1972

Corn Silage Diets for Finishing Cattle When Supplemented With Soybean Meal or Urea and DES Fed at 10 mg., 20 mg. Daily or Implanted

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A.S. Series 72-23

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Corn silage properly supplemented with protein, minerals and vitamin A forms a simple and efficient diet for growing and finishing cattle. Rate of gain will be less than for high-concentrate diets, especially during late stages of finishing. However, gain per acre of corn will be greater when fed as silage than as grain.

In a previous experiment, cattle fed a urea-corn mixture as the major supplemental protein to a ground ear corn finishing diet gained at about the same rate as those fed a soybean meal supplement or one composed of urea, corn and dehydrated alfalfa meal. There was some evidence that urea compared more favorably with soybean meal when the cattle received diethylstilbestrol (DES). The response to DES was about the same when fed at 10 or 20 mg. daily. It was considered desirable to make further comparisons between soybean meal and urea, with and without DES, when diets contained higher and lower amounts of energy than furnished by ear corn.

In the experiment reported here, corn silage was used as the major ingredient in the diet from an initial weight of about 600 lb. to market as finished cattle. The diets were supplemented with either urea or soybean meal and each was fed with and without DES at two levels in the feed or as an implant.

Procedures

One hundred twenty Hereford steers were used in the experiment. They were fed a diet composed of 4 lb. ground sorghum grain, 1 lb. of a corn-based supplement with various levels of bacitracin and chopped alfalfa hay to appetite for a period of 3 months prior to the experiment. DES was not administered during this time.

Allotment to the experimental treatments was at random into 8 pens of 15 each by weight groups after stratifying according to weight. Four pens were fed a urea-corn supplement and the other four pens received a soybean meal supplement. DES treatments within each supplement group were control, 10 mg. daily, 20 mg. daily and 36 mg. implant. The implanted group was reimplanted with the same level of DES after about 4 months.

Rations consisted of corn silage full-fed along with 3 lb. daily of a 40% protein supplement. The soybean meal supplement contained the following ingredients (%): soybean meal, 89.5; limestone, 3.0; dicalcium phosphate, 3.0 and trace mineral salt, 4.5. Composition of the urea supplement was as follows (%): urea (45% N), 11.4; ground corn grain, 75.8; limestone, 3.0; dicalcium phosphate,

Prepared for the Sixteenth Annual Cattle Feeders Day, October 27, 1972.

3.0; trace mineral salt, 4.5 and sodium sulfate, 2.3. Vitamin A was added to each supplement to provide 6,000 I.U. per pound of supplement. A DES premix was added to each supplement to provide 10 or 20 mg. daily and replaced an equal weight of soybean meal or corn grain.

The cattle were fed twice daily in outside, unpaved pens without access to shade or shelter. The experiment was terminated after 245 days and carcass data obtained following slaughter.

Results

The value of urea in comparison to soybean meal appeared to be about the same with each DES treatment at various intervals throughout the experiment. Results are, therefore, presented by protein supplement treatments and DES treatments in the tables.

Urea vs. Soybean Meal

Rate of gain was about the same for the 245-day experiment for steers fed urea as the major supplemental protein to corn silage as for those fed soybean meal (table 1). Feed consumption was also about the same between the two supplemental groups resulting in similar feed efficiency.

There was a slightly lower dressing percent (1.1% units) for the cattle fed urea. The few pounds advantage they had in final live weight was offset by this lower dressing percent resulting in a slightly lower carcass weight. Other differences shown in carcass characteristics are small and probably of no practical importance.

Comparisons between urea and soybean meal at the various weigh periods during the experiment are shown in table 2. Weight gain for the first month was lower than for other periods except the last one. There was no evidence of a required period of adaptation to urea during the first month. However, average gain for soybean meal exceeded that for urea by 10 lb. during the second month of the experiment. Thereafter, differences in weight gain by monthly periods varied only slightly between the supplement groups, resulting in similar total gains.

This lack of a period of adaptation to urea differs from several previous experiments. These cattle had been on a limited grain diet for a period of about 3 months. The dietary protein for each group came from the limited feed of grain with alfalfa hay. The change in source of protein for each group may have had an effect on results obtained here. The previous period in the feedlot, resulting in older and heavier cattle already adapted to feedlot conditions, also may have been of some importance in the results obtained. A higher level of supplemental protein was also fed than used in most of the previous experiments.

DES Treatments

Results for the various DES treatments are shown in table 3. Improvement in rate of gain over no DES control amounted to 7, 13 and 10% for 10 mg., 20 mg. and the implant treatments averaged over soybean meal and urea supplements.

Feed consumption was also increased by use of DES. However, there was a decrease in feed required per unit of gain amounting to 3.2, 7.7 and 3.6%, respectively, for the 10 mg., 20 mg. and implant DES treatments. These advantages for DES are less than those frequently reported, especially for the 10 mg. level.

The response to DES varied some between the urea and soybean meal supplements. There was no clear evidence of a supplement effect. However, the highest rate of gain (2.17 lb. daily) and the greatest improvement from DES (17%) were obtained with the urea supplement and 20 mg. of DES.

DES fed at 10 or 20 mg. daily did not appear to have any important effects on carcass characteristics in comparison to the control group except possibly less fat in relation to lean as evidenced by the values for marbling, percent of kidney fat and loin eye area. These differences in comparison to control were more pronounced for the implanted cattle. They graded nearly one-third of a grade lower in the carcass.

After the first month on trial, the response to the various DES treatments was relatively uniform during the course of the experiment (table 4). Most of the advantage in favor of the 20 mg. level of DES came the last month.

Summary

Steers fed a finishing diet of corn silage and protein supplement from about 600 lb. to market gained at similar rates and with similar feed efficiency when fed a soybean meal supplement or a urea-corn supplement of about the same protein content. There appeared to be no important differences in the two supplements as to effects on carcass characteristics.

