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Levels of Diethylstilbestrol and Types of Protein Supplements  
in Ground Ear Corn Diets for Finishing Cattle

L. B. Embry

Results of numerous experiments have shown that diethylstilbestrol at 10 mg. daily in the feed or implanted at 30 to 36 mg. improves weight gains and feed efficiency of feedlot cattle. More recently it has been reported that feeding more than 10 mg. daily to heavier cattle results in further stimulation of weight gains and feed efficiency. Feeding of 20 mg. per head daily of diethylstilbestrol is now cleared for feedlot cattle above 750 lb.

The response to diethylstilbestrol appears to be obtained with most types of rations, although the degree may depend on the nutritional adequacy and energy content. There is some evidence that the value of urea in comparison to preformed protein such as soybean meal for growing and finishing cattle is more favorable in the presence of diethylstilbestrol.\*

Ground ear corn properly supplemented in protein, minerals and vitamin A forms a rather simple and efficient diet for finishing cattle. Corn grain is lower in protein than most other feed grains, and the cob is lower in protein than most commonly used roughages. Both the cob and grain are low in quality of protein as measured by amino acid requirements of nonruminants. It would therefore appear that the value of urea in comparison to soybean meal and the benefits of other supplements could be more readily determined with ground ear corn than with other commonly fed diets for cattle.

This experiment was designed to compare soybean meal, urea and a urea-dehydrated alfalfa mixture as protein supplements to ground ear corn. Diethylstilbestrol was fed at 0, 10 and 20 mg. per head daily with each of the protein supplements.

Procedures

One hundred eight steers were purchased for the experiment. After about 1 month following arrival, they were allotted into 18 pens of 6 head each on basis of weight. Experimental treatments consisted of soybean meal, urea or urea-dehydrated alfalfa meal as protein supplements to a diet of ground ear corn. Each protein supplement was fed with 0, 10 or 20 mg. of diethylstilbestrol per head daily making up nine experimental treatments. Each of the treatments was replicated two times.

The cattle were full-fed ground ear corn once daily in outside paved pens. The protein supplements were formulated to contain 38% protein and were fed at 2 lb. per head daily. Ingredient composition of the protein supplement is shown in table 1.

The experiment was terminated after 170 days for one replication and 177 days for the other. Carcass data were obtained and individual carcasses were weighed following about 48 hours in the cooler.

## Results

Results for each level of diethylstilbestrol with each of the protein supplements are shown in table 2. Results for diethylstilbestrol with all protein supplements are shown in table 3 and for protein supplements at all diethylstilbestrol treatments in table 4.

### Levels of Diethylstilbestrol

The data in table 2 indicate that rate of gain when steers were fed either 10 or 20 mg. of diethylstilbestrol was not affected to any appreciable extent by the type of protein supplement fed with ground ear corn. Initial weight was not likely a factor in the response between the two levels of diethylstilbestrol, since the initial weight shown is a shrunk weight and the average weight of the cattle at the first 4-week weigh period was 786 pounds.

The average daily gain for all control steers was 2.33 lb. with 1,045 lb. feed per 100 lb. gain (table 3). Steers fed 10 mg. diethylstilbestrol gained 0.33 lb. more daily (14.2%). They consumed 1.18 lb. more ground ear corn daily than control steers and required 7.5% less feed per unit of gain. Rate of gain, feed intake and feed efficiency were about the same for the 10 and 20 mg. levels of diethylstilbestrol in this experiment. There was a good improvement from the 10 mg. level and feedlot performance was good for the ground ear corn diet for the weights of cattle and number of days involved.

Since the cattle were fed the same number of days, those fed diethylstilbestrol were heavier at slaughter and had heavier carcasses. Dressing percent was slightly higher for the 20 mg. level of diethylstilbestrol. Carcass shrink during the 48-hour chill was 9 or 10 lb. for all groups and the percent shrink varied only from 1.40 to 1.48%.

Carcasses from cattle fed diethylstilbestrol were rated slightly more firm, had less fat thickness and a larger loin eye. There were only very small differences between the 10 and 20 mg. levels of diethylstilbestrol in these characteristics. Other carcass characteristics listed in table 3 did not appear to be affected by the diethylstilbestrol treatments.

### Type of Protein Supplement

Results of the experiment as affected by type of protein supplement are shown in table 4. Average gain was about the same for each of the protein supplements. Feed consumption was less for the steers fed the urea-corn supplement and they had the lowest feed requirements. However, these differences were not large. It would appear for these results that a simple corn-urea mixture supplemented with mineral and vitamin A was essentially equal to soybean meal as a protein supplement with the ground ear corn diet. The urea-corn supplement was not improved by adding dehydrated alfalfa at 22.8% of the supplement fed at 2 lb. per head daily. Only in case of the group fed urea without diethylstilbestrol was the rate of gain not at least equal to the gain made by steers fed the soybean meal supplement or the supplement of urea and dehydrated alfalfa meal.

