Table 15

Feed Consumption and Lamb Production from Four Different Breeds of Rams and Three Types of Ewes.

	No. of lambs	Daily concentrate consumption in creep per lamb	Av. daily gain in lbs. per lamb	Gain per lb. of creep feed consumed
Sire groups:				
Hampshire	37	1.31	.60	.46
Suffolk	35	1.30	.57	.44
Southdown	37	1.22	.54	.44
Shropshire	35	1.13	.49	.44
Ewe groups:				
Finewools	55		.55	
Northwest whiteface	41		.61	
Northwest blackface	48		.55	

Table 16

Body Weights and Wool Production of Ewes of Different Types, 1956-1957.

	Grease wool production	Body wts. following lambing, lbs. per ewe
Finewool	12.3	145.5
Northwest whiteface	14.6	170.0
Northwest blackface	10.6	174.3

The Use of Management Techniques and Hormones to Control the Time, Rate, and Regularity of Lambing (Project BJ-441).

E. A. Nelson, Walter H. Smith and Carl S. Menzies

Fall lambing has been practiced in Kansas commercial ewe flocks for a good many years. Most breeders have reported that commercial ewes do not breed regularly during the summer months and that fall lambing periods tend to be extended with noticeable occasional lapses. In recent years there has been an appreciable amount of research conducted at several experiment stations which has been directed toward the determination of the extent to which each sex is involved in the summer fertility of sheep.

The experimental sheep used in conjunction with studies of summer fertility of sheep at the Kansas Agricultural Experiment Station consist of a commercial flock of approximately 136 head of western ewes of three predominant types (Texas or finewools, northwest blackface crossbreds, and northwest whiteface crossbreds) and four breeds of rams (Hampshire, Suffolk, Shropshire, and Southdown). Observations on the ewe flock during the past five years indicate that most ewes are sexually active during the summer months and that low summer fertility may be associated with the quality of the semen produced by the rams during the breeding season. During the summer of 1956, four of the eight rams used for summer breeding and observed for semen quality were classified as possessing low fertility on the basis of semen motility scores and concentration of spermatozoa. All four breeds of rams were included in the low fertility classifications. It is evident that individual rams tend to vary considerably more in regard to semen quality than do the breeds observed.

During the summer of 1957, 12 rams were observed for semen quality. Eight of these were in active breeding service, four were not. Six were subjected to a cooling treatment during the day by placing them in an air-conditioned room, starting on June 3 and continuing the practice until the end of the breeding season. One-half of the rams subjected to air

conditioning were shorn on June 24 and one-half of the rams not subjected to daytime cooling were shorn on the same date.

Weekly semen collections were made during the summer, starting on June 1 and terminating on August 14. Semen collections were observed for motility, ejaculate volume, sperm concentration, and percentage of abnormal spermatozoa.

All of the rams exhibited a definite decline in semen quality immediately after the start of the breeding season as indicated by all semen characteristics. Most of the rams showed progressive improvement during the breeding season, however. This improvement was more pronounced in rams not in active breeding use than in rams in active breeding use. Of the rams in breeding use, those subjected to daytime cooling displayed the most progressive improvement following the initial decline at the start of the summer breeding season. The effects of shearing were questionable. Shearing was apparently followed by a temporary decline in semen quality in most instances. Shearing may be most beneficial if it is done prior to the onset of the breeding season.

The effects of air conditioning or daytime cooling are also questionable in regard to the improvement of ram semen quality during the summer.

The Relationship of Physical Balance to the Utilization of Pelleted and Non-pelleted Rations for Lambs (Project 236). Three-Year Summary, 1955-56, 1956-57, 1957-58, and Results of 1957-58 Test.

C. S. Menzies, D. Richardson and R. F. Cox

Physical balance of lamb-fattening rations has been studied in this project for several years. These tests have been designed to study the effect of pelleting rations of varying proportions of roughages and concentrates upon feed-lot performance and feed efficiency compared with similar non-pelleted rations. For the past three years both dehydrated and field-cured alfalfa hay have been used as roughages.

Experimental Procedure

This is the third year that western feeder lambs have been divided into six lots and fed according to the following plan:

Lot 1—Pelleted ration, 60 percent field-cured alfalfa hay and 40 percent corn. In addition approximately .4 pound of chopped alfalfa hay was fed per lamb per day. Total ration was approximately 65 percent alfalfa hay and 35 percent corn.

