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Effects of DES Withdrawal on Feedlot Performance of Cattle

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DES

(diethylstilbestrol)

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In Brief:

- The growth promoting effect of DES appears to be maintained with increasing weight and finish of feedlot cattle.
- Removal of DES from the diet results in a prompt reduction in weight gain.
- Reduction in weight gain when DES is removed from the diet appears to be of about the same magnitude as the improvement expected from the compound (10% to 12% or about 2 to 3 lb. per head per week at near market finish).
- Any holding of cattle beyond the required withdrawal period should be justified by offsetting favorable conditions for marketing the cattle.
- Changes should be avoided during DES withdrawal which might result in a reduction in feed intake or subject the cattle to added stress conditions such as might be encountered from mixing of strange cattle, movement to new location or major changes in diets.
- Remove previously fed feeds in the feed bunks at time DES withdrawal is started. Include checks in storage and feeding systems to insure proper feed is offered during the withdrawal period.

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Federal regulations stipulating an increase from 2 to 7 in the number of days during which cattle are not to be fed diethylstilbestrol (DES) prior to slaughter may require changes in procedures followed for marketing finished cattle.

This has raised several questions concerning withdrawal of DES from cattle diets:

What happens to feedlot performance when DES is removed from the diet?

What would be the effects on performance if the withdrawal period was extended much beyond the required 7 days?

What are the advantages of feeding a supplement without DES in comparison to no supplement during the withdrawal period?

To obtain information related to these questions, the effects of DES withdrawal were studied in connection with experiments terminated recently where the cattle had been fed DES for typical periods in the feedlot.

PROCEDURES

Experiment 1.

This experiment involved 12 pens with 8 steers each which were considered to be at a desirable weight and finish for slaughter at the time of DES withdrawal. Previous diets consisted of ground ear corn with various types of supplements. Six experimental treatments were replicated twice. Only small differences in feedlot performance were obtained between experimental treatments in the previous experiment. Therefore, no changes were made in pen allotment for the DES withdrawal phase.

The cattle were changed from the diets of ground ear corn and 2 lb. of protein supplement (38% protein) to diets of a full feed of whole corn grain, 3 lb. of alfalfa-brome haylage and 2 lb. of the protein supplements. One pen of cattle from each of the previous experimental groups continued to receive DES at 10 mg per head daily while the compound was removed from the diet of the other pen in the replication. The six supplements fed previously were continued with the only change being that of offering with or without DES.

The change from ear corn to corn grain was made over a period of 6 days. The cattle were weighed

after this 6-day period without shrink for the initial weight. Weighing was done at weekly intervals thereafter for a period of 3 weeks. Feed and water were not withheld prior to any weighing of the cattle. However, all weighings were made in the morning before offering the daily feed. Feeding was once daily in outside pens paved with concrete, but without shade or shelter.

Weights at the end of 3 weeks were used as the final weights for the experiment. Cattle fed DES during the experimental period were fed supplements without the additive following the 3-week experiment for a 48-hour withdrawal period prior to slaughter.

Experiment 2.

The cattle used in this experiment had been fed various levels of corn grain while on alfalfa-brome pasture or in drylot with free access to alfalfa-brome haylage. At the end of the pasture season, the pasture group was put in drylot with allotment according to level of grain feeding on pasture. There were four levels of grain feeding from each of the pasture and drylot groups replicated two times for the drylot finishing phase of the experiment resulting in a total of 16 pens. All pens of cattle were fed 3 lb. alfalfa-brome haylage or hay, 2 lb. protein supplement (32%) and whole corn grain according to appetite. There were eight steers per pen initially from the pasture group and six fom the drylot group.

The cattle from each previous level of grain feeding were marketed at about the same average final weight. Because of differences in initial weights at beginning of the drylot finishing phase, the cattle were marketed over a period from December 8 to February 8.

This experiment was planned to study the effects of DES withdrawal during the last month of the finishing period for the cattle. One pen in each replication of the pasture and drylot finishing experiment continued to receive DES during this last month of the experiment while the other pen of cattle was fed the same kind of protein supplement without DES. Replicated pens were reallotted to equalize weight for the first two pairs of pens at the beginning of DES withdrawal. Subsequent pairs of pens were designated DES or no DES treatments with no change in previous pen allotment.

Feeding and management were similar as for experiment 1, and the two experiments were conducted at the same location. The cattle were weighed at weekly intervals in the morning before feeding, but feed and water were not withheld prior to weighing. Following the weighing at 4 weeks on the experiment, the supplement with DES was discontinued for 7 days prior to marketing the cattle. However, this 5th week was not included as a part of the experiment since there was no proper control group with which to compare the effects of DES withdrawal during this last week.

Experiment 3.

The cattle in this experiment had received a diet of 3 lb. alfalfa-brome haylage or hay, 2 lb. of protein supplement (40%) and a full feed of rolled corn grain. DES was fed at 0, 5, 10 or 20 mg per head daily with and without 70 mg daily

of chlortetracycline. After 120 days, cattle fed the various levels of DES were changed to the control supplement without DES, but with or without the antibiotic according to the previous treatment. Feeding and management were similar as for the two previous experiments and at the same location.

