

COMPARISONS OF COTTONSEED MEAL AND MIXTURES CONTAINING

UREA AS NITROGENOUS (PROTEIN) SUPPLEMENTS

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Tests with urea in beef cattle rations have been conducted at the Kansas Agricultural Experiment Station since 1940. In the first test, urea was compared with cottonseed meal as a source of nitrogen for fattening calves. The calves were fed individually for 168 days. Basal feeds fed to each group included ground shelled corn, Atlas sorgo silage, cane molasses and a mineral supplement. Both groups received the same quantities of these feeds. In addition, one group received cottonseed meal as a source of nitrogen. A second group received urea and enough other materials to provide the same quantities of nitrogen, energy and minerals furnished by the cottonseed meal fed to the first group.

During the 168 days that this feeding program was followed there was no difference in the average daily gains and the ration containing urea appeared to be just as palatable as the one containing cottonseed meal.

While being fed individually, part of the steers were used in technical studies to determine digestion coefficients and nitrogen balances. The results obtained during this phase of the investigation indicated that the percentage retention of urea nitrogen was fully equal to the retention of cottonseed meal nitrogen. Furthermore, the nutrients in the rations containing urea were digested as well as the nutrients in the rations which included cottonseed meal as a source of supplemental nitrogen.

For a 136-day period following the digestion trial and balance study, the steers were continued on the test rations, but were fed in two groups. The ground shelled corn was self-fed instead of being hand-fed twice daily. During this period the steers fed cottonseed meal as a source of supplemental nitrogen had somewhat better appetites, made larger gains and required less feed per 100 pounds of gain than did those fed urea as a source of supplemental nitrogen. It would seem, therefore, that when maximum gains are the objective, complete substitution of urea for cottonseed meal should not be made.

Subsequent feeding trials have dealt with the use of urea in wintering rations for stock cattle. Digestion coefficients obtained for wintering rations containing urea were comparable to those for wintering rations supplemented with cottonseed meal. Silage alone and silage plus prairie hay were the roughages used in these studies.

Results of group feeding trials completed during the past two years indicate that stock calves derive considerable benefit from the nitrogen in urea. In no instance, however, where urea was substituted entirely for cottonseed meal as a source of nitrogen were the gains as large as where cottonseed meal was fed. It should be noted in this connection that enough grain and mineral supplement were added to urea to provide the same quantities of energy and minerals furnished by the cottonseed meal fed to the test group.

The use of urea in wintering rations had no influence upon subsequent pasture gains of yearling and two-year-old steers. Pasture gains tended to be inversely proportional to the gains made during the winter irrespective of the kind or quantity of wintering ration used.

The results of the tests conducted to date at the Kansas Agricultural Experiment Station indicate that urea may be used advantageously in beef cattle rations for both fattening and wintering. However, supplementary mixtures in which urea furnished most of the nitrogen were not equal to cottonseed meal. It may be concluded, therefore, that urea should not be depended upon to supply the greater part of the nitrogen in a supplementary mixture used to replace cottonseed meal in a beef cattle ration.

Further tests will have to be made to determine the proportions of grain, urea and protein concentrate that will equal cottonseed meal.

Preliminary reports from the Oklahoma Station indicate favorable results from feeding pellets containing 25 per cent and 50 per cent urea mixed with a vegetable protein, such as cottonseed meal.

TABLE I - GRAIN COMPARISONS FOR FATTENING LAMBS

R. F. Cox and L. M. Sloan

Kansas Agricultural Experiment Station

1-Lot number	1	2	3	4	5	6	7	8	9
	Corn	Wheat	Milo	Kafir	Atlas	Wheatland Milo	Westland Milo	Sumac *	Leoti X Atlas
2-Ration fed	Protein supple- ment	Protein supple- ment	Protein supple- ment	Protein supple- ment	Protein supple- ment	Protein supple- ment	Protein supple- ment	Protein supple- ment	Protein supple- ment
	Roughage	Roughage	Roughage	Roughage	Roughage	Roughage	Roughage	Roughage	Roughage
3-Averages for number of tests	13	5	58	2 *	15	3	23	3 *	4
4-No. lambs per lot	32	41	46	44	27	40	49	41	50
5-No. days on feed	108	116	109	103	87	107	115	105	145
6-Initial wt. per lamb	63.62	63.56	60.33	61.01	67.60	56.17	67.13	60.29	65.75
7-Final wt. per lamb	98.31	96.80	95.14	94.69	91.27	89.85	99.74	92.00	103.55
8-Total gain per lamb	34.69	33.24	34.81	33.68	23.67	33.68	32.61	31.71	37.80
9-Daily gain per lamb	.32	.29	.32	* .32	.27	.31	.28	* .30	.27
10-Feed per lamb daily									
Grain	1.03	1.14	1.03	1.01	1.08	.89	1.17	1.01	1.09
Supplement	.23	.20	.23	.25	.24	.25	.23	.25	.24
Roughage	1.57	1.93	2.31	2.01	1.94	2.41	1.80	2.17	2.00
11-Feed per cwt. gain								*	
Grain	321.88	393.10	321.88	*315.63	400.00	287.10	417.86	336.67	403.70
Supplement	71.88	68.97	71.88	78.13	88.89	80.65	82.14	83.33	88.89
Roughage	490.63	665.52	721.88	628.13	718.52	777.42	642.86	723.33	740.74

* The gains in these two lots were higher and the feed required 100 pounds of gain lower, in relation to the other lots than could normally be expected, since widely different responses were obtained in a smaller number of tests.