Lot 2—Pelleted ration, 50 percent field-cured alfalfa hay and 50 percent corn. In addition each lamb received approximately .4 pound of chopped alfalfa hay per day. Total ration was approximately 55 percent alfalfa hay and 45 percent corn.

Lot 3—Non-pelleted ration, 65 percent chopped alfalfa hay and 35 percent ground corn.

Lot 4—Non-pelleted ration, 55 percent chopped alfalfa hay and 45 percent corn.

Lot 5—Pelleted ration, 60 percent dehydrated alfalfa hay and 40 percent corn. In addition each lamb received approximately .4 pound of chopped alfalfa hay per day. Total ration was approximately 65 percent alfalfa hay and 35 percent corn.

Lot 6—Pelleted ration, 50 percent dehydrated alfalfa hay and 50 percent corn. In addition about .4 pound of chopped alfalfa hay was fed per lamb per day. Total ration was approximately 55 percent alfalfa hay and 45 percent corn.

The alfalfa hay and dehydrated alfalfa hay used in these tests came from the same college field. A portion was dehydrated at the time of cutting and was later used with ground corn to make the pellets for lots 5 and 6. The remainder of the hay was baled and stored in the barn until part of it was ground and used with ground corn to make the pellets fed lots 1 and 2. The chopped hay used in all lots came from the baled-hay supply. This was chopped with an ensilage cutter. All the corn used in these tests has been purchased in bulk lots from a Manhattan mill.

The rations were fed twice a day; in addition, all the lambs had access to water and salt at all times. Individual weights were taken at the beginning of the trial and every two weeks thereafter. Carcass grades were obtained on all lambs when slaughtered.

Feed prices and processing charges used in determining the feed cost have varied from year to year. The 1957-58 prices have been used in calculating the feed cost per cwt. gain in both the 1957-58 test and in the summary of the three years' tests. These feed prices and processing charges were as follows: chopped alfalfa hay, $19 per ton ($16 per ton baled plus $3 per ton for chopping); ground corn, $1.88 per cwt.; dehydrated alfalfa hay, $37 per ton ($7 per ton for hay in the field plus $30 per ton for cutting, hauling, and dehydrating); grinding field-cured hay for pellets cost $5 per ton; and mixing, pelleting and sacking cost $7 per ton. With these prices the 60 percent field-cured hay and the 40 percent corn pellets cost $34.64 per ton, the 50 percent field-cured alfalfa hay and 50 percent corn pellets cost $36.30 per ton, the 60 percent dehydrated alfalfa hay and 40 percent corn pellets cost $44.24 per ton, and the 50 percent dehydrated alfalfa hay and 50 percent corn pellets cost $44.30 per ton.

Results and Discussion

The average daily gain, feed intake, feed consumed per cwt. gain, feed cost per cwt. gain and carcass grades for the 1957-58 test are shown in Table 18. This same information, for the three years this test has been conducted, has been summarized in Table 17. Separate results for the 1955-56 and 1956-57 tests have been reported in Kansas Agricultural Experiment Station Circulars 335 and 349, respectively.

Results of 1957-58 Test

During this year's test, lambs in lots 1 and 2, that were fed different ratios of field-cured alfalfa hay and corn in a pelleted form, and the lambs in lot 5 that were fed a 60-percent dehydrated alfalfa hay and 40-percent corn pelleted ration gained faster and more efficiently than did lambs fed non-pelleted rations. The lambs in lot 6, that were fed 50 percent dehydrated alfalfa hay and 50 percent corn pellets, gained only slightly more than lambs fed a similar non-pelleted ration.

Lambs fed a 55-percent alfalfa hay, 45-percent corn non-pelleted ration gained only slightly faster, but did so more efficiently than lambs fed a 65-percent alfalfa hay, 35-percent corn, non-pelleted ration.

The two lots fed field-cured alfalfa hay and corn pelleted rations produced cheaper gains than did any of the other four lots. Because of the cost of dehydrating alfalfa, the lambs in lots 5 and 6 had the highest feed cost per cwt. gain.

Observations from the Three-Year Summary

Lambs fed pelleted rations have consistently gained faster and more efficiently than those fed similar non-pelleted rations.

