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LAMB FEEDING TRIALS in the EL PASO VALLEY, 1947-49

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A Comparison of High Protein Cottonseed Products,
and of Ground and Unground Sorghum Grain

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The TEXAS AGRICULTURAL AND MECHANICAL COLLEGE SYSTEM

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Digest

Lambs fed ground sorghum grain averaged 2.2 pounds more gain per head in a 93-day feeding period than lambs fed unground sorghum grain in experiments conducted during 1947-49 at the El Paso Valley Experiment Station at Ysleta.

The feeding of the same amount of energy from either 41 percent protein cottonseed cake or 28 percent protein whole pressed cottonseed cake in a ration with alfalfa hay produced lambs of satisfactory finish in 90 to 100-day feeding periods.

As much as 2.0 pounds of these concentrates may be fed daily without ill effect.

The best daily gain, 0.36 pound per head, was obtained with a ration of ground sorghum grain supplemented with 41 percent protein cottonseed cake and alfalfa hay.

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LAMB FEEDING TRIALS IN THE EL PASO VALLEY, 1947-49

A Comparison of High Protein Cottonseed Products, and of Ground and Unground Sorghum Grain

N. B. Willey, J. H. Jones and P. J. Lyster*

THE EL PASO VALLEY produces large quantities of cotton and alfalfa hay. Little grain is produced in this area; however, the feed by-products of the cotton industry are available for feeding. A feeding system is needed through which these locally-produced feeds may be marketed to better advantage.

Factors which favor the development of a lamb feeding industry in this area are a dry climate and moderate winters, which permit feeding without shelter. Feeder lambs, principally of Rambouillet breeding, are available in the adjacent range areas of Texas and New Mexico. In years of adequate rainfall, many of these feeder lambs are sold for slaughter directly from the range. Lambs which do not fatten are sold as feeders and move to northern feedlots, or to the Great Plains for fattening on wheat pasture. While wheat pasture provides an economical means of fattening lambs, it is not available every year. Extended drouth in either the Great Plains or the Trans-Pecos area disrupts normal movement of these lambs. Alternate outlets for these feeder lambs also are desirable.

REVIEW OF LITERATURE

Since grain sorghums now grown are principally of the combine type (Karper, 1947) with small hard grains, the question is often asked if these newer varieties should be ground for feeding lambs. Feeding experiments conducted 20 years ago with larger, softer sorghum grains indicated that grinding was not worth the additional cost when the grain was hand-fed to lambs. It was found by Jones and Dickson (1928) that ground threshed milo was slightly superior to unground threshed milo in two lamb fattening tests, but it was stated that the test should be continued further. Later, Mackey and Jones (1932) observed

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that ground threshed milo and Hegari gave no better results than the unground threshed grain.

Fraps (1932) stated that cottonseed meal may at times be cheap enough to feed for its energy rather than for its protein content. Cox (1929) found that lambs fed one pounds of cottonseed meal and alfalfa hay free choice made gains almost equal to those of lambs fed corn, a protein supplement and alfalfa hay. The lambs were able to consume one pound of cottonseed meal daily but failed to clean up 1.25 pounds after having been on feed 65 to 75 days. Jones and Dickson also reported a fair rate of gain but unsatisfactory finish from feeding lambs a ration of cottonseed meal and cottonseed hulls. Neale (1932, 1940) reported that 0.8 pound of cottonseed meal per head daily had no ill effect on the health of lambs, but with an increase to 1.25 pounds, the lambs became irregular feeders and had a poor general appearance.

PURPOSE OF THE EXPERIMENT

The objectives of the feeding trials reported in this bulletin were to determine: (1) the advisability of grinding sorghum grain for fattening lambs; (2) the comparative utility of 41 percent protein cottonseed cake and 28 percent protein whole pressed cottonseed cake as feeds for fattening lambs; and (3) whether lambs can be fattened satisfactorily on these protein supplements when fed with alfalfa hay.

PROCEDURE

Alfalfa hay, "pea-size" cottonseed cake, whole pressed cottonseed cake and sorghum grain were used in fattening 876 Rambouillet lambs in four fattening tests between October 1947 and April 1949.