There were only small differences between the two supplements during the course of the experiment, indicating no required period of adaptation to urea under conditions of this experiment. The cattle had been fed a diet of limited grain with a full feed of alfalfa hay for about 3 months and therefore were adapted to the feedlot conditions. Source of protein was changed for each group at the beginning of the experimental period, thus eliminating a possible bias if soybean meal had been the previous supplemental protein. Diets also probably furnished a surplus of protein.

Steers fed 10 mg., 20 mg. or implanted with DES gained 7, 13 and 10% more than control steers. Improvement in feed efficiency amounted to 3.2, 7.7 and 3.6%, respectively, for the three DES treatments. The advantages obtained for DES were less than those frequently reported, especially for the 10 mg. level. There was slightly less marbling in carcasses from implanted steers and they graded lower than steers fed 10 or 20 mg. of DES.

There was no clear evidence of a supplement effect on the response to DES under conditions of the experiment.

Table 1. Corn Silage Finishing Diets Supplemented With Soybean Meal or Urea
(April 9 to December 10, 1971 - 245 Days)

	SBOM	Urea
No. of steers	60	60
Init. wt., lb.	603	604
Final wt., lb.	1090	1099
Avg. daily gain, lb.	1.99	2.02
Avg. daily feed, lb.		
Corn silage	50.5	51.1
Supplement	3.0	3.0
Total	53.5	54.1
Feed/100 lb. gain, lb.		
Corn silage	2541	2536
Supplement	150	148
Total	2691	2684
Carcass wt., lb.	661	657
Dressing %	60.8	59.7
Conformation[a]	20.4	20.1
Marbling[b]	4.72	4.62
Carcass grade[a]	18.6	18.5
Maturity[c]	22.9	22.9
Color[d]	4.82	4.72
Firmness[e]	5.35	5.25
% kidney fat	3.05	2.93
Loin eye area, sq. in.	11.79	12.04
Fat depth, in.	0.56	0.51

[a] Average good = 17; Average choice = 20. Graded to one-third grade.
[b] Slight = 4; small = 5.
[c] A+ maturity = 22; A maturity = 23 (Higher number represents younger carcass).
[d] Cherry red = 4; light cherry red = 5.
[e] Moderately firm = 5; firm = 6.

Table 2. Periodic Weight Gains of Steers Fed Corn Silage Supplemented With Soybean Meal or Urea
(April 8 to December 9, 1971 - 245 Days)

	SBOM	Urea
No. of steers	60	60
Initial wt., lb.	640	639
Weight gain per head		
1 to 29 days, lb.	46	50
% of SBOM		109
29 to 85 days, lb.	136	126
% of SBOM to date		97
85 to 113 days, lb.	58	54
% of SBOM to date		96
113 to 141 days, lb.	60	62
% of SBOM to date		97
141 to 183 days, lb.	103	108
% of SBOM to date		99
183 to 215 days, lb.	87	87
% of SBOM to date		99
215 to 245 days, lb.	14	15
Total for 245 days, lb.	504	502
% of SBOM to date		100

Table 3. Response by Steers to DES When Fed Corn Silage Finishing Diets (April 9 to December 10, 1971 - 245 Days)

	Control	10 mg. DES	20 mg. DES	DES Implant
No. of steers	30	30	30	30
Init. wt., lb.	602	603	604	604
Final wt., lb.	1058	1092	1120	1107
Avg. daily gain, lb.	1.86	1.99	2.10	2.05
Avg. daily feed, lb.				
Corn silage	48.9	50.9	51.1	52.2
Supplement	3.0	3.0	3.0	3.0
Total	51.9	53.9	54.1	55.2
Feed/100 lb. gain, lb.				
Corn silage	2628	2551	2431	2544
Supplement	160	149	142	145
Total	2788	2700	2573	2689
Dressing %	60.2	59.9	60.3	61.0
Conformation[a]	20.2	20.2	20.2	20.4
Marbling[b]	5.00	4.95	4.65	4.10
Carcass grade[a]	18.9	18.6	18.5	18.1
Maturity[c]	23.0	22.9	22.9	22.8
Color[d]	5.15	4.80	4.75	4.40
Firmness[e]	5.25	5.30	5.20	5.45
% kidney fat	3.18	3.00	2.94	2.83
Loin eye area, sq. in.	11.69	11.65	12.01	12.30
Fat depth, in.	0.54	0.52	0.54	0.53

[a] Average good = 17; Average choice = 20. Graded to one-third grade.
[b] Slight = 4; small = 5.
[c] A+ maturity = 22; A maturity = 23 (Higher number represents younger carcass).
[d] Cherry red = 4; light cherry red = 5.
[e] Moderately firm = 5; firm = 6.

Table 4. Periodic Weight Gains of Steers Fed Corn Silage Finishing Diets With Various DES Treatments (April 8 to December 9, 1971 - 245 Days)

	Control	10 mg. DES	20 mg. DES	DES Implant
Number of steers	30	30	30	30
Initial wt., lb.	638	640	640	640
Weight gain per head				
1 to 29 days, lb.	50	41	50	52
% of control		82	100	104
29 to 85 days, lb.	114	138	137	134
% of control to date		109	114	113
85 to 113 days, lb.	52	54	58	59
% of control to date		108	113	113
113 to 141 days, lb.	61	65	58	60
% of control to date		108	109	110
141 to 183 days, lb.	96	105	110	110
% of control to date		108	111	111
183 to 215 days, lb.	81	89	88	91
% of control to date		108	110	111
215 to 245 days, lb.	3	7	34	12
Total for 245 days, lb.	457	499	535	518
% of control to date		109	117	113