Table 39

Data from wheat pasture and cobalt tests with lambs.

	13	All lots	
	Wheat pasture	Cobalt bullets	No cobalt bullets
Number lambs	44	283	285
Days on feed	88	88	88
Av. initial wt., lbs.	71.4	72.9	73.4
Av. final wt., lbs.	108.6	111.9	112.4
Av. total gain, lbs.	37.2	39.0	39.0
Av. daily gain, lb.	.423	.443	.443
No cobalt	.413		
Cobalt	.433		
Daily feed per lamb, lb.:			
Wheat pasture	free choice		
Salt	.014		
Av. lbs. feed per cwt. gain:			
Salt	3.3		
Av. feed cost per cwt. gain[1]	$ 2.63		
Av. feed cost per lamb[1]	$ .98		
Cost per lamb start of test	$10.47		
Av. total cost per lamb[1]	$11.45		
Av. total cost per cwt.[1]	$10.54		

1. Includes cost of stilbestrol implant @ 9¢ but not cost of drench or cobalt bullets.

Observations

Lambs in lot 3 consumed about .5 pound more corn silage per lamb per day than those fed sorghum silage in lot 2. Because of this, slightly faster and cheaper gains were made by lambs fed corn silage. These results agree with those obtained in the 1959-60 test.

A ration of alfalfa hay, cottonseed meal, and free-choice grain sorghum silage produced satisfactory but slower and slightly more expensive gains than a ration of alfalfa hay, cottonseed meal, forage sorghum silage, and sorghum grain. Supplementing the grain sorghum silage ration with sorghum grain for the last 28 days of the 88-day period increased rate of gain. Lambs in lot 12 that were fed a corn silage ration supplemented with grain for the last 28 days of the test gained more slowly, less efficiently, and produced more expensive gains than lambs on the other silage rations.

Whole barley was equal to whole sorghum grain in this test. However, sorghum grain produced cheaper gains using current feed prices. Grinding and then pelleting sorghum grain or barley increased rate of gain, improved feed efficiency, and slightly reduced feed cost per cwt. gain. Lambs fed a grain mixture of ½ whole sorghum grain and ½ whole barley produced cheaper and slightly faster gains than lambs fed whole sorghum grain or whole barley.

Lambs in lot 1 fed a complete pelleted ration gained faster and more efficiently than lambs fed other drylot rations. The feed cost per cwt. gain was higher than for most of the other rations. However, because of the large total gain per lamb, and since the gain cost less per cwt. than the purchase price of the lamb, the total cost per cwt. was in line with other lots that produced slower but cheaper gains. A mixed self-fed ration of whole sorghum grain and dehydrated alfalfa pellets fed in lot 7 produced less efficient gains than the complete pelleted ration. However, lambs fed the mixed ration gained faster and more efficiently than lambs fed other rations. Replacing .75 pound of alfalfa hay with .5 pound dehydrated alfalfa pellets in lot 4 did not affect rate or efficiency of gain. However, replacing the alfalfa hay in lot 4 or the alfalfa hay and silage in lot 7 with dehydrated alfalfa pellets resulted in a higher feed cost per cwt. gain.

Wheat pasture produced as rapid gains as most rations at the lowest feed cost per cwt. gain. One light snow fell during the test but it interfered only slightly with grazing.

Lambs treated with a 5-gm. cobalt bullet gained no faster than those given no supplemental cobalt.

Two lambs died prior to the start of the test. Four lambs, one from lots 3, 8, 9, and 12 respectively, died from enterotoxemia during the test period.

Charles Pfizer and Co., Inc., Terre Haute, Indiana, furnished the stilbestrol implants; Wm. Cooper and Nephews, Inc., Chicago, Illinois, supplied the cobalt bullets; and Trivermol drench was furnished by Jen-Sal Laboratories, Kansas City, Missouri. The dehydrated alfalfa pellets were supplied by Archer-Daniels Midland Company and National Dehydrating and Milling Company.