Lambs Used

Rambouillet wether and ewe lambs were used. Three of the test groups were produced under range conditions in Jeff Davis and Brewster counties. The lambs used in the second feeding trial were produced on an irrigated farm in Dona Ana county, New Mexico. Lambs from both sources were healthy, thrifty feeders, Figure 1. In the first trial, the lambs were started on feed in October 1947 and were marketed in January 1948. The second trial was started in February 1948 and was completed in May. The lambs used in the third and fourth trials were purchased in September 1948. The heavier lambs were started on feed in that month and were marketed in December. The lighter lambs were fed alfalfa hay until December, when fattening rations were begun, and were marketed in April 1949.

Feeds Used

Forty-three per cent protein cottonseed meal was used in the

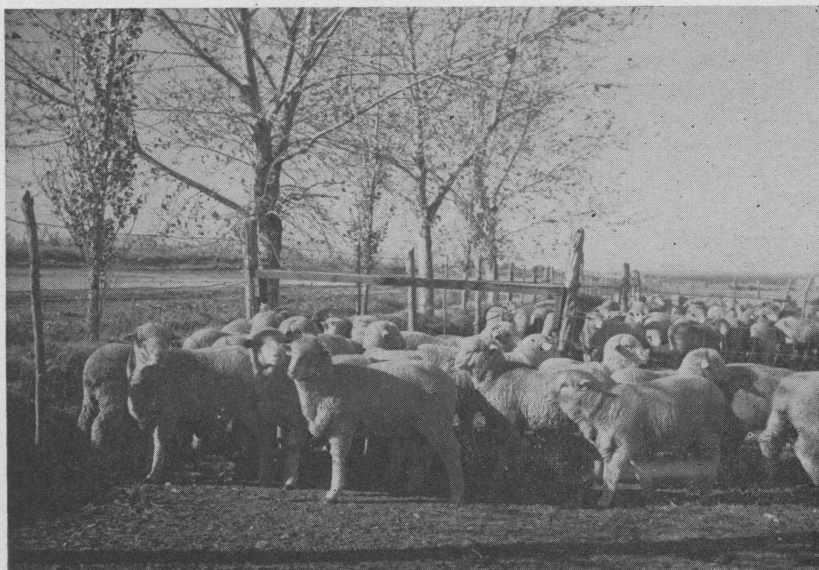


Figure 1. Typical Rambouillet lambs used in these tests.

first trial of the 1947-48 feeding season. Due to some difficulty in feeding the meal, 41 per cent protein "pea-size" cottonseed cake was used in the other three trials. These feeds and the 28 per cent protein whole pressed cottonseed cake were of prime quality and were processed in El Paso county from cotton grown under irrigation. The sun-cured alfalfa hay was produced on the Ysleta station. It consisted of second, third and fourth cuttings, being coarse but of good green color. The average grade of this hay was U. S. No. 2. Grain was purchased as bulk No. 2 milo and probably consisted of several varieties of combine grain sorghum. The grain was ground through a 3/16-inch screen.

Rations Used

The following rations were used:

Ground sorghum grain, 41 percent protein "pea-size" cottonseed cake and alfalfa hay.

Unground sorghum grain, 41 percent protein "pea-size" cottonseed cake and alfalfa hay.

41 percent protein "pea-size" cottonseed cake and alfalfa hay.

Ground sorghum grain, 28 percent protein whole pressed cottonseed cake and alfalfa hay.

Unground sorghum grain, 28 percent protein whole pressed cottonseed cake and alfalfa hay.

28 percent protein whole pressed cottonseed cake and alfalfa hay.

These rations were fed in two replications, making a total of 12 lots in each test.

In the lots in which 41 percent protein cottonseed cake was used to supplement sorghum grain, the two feeds were mixed in the proportion of 8.5 pounds of grain to 1.5 pounds of cake. With 28 percent protein whole pressed cottonseed cake, the proportion was 8.2 pounds of grain and 1.8 pounds of cake. Concentrates in rations containing 28 percent cake were fed at the rate of 1.04 times that of rations containing 41 percent cake.

Method of Feeding

The lambs were fed in pens approximately 50 by 100 feet in size without access to shelter. After the lambs had cleaned up the concentrates, which were fed each morning and afternoon, alfalfa hay was fed in sufficient quantities to last until the next feeding. Water and granulated salt were available at all times.