Data on carcass characteristics shown in table 4 do not show any appreciable differences as affected by type of protein supplements.

### Summary

The average improvements in rate of gain and feed efficiency from feeding 10 mg. diethylstilbestrol daily to steers fed a ground ear corn finishing diet were 14.2 and 7.5%, respectively. There appeared to be no advantage of increasing the level of diethylstilbestrol to 20 mg. daily and the relative positions of the 0, 10 and 20 mg. levels did not change appreciably during the course of the experiment. A benefit from the higher level has been reported by some researchers. Other research is planned where diets will be fed that are expected to result in higher rates of gain than obtained in this experiment.

Carcasses from steers fed diethylstilbestrol were rated slightly more firm, had less fat thickness and a larger loin eye, but there were essentially no differences between the 10 and 20 mg. levels. Other carcass characteristics measured did not appear to be affected by the diethylstilbestrol treatments. Carcasses were heavier from diethylstilbestrol-fed steers, reflecting the more rapid rates of gain.

Feedlot performance and carcass characteristics were about the same for steers fed soybean meal, urea-corn or urea-corn-dehydrated alfalfa meal supplements. Only when the simple corn-urea mixture supplemented with vitamin A and minerals was fed without diethylstilbestrol did feedlot performance fail to at least equal that obtained from the other supplements.

Table 1. Protein Supplement Composition

Daily level diethylstilbestrol, mg.	Soybean meal supplement			Corn-urea supplement			Corn-urea-dehydrated supplement		
	0	10	20	0	10	20	0	10	20
	%	%	%	%	%	%	%	%	%
Soybean meal (44%)	86.00	85.75	85.50	--	--	--	--	--	--
Ground corn grain (9%)	--	--	--	74.80	74.55	74.30	52.70	52.45	52.20
Urea (281%)	--	--	--	11.20	11.20	11.20	10.50	10.50	10.50
Dehydrated alfalfa meal (17%)	--	--	--	--	--	--	22.80	22.80	22.80
Ground limestone	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Dicalcium phosphate	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Trace mineral salt	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Diethylstilbestrol premix (5 mg. DES/lb. supplement)	--	0.25	0.50	--	0.25	0.50	--	0.25	0.50
Vitamin A premix (30,000 I.U./g.)	33 gm.	33 gm.	33 gm.	33 gm.	33 gm.	33 gm.	33 gm.	33 gm.	33 gm.

Table 2. Type of Protein Supplement with Various Levels of Diethylstilbestrol (DES)  
(May 26, 1970 to November 20, 1970 - 177 Days)

Type of supplement	Soybean meal			Urea-corn			Urea-corn-dehydrated alfalfa		
	0	10	20	0	10	20	0	10	20
Level of DES, mg./day	0	10	20	0	10	20	0	10	20
Number of animals	12	12	12	12	12	12	12	12	12
Init. shrunk wt., lb.	690	680	691	687	676	688	686	690	682
Final shrunk wt., lb.	1098	1138	1142	1074	1153	1152	1099	1137	1147
Avg. daily gain, lb.	2.35	2.64	2.59	2.28	2.76	2.68	2.38	2.57	2.67
Avg. daily feed, lb.									
Corn	23.00	24.18	23.89	21.30	23.14	23.51	23.04	23.57	23.98
Supplement	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99
Total	24.99	26.17	25.88	23.29	25.13	25.50	25.03	25.56	25.97
Feed/100 lb. gain, lb.									
Corn	979	919	921	934	840	877	966	916	897
Supplement	85	75	76	87	72	74	83	77	74
Total	1064	994	997	1021	912	951	1049	993	971
Hot carcass wt., lb.	657	673	686	625	686	690	651	672	688
Cold carcass wt., lb.	649	663	676	615	676	680	641	663	679
Dressing percent	59.8	59.0	60.0	58.1	59.4	59.3	59.2	59.2	60.0
Conformation <sup>a</sup>	20.4	20.4	20.3	19.8	20.5	20.6	20.7	20.1	20.4
Marbling <sup>b</sup>	5.1	4.9	4.9	4.6	4.8	4.6	4.8	5.2	5.0
Carcass grade <sup>a</sup>	18.7	18.8	18.8	18.5	18.9	18.5	18.6	19.2	18.8
Color <sup>c</sup>	4.5	4.5	4.8	4.7	4.7	5.0	4.8	5.0	5.0
Firmness <sup>d</sup>	45.0	5.3	5.5	5.4	5.5	5.2	5.2	5.4	5.7
Kidney fat, %	3.1	2.9	2.9	3.1	2.5	2.9	3.2	2.9	3.1
Maturity <sup>e</sup>	23.0	22.9	22.7	22.9	22.8	23.0	23.0	23.0	22.7
Fat thickness, cm.	1.54	1.81	1.74	1.33	1.66	1.76	1.61	1.68	1.72
Loin eye area, sq. in.	10.89	10.78	12.01	11.36	11.66	11.48	11.12	11.61	11.82
Abscessed livers	1	2	0	5	1	2	0	1	2