Pellets containing field-cured alfalfa hay have produced slightly faster and made more efficient gains than lambs fed pellets containing dehydrated alfalfa hay. This trend has not been consistent from year to year but the three-year average indicates a difference.

Slightly larger and cheaper gains have been produced by pellets containing 60 percent roughage and 40 percent corn than by pellets containing 50 percent roughage and 50 percent corn. However, in the non-pelleted form the ration of 55 percent roughage and 45 percent corn was more efficient as well as more economical than a non-pelleted ration of 65 percent roughage and 35 percent corn.

Due to the increased rate of gain and feed efficiency, the two lots fed field-cured alfalfa hay and corn pellets produced cheaper gains than lambs fed similar non-pelleted rations. This is based on the listed feed prices. Gains made by lambs fed dehydrated alfalfa hay and corn pellets cost considerably more than those made when other rations were fed.

There was little difference in the carcass grades of the lambs fed the different rations.

Table 17

Three-Year Summary—Pelleted and Non-pelleted Rations of Varying Concentrations for Fattening Lambs, 1955-56, 1956-57, 1957-58.

Lot number	1	2	3	4	5	6
Ration fed	60% field cured alf. hay, 40% corn, pelleted[1]	50% field cured alf. hay, 50% corn, pelleted[1]	65% chopped alfalfa hay, 35% cracked corn, non-pelleted	55% chopped alfalfa hay, 45% cracked corn, non-pelleted	60% dehydrated alf. hay, 40% corn, pelleted[1]	50% dehydrated alf. hay, 50% corn, pelleted[1]
Number of tests	3	3	3	3	3	3
Average number lambs per lot	21.0	20.7	21.0	20.3	21.0	20.7
Av. days on feed	88.7	88.7	88.7	88.7	88.7	88.7
Av. initial wt. per lamb, lbs.	77.4	77.7	77.2	77.3	77.5	77.3
Av. final wt. per lamb, lbs.	113.2	112.2	105.5	105.8	110.6	107.6
Av. total gain per lamb, lbs.	35.8	34.5	28.3	28.5	33.1	30.3
Av. daily gain per lamb, lbs.	.404	.389	.319	.321	.373	.342
Av. lbs. feed per lamb daily:[2]						
Pellet	2.95	2.75	.....	.....	2.85	2.65
Cracked corn	.....	.....	1.18	1.31	.....	.....
Chopped alfalfa hay	.44	.46	2.21	1.72	.42	.40
Av. lbs. feed per cwt. gain:[2]						
Pellet	730.2	706.9	.....	.....	764.1	774.9
Cracked corn	.....	.....	369.9	408.1	.....	.....
Chopped alfalfa hay	108.9	118.3	692.8	535.8	112.6	117.0
Feed cost per cwt. gain[3]	13.68	13.95	14.90	14.27	17.97	18.27
Number lambs died	0	1	0	2	0	1
Av. carcass grade, USDA[4]	9.32	9.88	9.19	9.25	9.16	9.22

1. Each lamb received, in addition, approximately .4 lb. chopped alfalfa hay daily.
2. Includes any feed that was wasted.
3. Feed cost per cwt. gain is based on feed prices quoted for 1957-58 test.
4. USDA grade was based on prime, 14; choice, 11; good, 8; utility, 5; and cull, 2.

Table 18

Pelleted and Non-pelleted Rations of Varying Concentrations for Fattening Lambs, 1957-58.