Individual weights were taken at the beginning and end of each feeding trial. All lambs in a lot were weighed as a group at 28-day intervals.

RESULTS

Conclusions presented in this bulletin are based on an evaluation of feedlot grain, hot carcass weights and grades, feed consumed and feed required to produce 100 pounds of gain.

Ground Compared with Unground Sorghum Grain

Lot I received ground sorghum grain and Lot II unground sorghum grain (Table 1).

Table 1. Summary of comparisons using ground and unground sorghum grain in lamb fattening rations

	I	II
Lot number	1 and 4	2 and 5
Group and ration no. ¹	290	294
Number of lambs	Ground sorghum grain	Unground sorghum grain
Comparison		
Averages in pounds per lamb unless otherwise stated		
Initial weight	72.3	72.1
Final weight	106.2	103.8
Daily gain, basis feedlot weight	0.365	0.341
Carcass weight (warm)	50.0	48.8
Yield, percent (basis feedlot and warm carcass)	47.1	47.0
Carcass grades, percent:		
Choice	60.7	51.4
Good	29.3	35.4
Medium	10.0	13.2
Total feed (consumed):		
Sorghum grain	94.1	95.0
Protein supplement	17.2	17.4
Alfalfa hay	184.6	181.8
Feed required per cwt. feedlot gain:		
Sorghum grain	277.6	299.7
Protein supplement	50.7	54.9
Alfalfa hay	544.5	573.5

¹Data for individual groups fed various rations are shown in Table 6.

Lambs fed ground sorghum grain made more gain than those fed unground grain in each of the four trials. The difference of 2.2 pounds of feedlot gain was great enough to be statistically significant. Results of this comparison are shown graphically in Figure 2.

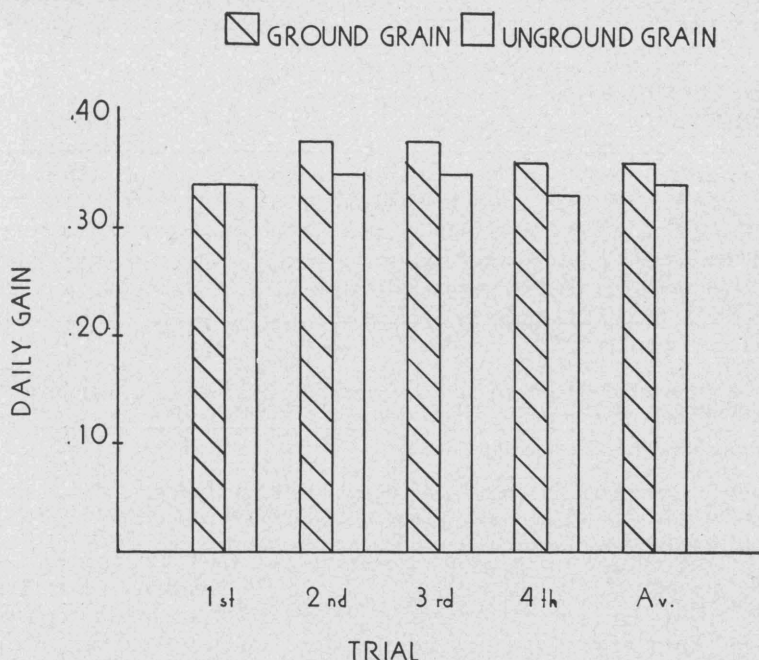


Figure 2. Average daily feedlot gain in pounds obtained by feeding ground and unground sorghum grain.

Grinding grain through a 3/16-inch screen reduced the amount of feed required to produce 100 pounds of gain. The lambs fed ground sorghum grain required 328 pounds of concentrates and 544 pounds of alfalfa hay to produce 100 pounds of gain. The respective requirements for the lambs fed unground sorghum were 355 pounds of concentrates and 574 pounds of alfalfa hay.

Lambs fed ground sorghum grain had a slight advantage in finish, as 60.7 percent of the carcasses graded Choice. Only 51.4 percent of the lambs fed unground sorghum grain graded Choice.

Financial returns favored lambs fed ground grain. A charge of \$4.00 per ton was allowed for grinding.

