Sorghum stubble produced economical gains, but the gains were small. This was particularly true with lambs that remained on sorghum stubble the entire feeding period.

The lambs given hormones—either as implants at the beginning of the tests or daily in the feed—gained more rapidly than lambs on a similar ration with no hormone treatment. In previous tests with stilbestrol implants and with stilbestrol-progesterone implants, the hormone-treated lambs shrank more going to market and produced lower grading and lower yielding carcasses than lambs fed similar rations without hormones. Further information concerning the use of hormones in lamb feeding is presented below.

The lambs were shown at the close of the experimental feeding period. Wool production for the various lots is shown in the bottom line of each table. The lots making larger gains generally produced larger and heavier fleeces.

A comparative appraisal was made by a commission firm representative following shearing. He considered the lot receiving the beet top silage, the lot receiving the 6 mg. implants of stilbestrol, and the lot of lambs receiving the pelleted ration the best lambs, with the wheat pasture lambs almost as good. He ranked the remaining lots lower and thought they probably would sell in about the same price range. Other observers at the Feeders' Day program thought the sorghum-pasture lambs and the lambs receiving "Synovex" implants were of lower finish and quality.

Only two lambs were lost in the tests this year, both from "overeating disease."

Appreciation is expressed to Eli Lilly Company, Indianapolis, Ind., for the stilbestrol pre-mix fed; to Norden Laboratories, Lincoln, Neb., for the stilbestrol pellets; and to Syntex Animal Products Company, Kansas City, Mo., for the estradiol-progesterone (Synovex) pellets.

Use of Hormones

PROJECT 111 GC

T. Donald Bell, Walter H. Smith, A. B. Erhart, A. W. Gardner, D. L. Mackintosh, and Ralph Soule

In the lamb-feeding tests at the Garden City Branch Station during the 1953-54 feeding season, one lot of 48 lambs was given stilbestrol implants of varying sizes at the beginning of the feeding period. Another lot of 48 lambs was given stilbestrol-progesterone implants at two different dosage levels at the beginning of the feeding period. The performance of these lambs was compared with those in another group of 48 receiving a similar ration of ground sorghum fodder, sorghum grain, protein supplement, and limestone—but no hormone treatment. The preliminary results of the feedlot studies were presented in the 41st Annual Livestock Feeders' Day report of May 1, 1954. Additional feedlot, slaughter, and carcass data were obtained from these lambs and are presented in Table 4.

At the conclusion of the feeding tests the spring of 1954, three lambs from the control lot, three lambs that had received 15 mg. stilbestrol implants, and three lambs that had received 12 mg. of stilbestrol and 120 mg. of progesterone in pellet implants at the beginning of the tests were brought to Manhattan for detailed carcass studies. The information from these studies is presented in Tables 5, 6, and 7.

Table 4.—Feedlot performance, shrinkage to market, and carcass grades and yields of lambs receiving hormone implants and of lambs receiving a similar ration with no hormone treatment.

	Stilbestrol implants				Stilbestrol-progesterone implants[1]			Controls
	6 mg.	12 mg.	15 mg.	Total	2 pellets	4 pellets	Total	No treatment
Number of lambs	17	16	15	48	25	23	48	48
Daily rate of gain	.31	.34	.34	.33	.33	.34	.33	.25
Shrink to market, %[2]				9.3			9.3	9.3
Carcass yield, %				46.5			46.1	50.0
Carcass wt., lbs.				44.2			44.3	43.7
Carcass grades[3]								
Choice								5
Good				12			11	31
Utility				31			28	10
Cull				2			5	1
Average			High utility			Utility		Good

1. Each pellet contained 3 mg. stilbestrol and 30 mg. progesterone.
2. Shrinkage figured on loss of weight while trucking from Garden City to Wichita.
3. A representative portion of the lambs was used for detailed carcass studies and was not taken to Wichita.

Table 5.—Slaughter and carcass information secured from lambs receiving hormone implants at the beginning of the feeding period, and from lambs receiving a similar ration but given no hormone implants.