TABLE II - ROUGHAGE COMPARISONS FOR FATTENING LAMBS

R. F. Cox and L. M. Sloan

Kansas Agricultural Experiment Station

1-Lot number	1	2	3	4	5	6	7	8
2-Ration fed	Sorghum grain Protein Supp. Alfalfa (1)	Sorghum grain Protein Supp. Alfalfa (1) Sorghum Rg. (2)	Sorghum grain Protein Supp. Atlas Rg. (1) Gr. Lime-stone	Sorghum grain Protein Supp. Sumac Rg. (1) Gr. Lime-stone	Sorghum grain Protein Supp. Milo Rg. (1) Gr. Lime-stone	Sorghum grain Protein Supp. Leoti X Atlas Rg. (1) Gr. Lime-stone	Sorghum grain Protein Supp. Alfalfa straw (1)	Sorghum grain Protein Supp. Brown Alfalfa (1)
3-Averages for number of tests	8	5	2	15	9	11	3	2
4-No. lambs per lot	48	45	50	44	45	49	48	50
5-No. days on feed	116	102	120	112	115	129	115	165
6-Initial wt. per lamb	60.88	57.04	60.44	62.55	61.49	68.46	57.87	61.43
7-Final wt. per lamb	102.39	94.69	91.78	97.09	92.23	102.44	96.24	111.34
8-Total gain per lamb	41.51	37.65	31.34	34.54	31.74	33.98	38.37	49.91
9-Daily gain per lamb	.36	.37	.26	.31	.28	.26	.33	.30
10-Feed per lamb daily								
Grain	1.03	.91	.93	.94	.99	1.13	1.00	1.10
Supplement	.23	.20	.20	.23	.23	.26	.24	.25
Roughage (1)	1.85	.79	2.23	2.07	2.10	1.98	1.87	2.01
Roughage (2)	---	1.06	---	---	---	---	---	---
Gr. Limestone	---	---	(Oz) .25	(Oz) .25	(Oz) .25	(Oz) .25	---	---
11-Feed per cwt. gain								
Grain	286.11	254.05	357.69	303.23	353.57	434.62	303.03	366.67
Supplement	63.89	54.05	76.92	74.19	82.14	100.00	72.73	83.33
Roughage (1)	513.89	213.51	857.69	667.74	750.00	761.54	566.67	670.00
Roughage (2)	----	286.49	----	----	----	----	----	----

TABLE III - PROPORTION OF CONCENTRATES TO ROUGHAGE IN LAMB FATTENING RATIONS

Rufus F. Cox

Kansas Agricultural Experiment Station

1-Lot number	Average of 7 tests			Average of 2 tests			Average of 4 tests		
	1	2	3	1	2	3	1	2	3
2-Ration fed	Corn Protein Supp. Alfalfa (1) Silage (2)	Corn Protein Supp. Alfalfa (1) Silage (2)	Corn Protein Supp. Alfalfa (1) Silage (2)	Corn Alfalfa (1) (Ground and self-fed)	Corn Alfalfa (1) (Ground and self-fed)	Corn Alfalfa (1) (Ground and self-fed)	Sorghum grain Cotton- seed Ck. Sorghum Rg. (1) Gr. Lime- stone	Sorghum grain Cotton- seed Ck. Sorghum Rg. (1) Gr. Lime- stone	Sorghum grain Cotton- seed Ck. Sorghum Rg. (1) Gr. Lime- stone
3-Proportion: Concentrates to	35% to 65%	45% to 55%	55% to 45%	35% to 65%	45% to 55%	55% to 45%	35% to 65%	45% to 55%	55% to 45%
4-No lambs per lot	28	28	27	19	19	19	60	60	59
5-No. days on feed	129	129	129	94	94	94	100	100	100
6-Initial wt. per lamb	63.67	63.77	63.56	66.39	66.45	66.60	63.28	63.35	63.47
7-Final wt. per lamb	99.42	105.02	101.82	89.68	93.20	91.21	90.26	93.65	94.58
8-Total gain per lamb	35.75	41.25	38.26	23.29	26.75	24.61	26.98	30.30	31.10
9-Daily gain per lamb	.28	.32	.30	.25	.28	.26	.27	.30	.31
10-Feed per lamb daily:									
Grain	.72	.97	1.21	1.01	1.24	1.43	.91	1.20	1.40
Supplement	.25	.25	.25	---	---	---	.20	.20	.20
Roughage (1)	.99	.87	.65	1.84	1.59	1.32	2.17	1.83	1.52
Roughage (2)	2.22	1.92	1.54	---	---	---	---	---	---
11-Feed per cwt. gain:									
Grain	257.14	303.13	403.33	404.00	442.86	550.00	337.04	400.00	451.61
Supplement	89.29	78.13	83.33	---	---	---	74.07	66.67	64.52
Roughage (1)	353.57	271.88	216.67	736.00	567.86	507.69	803.70	610.00	490.32
Roughage (2)	792.86	600.00	512.33	---	---	---	---	---	---
12-Feed cost per cwt. GAIN	\$8.86	\$8.03	\$8.74	\$6.56	\$6.16	\$6.87	\$6.20	\$5.95	\$6.13

* The proportion of concentrates to roughage was 50:50 in lot 3 one year, instead of 55:45.