<sup>a</sup> Good = 17; Choice = 20. Graded to one-third grade.

<sup>b</sup> Slight = 4; small = 5; modest = 6.

<sup>c</sup> Cherry red = 4; light cherry red = 5.

<sup>d</sup> Moderate firm = 5; firm = 6.

<sup>e</sup> A♠ maturity = 22; A maturity = 23 (Higher number represents younger carcass).

Table 3. Levels of Diethylstilbestral With Ground Ear Corn Diet  
(May 26, 1970–November 20, 1970 - 177 Days)

	Control	DES 10 mg./day	DES 20 mg./day
Number of animals	36	36	36
Init. shrunk wt., lb.	688	680	687
Final shrunk wt., lb.	1090	1143	1147
Avg. daily gain, lb.	2.33	2.66	2.65
Avg. daily feed, lb.			
Corn	22.45	23.63	23.76
Supplement	1.99	1.99	1.99
Total	24.44	25.62	25.75
Feed/100 lb. gain, lb.			
Corn	960	892	898
Supplement	85	75	75
Total	1045	967	973
Hot carcass wt., lb.	644	677	688
Cold carcass wt., lb.	635	667	678
Dressing percent	59.0	59.2	59.8
Conformation <sup>a</sup>	20.3	20.3	20.4
Marbling <sup>b</sup>	4.8	4.7	4.8
Carcass grade <sup>a</sup>	18.6	19.0	18.7
Color <sup>c</sup>	4.7	4.7	4.9
Firmness <sup>d</sup>	5.2	5.4	5.5
Kidney fat, %	3.1	2.8	3.0
Maturity <sup>e</sup>	23.0	22.9	22.8
Fat thickness, cm.	1.49	1.72	1.74
Loin eye area, sq. in.	11.12	11.35	11.77
Abscessed livers	6	4	4

<sup>a</sup> Good = 17; Choice = 20. Graded to one-third grade.

<sup>b</sup> Slight = 4; small = 5; modest = 6.

<sup>c</sup> Cherry red = 4; light cherry red = 5.

<sup>d</sup> Moderate firm = 5; firm = 6.

<sup>e</sup> A+ maturity = 22; A maturity = 23.

Table 4. Type of Protein Supplement With Ground Ear Corn Diets  
(May 26, 1970–November 20, 1970 - 177 Days)

	Soybean meal	Urea- corn	Urea-corn- dehydrated alfalfa
Number of animals	36	36	36
Init. shrunk wt., lb.	687	684	686
Final shrunk wt., lb.	1126	1126	1128
Avg. daily gain, lb.	2.53	2.57	2.54
Avg. daily feed, lb.			
Corn	23.69	22.65	23.53
Supplement	1.99	1.99	1.99
Total	25.68	24.64	25.52
Feed/100 lb. gain, lb.			
Corn	940	884	926
Supplement	79	78	78
Total	1019	962	1004
Hot carcass wt., lb.	672	667	670
Cold carcass wt., lb.	663	657	661
Dressing percent	59.6	58.9	59.5
Conformation <sup>a</sup>	20.4	20.3	20.4
Marbling <sup>b</sup>	5.0	4.7	5.0
Carcass grade <sup>a</sup>	18.9	18.6	18.9
Color <sup>c</sup>	4.6	4.8	4.9
Firmness <sup>d</sup>	5.3	5.4	5.4
Kidney fat, %	3.0	2.8	3.1
Maturity <sup>e</sup>	22.9	22.9	22.9
Fat thickness, cm.	1.70	1.58	1.67
Loin eye area, sq. in.	11.23	11.50	11.52
Abscessed livers	5	8	6

<sup>a</sup> Good = 17; Choice = 20. Graded to one-third grade.

<sup>b</sup> Slight = 4; small = 5; modest = 6.

<sup>c</sup> Cherry red = 4; light cherry red = 5.

<sup>d</sup> Moderate firm = 5; firm = 6.

<sup>e</sup> A+ maturity = 22; A maturity = 23.