	Lambs given 15 mg. stilbestrol implants (Av. of 3 lambs)	Lambs given stil.-prog. implants* (Av. of 3 lambs)	Lambs given no hormone (Av. of 3 lambs)
Live wt., lbs.	90.5	93.0	88.0
Dressed wt., lbs.	43.3	46.3	45.0
Chilled wt., lbs.	42.2	45.0	43.5
Difference in hot and chilled wt., lbs.	1.1	1.3	1.5
Dressing percentages			
Based on cold wt.	47.0	48.1	50.0
Based on hot wt.	48.2	50.0	52.0
Shorn pelt wt., lbs.	13.2	13.0	11.1
Weight of organs, gms.			
Liver	645.0	662.0	552.0
Spleen	63.0	59.0	71.0
Kidney	108.0	105.0	96.0
Heart	146.0	150.0	131.0
Blood wt., lbs.	3.7	3.7	3.5
P.H. of liver	6.0	6.1	6.0
P.H. of spleen	6.2	6.2	6.1
Rib cut percentages:			
Eye	17.9	18.0	18.1
Other lean	34.4	34.0	30.0
Fat	22.5	23.0	28.0
Bone	25.3	26.0	24.0
Carcass grades	Low good	Low good	Good

* Lambs were given 4 pellets containing a total of 12 mg. stilbestrol and 120 mg. progesterone.

Table 6.—Cooking and palatability data for legs of lamb from lambs receiving hormone implants and those receiving no implants.[1]

	Lambs given 15 mg. stilbestrol implants (Av. of 3 legs)	Lambs given stil.-prog. implants[1] (Av. of 3 legs)	No hormone controls (Av. of 3 legs)
Volatile loss, %	16.1	18.6	17.7
Drip loss, %	5.5	4.4	5.6
Total loss, %	21.7	23.1	23.3
Desirability scores[2]			
Aroma	5.9	5.9	6.0
Lean	5.8	6.4	6.4
Fat	5.7	5.0	5.5

Table 6 (Continued).

Tenderness score[2]	6.0	5.8	6.1
Shear value, lbs.	10.9	16.9	16.0
Juiciness score[2]	5.1	6.1	5.5
Press fluid yield M1/25g.	7.9	8.1	8.0
Comments	Soft, with little fat		

1. This work was done by The Home Economics Department of the Kansas Agricultural Experiment Station.
2. Maximum score, 7.

Table 7.—Chemical analyses of meat from hormone-treated and untreated lambs.

	Moisture %	Ash %	Ether extract %	Total nitrogen %
Lambs given 15 mg. stilbestrol implants:				
Rib eye	73.92	1.04	4.31	3.33
Other lean	65.20	.96	16.21	2.99
Fat	17.19			
Lambs given stilbestrol-progesterone implants:				
Rib eye	74.07	1.05	4.11	3.29
Other lean	65.74	.96	14.94	3.07
Fat	22.62			
Controls—no hormones:				
Rib eye	73.01	1.04	5.18	3.35
Other lean	60.72	.96	17.64	3.17
Fat	16.11			

Tables 8 and 9 show the comparative measurements of the urogenital systems of lambs receiving the hormone implants, and those that received no implants. They were recovered at the time of slaughter in the Wichita packing plant in the 1954 studies, and in the 1955 tests were taken from the 40 lambs brought to Manhattan for detailed carcass studies.

In the 1954-55 tests at Garden City, four lots of 50 lambs each were fed basal rations of ground sorghum stover, sorghum grain, cottonseed meal, salt, and limestone. The lambs in one lot received pellet implants containing 6 mg. stilbestrol at the beginning of the test; those in another lot received pellet implants of estradiol and progesterone containing 10 mg. of estradiol and 250 mg. of progesterone; those in another lot were fed 2 mg. of stilbestrol per head daily in their feed; and those in the control lot were given no hormones.

Following the Lamb Feeders' Day at Garden City March 5, 1955, 10 lambs from the control lot and 10 from each of the three hormone-treated lots were brought to Manhattan to secure additional information. The detailed study of the carcasses of these lambs is being made jointly by the Departments of Animal Husbandry, Chemistry, and Home Economics. Results of their studies will be made at a later date.

The shrink in bringing these lambs from Garden City to Manhattan is shown in Table 10, together with the carcass grades of the four groups of lambs. Measurements of the urogenital system from these lambs are shown in Table 8.