28% Compared with 41% Cake as Supplements

The two protein feeds were compared as supplements in a ration containing sorghum grain and alfalfa hay. Lambs fed

Table 2. Summary of comparisons using 41 per cent protein cottonseed cake and 28 per cent protein whole pressed cottonseed cake as supplements in lamb fattening rations

Lot number.....	III	IV
Group and ration number ¹	1 and 2	4 and 5
Number of lambs.....	294	290
Comparison.....	41% cake	28% cake
Averages in pounds per lamb unless otherwise stated		
Initial weight.....	72.0	72.3
Final weight.....	105.0	105.0
Daily gain, basis feedlot weight.....	0.355	0.352
Carcass weight (warm).....	49.6	49.1
Yield, percent (basis feedlot and warm carcass).....	47.2	46.8
Carcass grades, percent:		
Choice.....	57.1	54.8
Good.....	32.0	32.8
Medium.....	10.9	12.4
Total feed (consumed):		
Sorghum grain.....	95.6	93.5
Protein supplement.....	14.9	19.8
Alfalfa hay.....	182.7	183.7
Feed required per cwt. feedlot gain:		
Sorghum grain.....	289.7	285.9
Protein supplement.....	45.2	60.6
Alfalfa hay.....	553.6	561.8

¹Data for individual groups fed various rations are shown in Table 6.

41 percent protein cottonseed cake as a supplement, Lot III, had a slight advantage in feedlot gain over those fed 28 percent whole pressed cottonseed cake, Lot IV (Table 2). During the 93-day feeding period, lambs in Lot III made a total gain of 33.0 pounds per head, as compared with 32.7 pounds made by lambs in Lot IV.

Lambs fed 41 percent protein cake graded higher and produced slightly heavier carcasses. A total of 57.2 percent of these lambs graded Choice, as compared with 54.8 percent of those given 28 percent protein cottonseed cake.

Feed was utilized with near equal efficiency in this comparison. In the lot fed 41 percent protein cake, the lambs were given 335 pounds of concentrates and 554 pounds of alfalfa hay per 100 pounds of weight gained. In the lot receiving 28 percent protein cake, the lambs consumed 346 pounds of concentrates and 562 pounds of alfalfa hay.

Cottonseed Cake Compared with Grain and Cake

Lambs fed grain and a protein supplement, Lot V, made practically the same average daily feedlot gain as those receiving cottonseed cake as the only concentrate (Lot VI).

Feed was utilized with approximately the same efficiency by both lots of lambs (Table 3). In the lot fed grain and a protein supplement, the lambs were fed 341 pounds of concentrates and 558 pounds of alfalfa hay for each 100 pounds gain in weight. In the lot fed only cottonseed cake, the lambs consumed 341 pounds of cake and 568 pounds of alfalfa hay.

Carcasses of lambs fed grain and cottonseed cake graded slightly higher than those fed only the cake. A total of 56.0 percent of the lambs fed grain and cake graded Choice, as compared with 51.0 percent of the lambs fed cottonseed cake as the only concentrate.

28% Compared with 41% Cake as the Only Concentrate

A comparison was made of 41 percent protein "pea-size" cottonseed cake, Lot VII, and 28 percent whole pressed cottonseed cake, Lot VIII, as the only concentrate (Table 4). An average of 1.06 pounds of 28 percent cake was fed for each 1.0 pound of 41 percent cake.

Lambs fed 28 percent cake had a slight advantage, 0.9 pound per head, in feedlot gain, but this difference was not statistically significant.

Table 3. Summary of feeding trials comparing cottonseed cake with sorghum grain supplemented with cottonseed cake in lamb fattening rations

Lot number	V	VI
Groups and ration number ¹	1, 2, 4 and 5	3 and 6
Number of lambs	584	292
Comparison	Grain supplemented with cake	Cottonseed cake
Averages in pounds per lamb unless otherwise stated		
Initial weights	72.2	72.7
Final weight	105.0	105.4
Daily gain, basis feedlot weight	0.353	0.352
Carcass weight (warm)	49.4	49.5
Yield, percent (basis feedlot and warm carcass)	47.0	47.0
Carcass grades, percent:		
Choice	56.0	51.0
Good	32.4	38.4
Medium	11.6	10.6
Total feed (consumed):		
Sorghum grain	94.5	
Protein supplement	17.3	111.6
Alfalfa hay	183.2	185.9
Feed required per cwt. feedlot gain:		
Sorghum grain	288.1	
Protein supplement	52.7	341.3
Alfalfa hay	558.5	568.5

¹Data for individual groups fed various rations are shown in Table 6.