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

Carl Menzies and Evans Banbury

This sheep project was initiated in the spring of 1959 as a new research project at the Colby Branch Experiment Station in cooperation with the Department of Animal Husbandry, Kansas State University.

One hundred fifty-one finewool yearling ewes were purchased from near Del Rio, Texas, May 4, 1959. An additional 200 similar yearling ewes were purchased from the same area May 13, 1960. These 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.

Over-all objectives of this project are to determine the productive and economic value of various management practices, types of pastures, 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 1959

One hundred fifty-one yearling ewes were divided into three lots and fed the following rations for 40 days (May 14-June 23).

Lot 1. Rye pasture and/or chopped green cereal crops. Rye pasture was grazed May 14 to May 27; from May 27 to June 13 chopped green wheat forage was fed in addition to rye pasture; and from June 13 to June 23 a ration of chopped green wheat forage and sorghum silage was fed. In addition to the rye pasture, 131 pounds of chopped wheat forage and 12 pounds of silage were fed per ewe during the flushing period. Both the rye and wheat had advanced to the soft-dough stage by the end of the flushing period.

Lot 2. Drylot. A ration of ¾ pound whole sorghum grain, 1¼ pounds alfalfa hay, and free-choice sorghum silage (4.7 pounds average consumption) was fed per ewe per day.

Lot 3. Buffalograss pasture. Ewes were grazed on 80 acres of very good buffalograss pasture.

Six yearling Hampshire rams were used to breed the ewes. Breeding season started May 25, about two weeks after ewes were placed on the different flushing rations. The six rams were divided into three pairs and were turned with the ewe groups each night and removed each morning. Each pair of rams was rotated to a different ewe lot twice a week. At the end of the flushing period, June 23, all ewes were turned together and grazed on buffalograss pasture. All six rams were turned with the entire flock each night until the end of the breeding season, September 1.

Results and Discussion

Ewe Gains Made During 40-day Flushing Period

Lot No.	No. ewes	Av. initial wt. May 14, lbs.	Av. final wt. June 23, lbs.	Total gain, lbs.	Av. daily gain, lbs.
1	50	94.5	109.6	15.1	.38
2	50	92.1	108.6	16.5	.41
3	51	93.2	113.4	20.2	.51

Ewe Lambing Performance[1]

Lot No.	No. ewes	Total No. lambs	No. single lambs	No. twin lambs	Percent ewes lambing	Percent lamb crop
1	50	51	43	8	94	102
2	50	49	49	0	98	98
3	51	65	35	30	98	127.5

1. Includes all lambs born regardless of health at birth.

Cumulative Percentage Ewes Lambing by Periods After First Lamb Birth, October 19, 1959

Lot No.	Days after October 19				
	10	20	30	40	100
1	22.0	52.0	68.0	82.0	94.0
2	16.0	46.0	80.0	90.0	98.0
3	19.6	58.8	92.2	92.2	98.0

Ewes in lot 3, flushed on buffalograss pasture, made the largest gains during the flushing period. These ewes also produced more twins and a larger percentage of them lambed within the first month of lambing season. Low percentage of ewes lambing in lot 1 between the 20th and 30th days of the lambing season can be related to the June 2 to June 23 flushing period when rye pasture and green chopped wheat were maturing from bloom into soft-dough stages.

Ewes bred during the flushing period should have lambed within the first 30 to 35 days of the lambing season. Over-all lambing performance of all ewes was very good for yearling ewes.

Ewe Pre-lambing Treatment Test—Fall 1959

The 151 yearling ewes used in the spring flushing test were divided into three lots September 23 and fed the following until lambing or November 5, whichever came first. Ewes were fed the different pre-lambing rations for 30 to 40 days.

Lot 4. Fifty ewes were grazed on good buffalograss pasture plus ¼ pound sorghum grain per ewe daily.