Table 8.—Comparative size of organs of the urogenital systems of wether lambs given hormones and of untreated lambs.

	Number of lambs	Seminal vesicles		Bladder		Ampullae diameter mm	Urethra and prostate diameter mm	Cowper's glands, diameter mm
		Length mm	Width mm	Length mm	Width mm			
1954								
No hormone	20	12.4	8.0	38.0	23.2	3.3	10.8	9.4
Stil. implants:								
6 mg.	6	20.1	12.3	48.0	25.0	4.4	18.1	11.7
12 mg.	6	23.6	15.2	43.0	29.3	6.1	18.1	19.5
15 mg.	7	24.8	16.9	41.8	29.8	7.0	16.0	16.6
Stil.-prog. implants:								
2 pellets	12	23.4	15.7	45.8	27.0	6.6	16.3	15.8
4 pellets	9	25.8	17.0	46.1	27.4	7.0	17.7	18.9
1955								
No hormone	10	16.0	7.4	43.5	23.4	3.4	13.7	8.6
6 mg. stil. implants	8	21.2	11.9	47.5	29.5	5.3	16.1	13.5
Stil. in feed (2 mg. daily)	10	26.4	13.3	50.1	29.0	5.7	18.3	14.2
Estradiol prog. pellet implants (10 mg. estradiol 250 mg. prog.)	10	25.6	15.4	62.8	35.8	6.6	21.3	19.6

Table 9.—Comparative size of organs of the urogenital systems of ewe lambs given hormone implants and those receiving no implants.

	Number of lambs	Diameter of cervix mm	Ovaries		Diameter of largest follicle mm	Bladder		Diameter of body of uterus mm
			Length mm	Width mm		Length mm	Width mm	
1954								
No hormone	21	12.3	14.7	11.2	5.2	40.5	25.0	15.1
6 mg. stil. pellet implants	9	11.7	14.2	10.8	5.2	49.0	28.5	14.4
12 mg. stil. pellet implants	8	14.1	17.0	13.1	5.2	45.5	27.5	16.6
15 mg. stil. pellet implants	9	15.1	18.0	12.0	3.3	49.1	29.0	18.4
Stil. and prog. implants:								
2 pellets	12	13.6	16.0	10.4	2.3	45.8	26.6	14.8
4 pellets	12	14.8	14.6	10.9	2.7	42.0	28.0	14.9

Table 10.—Shrink in transit and carcass grades of hormone-treated lambs and untreated lambs.

Treatment	Number of lambs	% Shrink—Garden City to Manhattan	Carcass grades* C	C–	G+	G	G–	U+
Controls—no treatment	10	4.67		4	6			
6 mg. stilbestrol implants ..	10	4.54	2	4	4			
Estradiol-progesterone implants	10	5.75			4	5		1
Stilbestrol in the feed (2 mg. daily)	10	5.11		3	3	4		

* C = choice, G = good, U = utility.

Observations

In the 1953-54 tests, feeder lambs given either stilbestrol implants or stilbestrol-progesterone implants made larger gains in the feed lot than lambs receiving a similar ration, but receiving no hormone treatment. The hormone-treated lambs, however, yielded between 3.5 and 4.0 percent less than the controls when slaughtered, and the hormone lambs graded nearly a full grade less than the untreated lambs.

The untreated lambs and those receiving the 6 mg. stilbestrol implants in the 1954-55 tests were graded higher on foot than either the lambs receiving stilbestrol in their feed, or those receiving the estradiol-progesterone pellet implants. The lambs receiving the hormones carried their tails higher and some swelling was evident in their rectal region. The swellings were particularly evident in lambs receiving the estradiol-progesterone implants, and some lambs were showing considerable discomfort at the end of the 105-day feeding period.

Based on a sample of 10 lambs from each of the four groups, shrinkage in transit was less on the untreated lambs and those receiving the 6 mg. stilbestrol implants. These lambs also had higher grading carcasses. The estradiol-progesterone treated lambs graded the lowest and had watery, slimy carcasses that failed to harden in the cooler.