Lot number	1	2	3	4	5	6
Ration fed	60% field cured alf. hay, 40% corn, pelleted[1]	50% field cured alf. hay, 50% corn, pelleted[1]	65% chopped alfalfa hay, 35% cracked corn, non-pelleted	55% chopped alfalfa hay, 45% cracked corn, non-pelleted	60% dehydrated alf. hay, 40% corn, pelleted[1]	50% dehydrated alf. hay, 50% corn, pelleted[1]
Number lambs per lot	20	19	20	20	20	20
Days on feed	93	93	93	93	93	93
Initial wt. per lamb, lbs.	77.6	79.7	78.1	79.2	79.6	78.4
Final wt. per lamb, lbs.	111.5	112.1	103.0	106.5	113.9	108.2
Total gain per lamb, lbs.	33.9	32.4	24.9	27.4	34.3	29.8
Av. daily gain per lamb, lbs.	.364	.348	.268	.294	.369	.320
Lbs. feed per lamb daily:[2]						
Pellet	2.99	2.84	.....	.....	2.95	2.80
Cracked corn	.....	.....	1.17	1.36	.....	.....
Chopped alfalfa hay	.413	.415	2.16	1.76	.413	.413
Lbs. feed per cwt. gain:[2]						
Pellet	821.4	816.1	.....	.....	799.5	875.0
Cracked corn	.....	.....	436.6	462.6	.....	.....
Chopped alfalfa hay	113.5	119.3	806.0	598.6	111.9	129.1
Feed cost per cwt. gain, $	15.31	15.94	17.48	16.10	18.74	20.61
Number lambs died	0	1	0	0	0	0
Av. carcass grade, USDA[3]	8.90	9.26	8.00	8.15	8.30	8.60

1. Each lamb received, in addition, approximately .4 lb. chopped alfalfa hay daily.
2. Includes any feed that was wasted.
3. USDA grade was based on prime, 14; choice, 11; good, 8; utility, 5; and cull, 2.

The Effect upon the Quality and Palatability of the Carcass of Implanting Stilbestrol, and Feeding a Premix, to Feeder Lambs (Project—Hatch 423).

Animal Husbandry, Chemistry, and Home Economics (Foods and Nutrition) cooperating.

D. L. Mackintosh, R. A. Merkel, T. D. Bell, C. S. Menzies, D. Harrison, B. Westerman and L. Anderson

Over the past four years 160 lambs have been slaughtered on this experiment. Ten head of lambs from each of four lots of 35 to 50 lambs fed at the Garden City Station have been shipped to Manhattan for slaughter and carcass observations.

The lots have included, in addition to the controls, 2 mgs. stilbestrol in the feed, 6 mgs. implants and a commercial preparation known as Synovex. The components of this premix have been varied from year to year. This year (1958) the lot receiving 2 mgs. stilbestrol per day in the feed was replaced with a lot implanted with 3 mgs. stilbestrol.

Observations on storage and palatability of the meat from the lambs slaughtered in 1957 have just been completed and are now being analyzed. Carcass data from 1955 and 1956 indicate that the control lambs had the highest yield in 1955 and 1956. They also had the lightest livers and the lowest liver glycogen, the highest level of liver fat, and most fat in the rib eye (indicative of marbling). The lots receiving 2 mgs. of stilbestrol in the feed daily had the heaviest livers both years, lowest liver fat levels, and heaviest pelts. The lambs with the implants had the most outside covering and graded slightly higher each year. The lambs receiving the Synovex had the thickest covering over the ribs but the poorest covering otherwise. They also showed the least rib eye fat, smallest volume of press fluid, least press fluid nitrogen and highest percent N.P.N (non-protein nitrogen) of the total nitrogen in the press fluid. In all three lots receiving stilbestrol the pelt was strongly attached to the fell, with the result that these lambs pelted much harder than the controls.

In the second trial no stilbestrol was found in the composite sample of the rib eye, back fat, and liver, either from the fed or the implanted lot. This confirms results of the first trial. Higher calcium nitrogen ratios and calcium phosphorus ratios were found in both fed and implanted lots than in the controls. These observations may have direct bearing on hormone treatment of human pathology related to arthritis.

The strong adherence of the pelt to the fell in the stilbestrol lambs may be associated with the greater calcium deposits in the fell. Collagen fibers (constituents of connective tissues) become more cohesive when calcium is abundant and vice versa.

Average data indicate that the cooking time, total cooking losses and palatability of roasted legs from the 1956 lambs were not affected by the feeding or implanting treatments. Volatile losses accounted for 75 to 80 percent of the losses during cooking, but the dripping losses increased sharply in the first 10 minutes after the roasts were removed from the oven. The flavor of the lean meat was good after 48 weeks of frozen storage, but the flavor of the fat was slightly undesirable after 24 weeks of frozen storage.

The thiamine and riboflavin content of the loins was not affected by the treatment of the lambs or by frozen storage. The loins from lambs on the control diet contained significantly more pantothenic acid and niacin than did the loins from the other groups of lambs. Frozen storage did not affect the amount of these vitamins in the loins.