily, but gained as efficiently as those in lot 1. Gains in lot 3 were cheaper than those of any lambs fed pelleted rations. There were more deaths in this lot due to overeating. The ration was self-fed and the lambs presumably separated the concentrate from the roughage.

The pelleted ration requires less labor to feed and the management

1. Furnished by Chas. Pfizer and Co., Inc., Terre Haute, Ind.