Table 4. Summary of feeding trials comparing two types of cottonseed cake as concentrates in lamb fattening rations

Lot number	VII	VIII
Group and ration number ¹	3	6
Number of lambs	146	146
Comparison	41% cake	28% cake
Averages in pounds per lamb unless otherwise stated		
Initial weight	72.3	73.1
Final weight	104.6	106.3
Daily gain, basis feedlot weight	0.347	0.357
Carcass weights (warm)	49.7	49.3
Yield, percent (basis feedlot and warm carcass)	47.5	46.4
Carcass grades, percent:		
Choice	52.7	49.3
Good	36.3	40.4
Medium	11.0	10.3
Total feed (consumed):		
Protein supplement	108.1	115.1
Alfalfa hay	185.6	186.2
Feed required per cwt. feedlot gain:		
Protein supplement	334.7	346.7
Alfalfa hay	574.6	560.8

¹Data for individual groups fed various rations are shown in Table 6.

Carcasses from lambs fed 41 percent cake were heavier and graded higher than those from lambs fed 28 percent cake. A total of 52.7 percent of the lambs from Lot VII graded Choice, while only 49.3 percent from Lot VIII reached this grade.

In the lot fed 41 percent protein, the lambs were given 335 pounds of cake and 575 pounds of alfalfa hay per 100 pounds of weight gained. The lambs fed 28 percent protein consumed 347 pounds of cake and 561 pounds of alfalfa hay to put on the same weight.

There were no digestive disturbances in the lambs receiving either the 41 or the 28 percent cake. During the last 43 days of the fourth feeding trial, one group of lambs consumed an average of 1.99 pounds of 41 percent protein cake daily and another group 2.16 pounds of 28 percent cake. Only one lamb was lost out of the 293 fed protein supplement as the only concentrate.

Table 5 summarizes the average rations consumed and the average daily gains in pounds for approximate 28-day feeding periods. A summary of the four feeding trials, based on weighted averages, is shown in Table 6. This table includes initial and final feedlot weights, hot carcass weights and carcass grades and amounts of feed consumed per lamb. A financial statement

is included to show prevailing costs of feed, lambs, sale prices and return from feeding.

Table 5. Average rations consumed and gains in pounds by periods of four lamb fattening trials, 1947-49

	1-28 days	28-56 days	56-93 days	Average
Ration 1. Ground sorghum grain, 41% protein cottonseed cake and alfalfa hay				
Grain.....	.50	1.01	1.43	1.02
Cottonseed cake.....	.08	.16	.22	.16
Alfalfa hay.....	2.30	2.06	1.63	1.96
Daily gain.....	.29	.37	.42	.37
Ration 2. Unground sorghum grain, 41% protein cottonseed cake and alfalfa hay				
Grain.....	.50	1.01	1.45	1.03
Cottonseed cake.....	.08	.16	.22	.16
Alfalfa hay.....	2.31	2.07	1.63	1.97
Daily gain.....	.30	.33	.38	.34
Ration 3. 41% protein cottonseed cake and alfalfa hay				
Cottonseed cake.....	.58	1.18	1.59	1.16
Alfalfa hay.....	2.36	2.06	1.67	2.00
Daily gain.....	.32	.36	.36	.35
Ration 4. Ground sorghum grain, 28% protein whole pressed cottonseed cake and alfalfa hay				
Grain.....	.51	1.01	1.36	1.00
Cottonseed cake.....	.11	.22	.28	.21
Alfalfa hay.....	2.38	2.06	1.69	2.01
Daily gain.....	.33	.33	.41	.36
Ration 5. Unground sorghum grain, 28% protein whole pressed cottonseed cake and alfalfa hay				
Grain.....	.50	1.01	1.40	1.01
Cottonseed cake.....	.11	.22	.29	.21
Alfalfa hay.....	2.28	2.03	1.62	1.94
Daily gain.....	.31	.30	.40	.34
Ration 6. 28% protein whole pressed cottonseed cake and alfalfa hay				
Cottonseed cake.....	.61	1.24	1.71	1.24
Alfalfa hay.....	2.32	2.11	1.68	2.00
Daily gain.....	.34	.34	.38	.36