Lot 5. Fifty ewes were grazed on lush rye pasture plus ¼ pound of sorghum grain per ewe daily.

Lot 6. Fifty-one ewes were grazed on good buffalograss pasture plus ¼ pound of 41% protein soybean oil meal pellets per ewe daily.

Results and Discussion

Ewes in lot 5, grazed on rye pasture plus ¼ pound grain, produced single lambs that weighed an average of 0.9 and 0.8 pound more at birth than lambs in lots 4 or 6, respectively. Twin lambs from lot 5 weighed an average of 2.6 and 2.5 pounds more at birth than lambs from lots 4 or 6, respectively. Results show that the difference between lots in birth weights narrowed as lambing season progressed, and as length of time when ewes were removed from the different pre-lambing rations and date of lambing increased.

Average Lamb Birth Weights, Lbs.

Lot No.	First 10 lambs	First 20 lambs	First 30 lambs	First 40 lambs	All single lambs	Twin lambs
4	10.2	10.3	10.2	10.0	10.1 (41 lambs)	5.9 (9 sets)
5	12.1	11.5	11.6	11.1	11.0 (42 lambs)	8.5 (4 sets)
6	10.1	9.8	9.7	10.2	10.2 (44 lambs)	6.0 (5 sets)

Lamb Feeding Tests—Winter 1959-60

Ewes and lambs were divided into three lots according to prior ewe treatment, date of lamb birth, and type of birth (single or twin).

Ewes and lambs were given one week to adjust after lamb birth before being placed in their respective lots. Lambs were docked with rubber bands when two to three days of age and castrated with a knife when around six days of age.

Lot 7. Ewes and lambs were grazed on rye pasture until December 22. Lambs had access to creep of whole sorghum grain and alfalfa hay. From December 22 to market this lot was handled the same as lot 9.

Lot 8. Ewes and lambs were grazed on rye pasture until December 22. Creep was not provided lambs in this lot. From December 22 to market, this lot was handled the same as lot 9.

Lot 9. Ewes in this lot were fed a daily ration of 1 pound whole sorghum grain, 1 to 1¼ pounds of alfalfa hay and all the sorghum silage they would consume (average consumption, 6.9 pounds). Ewes were fed this ration until lambs were marketed. Lambs had access to a creep of whole sorghum grain and alfalfa hay.

Results and Discussion

The following table shows lamb gains during the time when lots 7 and 8 were on rye pasture.

Lamb Gains from Birth to December 22

Lot No.	No. lambs	Av. lamb age Dec. 22, days	Av. lamb wt. Dec. 22, lbs.	Av. lamb gain, lbs.	Av. daily gain, lbs.
7	47	47.8	40.4	30.6	.64
8	48	47.3	39.7	29.8	.63
9	46	46.3	33.6	23.8	.51

Lambs in lot 7 that had access to a creep and those in lot 8 that did not have a creep, gained the same while on rye pasture. Both these lots made faster gains during this period than lambs in lot 9 that had access to a creep in the drylot.

The 1626 and 1633 ewe grazing days on rye pasture, in lots 7 and 8, respectively, each replaced around ¾ ton of sorghum grain, ¾ ton alfalfa hay, and slightly over 5 tons of sorghum silage fed to lot 9 during the same period. Lambs in the drylot ate about ⅓ pound of grain per day during this period. Grain consumption for lot 7 could not be figured accurately because of heavy bird feeding. Hay consumption by lambs during this period averaged less than 1/10 pound per day.

Summary of lamb gains from birth to market follows.

Lamb Gains from Birth to Sale Date

Lot No.	No. of lambs	Av. market wt., lbs.	Av. total gain	Av. age at market, days	Av. daily gain, lbs.
7	46	99.3	89.4	163.6	.55
8	48	99.7	89.7	169.6	.53
9	49	97.1	87.5	171.5	.51

Lambs in lots 7 and 8 made slower gains in the drylot than they did on rye pasture. Several lambs in each of these lots were born after lambs had been taken off rye pasture. The lambs born prior to December 2 that were placed on rye pasture reached market weight in 15 and 9 days less time in lots 7 and 8, respectively, than lambs of similar age in lot 9.