Detailed slaughter and carcass studies of hormone-implanted lambs and untreated lambs in the 1953-54 tests showed that the untreated lambs yielded and graded higher with a larger proportion of fat and a lower proportion of bone than the lambs receiving the hormone implants. The hormone-treated lambs had larger livers, kidneys, and hearts and had a greater blood weight than the control lambs.

Cooking and palatability tests did not indicate any consistent differences in cooking losses, palatability, tenderness, or juiciness between the control and treated lambs.

A chemical analysis of the rib eyes, other lean, and fat from rib cuts showed that the hormone-treated lambs had a higher percentage of moisture in all three portions, and had a lower percentage of ether extract or fat.

The hormones, either as implants or given in the feed, have increased the size of the organs of the urogenital systems of wether lambs. Previous work showed that the stimulated growth of the Cowper's glands and of the prostate and urethra may block the urethral passage and cause lethal complications.

The increase in size of the organs is generally associated with the size of the dosage. Inclusion of progesterone in the pellet implant does not prevent the growth stimulation. Differences in the urogenital systems of female lambs given the hormones in the feed or as implants are not so apparent as those shown by the wether lambs. The bladders of the treated ewe lambs are larger than those from untreated lambs. Larger pellet implants of stilbestrol and the implants containing both stilbestrol and progesterone apparently inhibited follicle development in the ovaries.

The Relationship of Physical Balance in the Utilization of Pelleted and Non-pelleted Rations for Lambs.

PROJECT 236

T. Donald Bell, Draytford Richardson, R. F. Cox, J. W. Needham, and Russell John

This project was designed to study the difference between pelleted and non-pelleted rations of different concentrations. Many commercial lamb feeders are pelleting the entire ration and believe it is superior to the same ration hand-fed. At the present time, the extra cost of pelleting varies from $8-$12 per ton. This test and others are designed to determine whether there is enough additional gain in weight and feed efficiency to warrant the use of pelleted rations, and to determine the most desirable ratio of roughage to concentrate.

Experimental Procedure

Seventy-nine black-faced feeder lambs were used in this study. The lambs were purchased at the Kansas City stock yards and weighed approximately 75 pounds each when purchased. The lambs arrived at the Kansas State College station in early October and were placed in dry lot on arrival. They were fed prairie hay three days and then changed to alfalfa hay. Small amounts of cracked corn were added until the lambs were approximately on full feed. The top 16 lambs by weight were separated and used for digestibility trials corresponding to the same rations used for the feeding tests. The lambs in the remaining group were weighed and lotted randomly into four lots of 10 lambs each and four lots of five lambs each. The four lots, in which the pellets were to be fed, were changed to pellets and for the first few days a limited amount of alfalfa hay was provided. The trial began November 2 and continued 86 days. The rations fed to the lots were as follows:

Lot 1—Pelleted ration (65 percent dehydrated alfalfa hay and 35 percent corn).
Lot 2—Pelleted ration (55 percent dehydrated alfalfa hay and 45 percent corn).
Lot 3—Sixty-five percent chopped alfalfa hay and 35 percent cracked corn.
Lot 4—Fifty-five percent chopped alfalfa hay and 45 percent cracked corn.
Lot 5—Same as Lot 1, individually self-fed.
Lot 6—Same as Lot 2, individually self-fed.
Lot 7—Same as Lot 3, individually self-fed.
Lot 8—Same as Lot 4, individually self-fed.

Lots 1, 2, 3, and 4 received the same amount of total digestible nutrients daily until the latter part of the feeding period, when Lot 2 went off feed and had to have the volume of feed lowered. At this time, Lot 1 was eating all the pellets they would clean up so they were left on the same quantity of feed, but Lots 3 and 4 were raised to a higher level of feed intake.

The alfalfa hay used in this trial was harvested from the same area for the pelleted and non-pelleted feeds. For the pelleted rations, the alfalfa hay was taken from the field as it was cut and then dehydrated. The hay for the unpelleted rations was cured in the field, baled, and then chopped. The corn for all rations was taken from the same bulk at the Manhattan elevator.

The individually fed lambs (lots 5, 6, 7, and 8) were placed in separate feeding pens two hours night and morning. Small self-feeders were used for each lamb. The lambs fed as a group (Lots 1, 2, 3, and 4) were hand-fed twice daily. Water and salt were before the lambs at all times.