Table 6. Summary of four lamb fattening trials, 1947-49

Group number	1	2	3	4	5	6
Number of lambs	147	147	146	143	147	146
Feeds: alfalfa hay plus	41% protein cottonseed cake			28% protein whole pressed cottonseed cake		
	Ground sorghum grain	Unground sorghum grain	No sorghum grain	Ground sorghum grain	Unground sorghum grain	No sorghum grain
Averages in pounds per lamb unless otherwise stated						
Initial weight ¹	72.2	71.9	72.3	72.4	72.3	73.1
Final weight	106.4	103.7	104.6	106.0	104.0	106.3
Daily gain, basis feedlot weight	0.368	0.342	0.347	0.361	0.341	0.357
Carcass weight (warm)	50.4	48.8	49.7	49.6	48.7	49.3
Yield, percent (basis feedlot and warm carcass)	47.4	47.1	47.5	46.8	46.8	46.4
Carcass grades, percent:						
Choice	59.9	54.4	52.7	61.5	48.3	49.3
Good	32.0	32.0	36.3	26.6	38.8	40.4
Medium	8.1	13.6	11.0	11.9	12.9	10.3
Total feed (consumed): ²						
Sorghum grain	95.2	95.9	0	92.9	94.1	0
Cottonseed cake	14.9	14.9	108.1	19.6	20.0	115.1
Alfalfa hay	182.4	183.0	185.6	186.8	180.6	186.2
Initial cost into feedlot at \$21.77 per cwt.	\$15.72	\$15.65	\$15.74	\$15.76	\$15.74	\$15.91
Feed cost (consumed)	6.64	6.49	7.01	6.71	6.49	6.67
Marketing cost at \$0.67 per cwt.	0.71	0.69	0.70	0.71	0.70	0.71
Total cost	23.07	22.83	23.45	23.18	22.93	23.29
Received at \$22.48 per cwt.	23.92	23.31	23.51	23.83	23.38	23.90
Net return	.85	.48	.06	.65	.45	.61

¹Weights less wool clip for lambs fed during spring months.

²Feed prices per ton: ground sorghum grain, \$74.00; unground sorghum grain, \$70.00; 41% protein cottonseed cake, \$82.50; 28% protein whole pressed cottonseed cake, \$71.50; and alfalfa hay \$27.50.

SUMMARY

A total of 876 lambs were fed in 48 different lots over the 2-year period, 1947-48 and 1948-49. Information was obtained on (1) the value of grinding combine sorghum grain, and on (2) the utility of 41 percent protein cottonseed cake and 28 percent protein whole pressed cottonseed cake as supplements and as the only concentrate in lamb fattening rations.

Grinding sorghum grain increased feedlot gain 2.2 pounds per lamb during four feeding periods averaging 93 days. This difference in gain was great enough to be statistically significant. Grinding grain reduced the amount of feed required to produce 100 pounds of gain. The lambs fed ground grain carried more finish and had a higher slaughter grade than those fed unground grain.

A comparison was made of the two protein feeds as supplements for sorghum grain and alfalfa hay. Lambs fed 41 percent cottonseed cake made more feedlot gain, their carcasses were heavier and graded higher than those fed the 28 percent protein cake.

Cottonseed cake was compared with sorghum grain supplemented with cottonseed cake as a concentrate for lamb fattening. Lambs in both lots made practically the same rate of gain and utilized feed with equal efficiency. Carcasses from the lambs fed grain and a supplement graded higher than those receiving cake as the only concentrate.

The 41 percent protein cottonseed cake and 28 percent protein whole pressed cottonseed cake were compared as concentrates in a ration with alfalfa hay for fattening lambs. An average of 1.06 pounds of 28 percent protein cake was fed for each 1.0 pound of 41 percent protein cake. Differences in rate of gain, feed required to produce 100 pounds of gain and carcass grades were not significant.

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