Seven cases of urinary calculi (2 died) occurred in lot 9, and one lamb in each of lots 7 and 8 developed urinary calculi.

One-half the lambs in lots 7, 8, and 9 were given 3 cc. of enterotoxemia antitoxin containing a minimum of 4,500 antitoxin units, on December 5. Lambs ranged from 10 to 48 days of age when treated. Bacterin was later given these same lambs when the youngest lamb was 2 months old.

Daily gains were similar for vaccinated and nonvaccinated lambs. One lamb died from a reaction when given the bacterin and one antitoxin-treated lamb died about one month after treatment. No lamb loss from enterotoxemia occurred after December 5 among the nonvaccinated lambs.

Lambs were marketed in periodic shipments. All lambs not already sold were weaned on April 25, 1960. All lambs were sold by June 11, 1960.

Ewe Flushing Test—Spring 1960

One hundred fifty two-year-old ewes were divided into two groups on April 25, 1960, and fed different rations until May 12, a 17-day period. One group was given a low-energy ration of 2 pounds alfalfa hay per ewe per day. The other group was fed a normal ration of 2 pounds alfalfa hay, 3 pounds sorghum silage, and ¼ pound sorghum grain per ewe per day. May 13 each of these groups was divided into six lots along with 200 yearling ewes. These six lots were fed the following flushing rations for a 40-day period:

Lot 1. Drylot—¾ pound whole wheat, 1¼ pounds alfalfa hay, and free-choice sorghum silage.

Lot 2. Drylot—¾ pound whole sorghum grain, 1¼ pounds alfalfa hay, and free-choice sorghum silage.

Lot 3. Cereal crop pasture plus ½ pound whole sorghum grain.

Lot 4. Cereal crop pasture.

Lot 5. Buffalograss pasture plus ½ pound whole sorghum grain.

Lot 6. Buffalograss pasture.

A pair of Hampshire rams was turned with each lot at night from May 28 to June 30, 1960. Rams were rotated to a new ewe group twice each week. On 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

The following table gives results of pre-flushing two-year-old ewes and flushing treatment on weight gain of two-year-old and yearling ewes.

Effect of Pre-flushing and/or Flushing Treatment on Weight Gain or Loss.

	Two-year-old ewes			Two-year-old and yearling ewes	
	No. of 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 ration	13	−11.9	20.9		
Normal ration	12	− 8.1	20.1		
Lot 2				59	16.0
Low-energy ration	13	−11.3	21.4		
Normal ration	12	− 7.3	16.8		
Lot 3				58	12.8
Low-energy ration	13	−12.9	12.1		
Normal ration	12	− 7.3	12.4		
Lot 4				58	10.6
Low-energy ration	12	−12.5	9.1		
Normal ration	13	− 6.3	6.6		
Lot 5				58	16.2
Low-energy ration	12	−11.8	18.2		
Normal ration	13	− 9.4	17.3		
Lot 6				59	14.6
Low-energy ration	12	−11.9	15.0		
Normal ration	13	− 8.2	12.4		
All lots					
Low-energy ration	75	−12.0	16.2		
Normal ration	75	− 7.8	14.2		

Ewes on the low-energy pre-flushing ration lost an average of 4.2 pounds more than ewes fed the normal ration, but gained an average of 2 pounds more than the normal-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 right-hand column of the preceding table.

The table below 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 lambed	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 over-all difference in cumulative percentage of ewes lambing in a given length of time between the two groups. About 90% of these two-year-old ewes lambed 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. The table below gives the combined performance.

Lambing Performance for Two-year-old and Yearling Ewes.[1]

Lot No.	No. of ewes	No. ewes lambed	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

1. Includes all lambs born regardless of health of lamb at birth.

Cumulative Percentage Ewes Lambing by Periods After First Lamb Birth—October 22, 1960.

	Days after October 22				
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. This may not be due to treatment. There was little difference in cumulative percentage of ewes lambing after the first 40 days of lambing season. Ewes in lot 4 were behind other lots during the early part of the lambing season.

Ewe Pre-lambing Treatment Test—Fall 1960

The 350 ewes were divided into three lots according to age and prior treatment September 27, 1960, and fed according to the following plan until October 31 or lambing, whichever came first.

Lot No.	No. ewes	
7	117	Buffalograss pasture plus ¼ pound whole grain sorghum grain.
8	117	Buffalograss pasture plus ¾ pound whole sorghum grain.
9	116	Rye pasture plus ¼ 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 ¾ pound or ¼ pound sorghum grain on buffalograss pasture produced lambs that weighed about the same at birth.

Average Lamb Birth Weights, Lbs.

Lot No.	First 10 lambs 10-26-60	First 30 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)

Meat

The Relation of Packaging Material to the Keeping Quality of Frozen Pork (Project 424).

D. L. Mackintosh, R. A. Merkel, J. L. Hall, Dorothy L. Harrison, L. Anderson

With the increasing number of home storage units, information regarding packaging material and storge life of meat is in constant demand. This project was designed, a number of years ago, to acquire information that might aid in answering these inquiries. Many wrapping materials have been tested and the general conclusion, at this time, is that there are now available many good wrapping materials which can be procured in commercial rolls or home-package size and that there is no need to use inferior materials such as parchment paper or wax papers.

During the past year, a vacuum pack and two different weights of polyethylene papers were tested, using pork sausage as the storage material. There was less than 1% loss in weight after 300 days of storage at 0° F., though the vacuum pack showed practically no loss. In each case, the sausage was no longer acceptable to the palatability committee after seven months, though the vacuum pack was in a little better condition than the others. Since antioxidants are now available and their use in the storage of fresh pork appears to increase the storage life, an antioxidant is being used this year in connection with a good wrapping material and a poor wrapping material. This phase is under observation at this time.

The Relation of Feathering and Overflow Fat of Lamb Carcasses to the Grade of the Lamb, Degree of Marbling, and Market Value of the Lamb (Project 580).

D. L. Mackintosh, R. A. Merkel, and C. S. Menzies

This project was undertaken in the spring of 1960 in an endeavor to determine the relationship, if any, of internal fats, overflow, and feathering to the degree of marbling in the *longissimus dorsi* muscle (eye muscle), the grade of the carcass; and the relationship of marbling to the palatability of meat.

Eighty-eight lambs of known breeding were slaughtered in the station laboratory during March, April, and May, 1960. They were the product of a sheep breeding experiment in progress at this station so that the history of each lamb was known. The lambs were slaughtered at about 95 lbs. and slaughter and carcass data recorded. All observations regarding carcass grade were made by a representative of the Federal Grading Service. Data on the palatability of the lambs are not yet available and the observations have not been treated statistically. The following general observations have been made. All carcasses graded within the range of high choice and high prime, feathering from 5 to 9, overflow from 4 to 8, flank fat from 4 to 7, estimated marbling 4 to 7, and actual marbling from 4 to 8, all on a basis of a standard ranging from 1 to 11.

Chemical analyses of the intercostal muscle for fat, as a measure of feathering, ranged from 19% to 30%; the overflow fat, separated mechanically, ranged from 20 to 101 grams, with over 50% falling between 33 and 50 grams. Chemical analyses of the eye muscle ranged from 2% to 7% fat, with about 50% of the lambs falling between 3.5% and 5% fat. Other observations include area of the eye muscle, thickness of fat over the eye muscle, and color of the flank muscle.

The project is being continued and should yield valuable information regarding the indices of finish to marbling, to grade of the carcass, and to palatability of the meat. It will also make valuable carcass data available to the sheep breeding project (No. 347).