The cattle were weighed before DES withdrawal was started and again after 7 days. Weighing procedures were as for the other experiments.

RESULTS AND DISCUSSION

Considerable variation in weight gain between 1-week periods was expected under the weighing conditions used. No control was exercised over feed and water intakes. It was not considered desirable to withhold feed and water in order to obtain more uniform weighing conditions with only 1-week intervals between weighings. Therefore, the cattle were weighed in the morning before feeding and in the same pen order each time.

In order to measure treatment effects on weight gain over a short period of time it was considered that a large number of animals would be needed and that they should be weighed at frequent intervals to determine amount of variation and trends in weight gains following DES withdrawal. Small differences in amount of fill could have pronounced effect on the amount of weight gain over a 1-week period. In view of this as well as effects of fluctuating climatic conditions during the experiments and the ability of compensatory gains by cattle, average gains over the periods involved following DES withdrawal probably represents more typical performance than that obtained at weekly periods. Therefore, average performance for periods involved is presented in the tables showing results of the experiments.

Experiment 1.

High rates of gain were obtained over the 3-week period of this experiment (table 1). There was considerable variation between weeks but steers fed DES gained at a faster rate in 5 of the 6 pairs of pens over the 3-week period. A factor having a likely influence on the weight gain was the change from ear corn to corn grain 6 days prior to the beginning of this experiment. This resulted in an increase in energy intake and an improvement in rate of gain over that obtained from ear corn.

Table 1. Effects of diethylstilbestrol withdrawal. (Experiment 1: Oct. 4 to Oct. 25, 1971—21 days)

	DES Fed	DES Withdrawn
Number of steers	48	47
Initial wt., lb.	1117	1120
Final wt., lb.	1195	1190
Weight gain, lb.		
Avg. per head	78	70
Avg. daily	3.71	3.33
Avg. daily feed, lb.	27.1	27.5
Feed/100 lb. gain, lb.	730	826
Carcass wt., lb.	739.0	730.1
Dressing percent*	62.7	62.4
Conformation†	21.6	21.5
Marbling‡	5.4	5.2
Carcass grade†	18.7	18.3

*Calculated from market weight.
†Good=17, Choice=20. Graded to one-third grade.
‡Slight=4, Small=5, Modest=6.

While rate of gain by weekly periods was not consistent for steers with and without DES, the average for the 3 weeks was 3.71 lb. daily for those fed DES and 3.33 lb. when DES was removed from the diet. The difference of 0.38 lb. daily amounts to 11.4% more gain for supplementation with DES. This percentage value represents a rather typical response to DES by steers fed finishing type diets.

It would appear that the weight gain response to DES is lost rather promptly upon removal of it from the diet. Studies on tissue residues of DES have shown the compound is rapidly eliminated from the tissues upon removal from the diet, and thus a rather immediate loss of its growth promoting effects should be expected. This experiment indicates the degree of reduction in weight gain is about equal to the response commonly obtained from this hormone-like compound.

DES in the feed, or implanted, has generally resulted in an increase in feed intake but with a reduction in amount of feed per pound of gain. Feed was weighed to the cattle in this experiment with the corn grain portion being full-fed. There were only small differences in feed intake between cattle with and without DES. Under these conditions, improvement in feed efficiency would be of about the same magnitude as the improvement in rate of gain.

Some carcass data were obtained upon slaughter of the cattle. It should be expected that measures shown would not be greatly influenced during the short time of this experiment. This statement is supported by the carcass data shown in table 1. However, the advantage in weight gain for the DES-fed cattle was also evident in the carcass weight.

Experiment 2.

Results of this experiment are shown in table 2. It differed from experiment 1 mainly in that DES withdrawal was started at lighter weights, the cattle were marketed at various times over a 2-month period, weather conditions were more severe and the experiment was 1 week longer. As in experiment 1, differences between cattle with and without DES varied considerably between weekly periods. Average gain per head over the 4 weeks amounted to 82 and 74 lbs., respectively, for cattle with and without DES. The advantage for DES was rather consistent, being obtained in six of the eight pairs of pens.

Average daily gain amounted to 2.93 lb. for cattle fed DES and 2.64 lb. when the compound was withdrawn from the diet. The difference of 0.29 lb. daily amounts to 11.0% more for the DES-fed cattle. Rate of gain was less than in experiment

Table 2. Effects of diethylstilbestrol withdrawal. (Experiment 2: Four-week withdrawal periods initiated at various times from Nov. 1 to Jan. 4, 1972)

	DES Fed	DES Withdrawn
Number of steers	56	54
Initial wt., lb.	1093	1092
Final wt., lb.	1175	1166
Weight gain, lb.		
Avg. per head	82	74
Avg. daily	2.93	2.64
Avg. daily feed, lb.	28.0	28.2
Feed/100 lb. gain, lb.	956	1068

1, but the percentage response from DES was about the same. Results agree with experiment 1 and show that the growth stimulating effect of DES appears to be lost rapidly upon removal of the compound from the diet. Again, the degree of reduction appeared to approximate the degree of stimulation expected from the additive.

Average daily feed intake varied only slightly between cattle with and without DES during the 4 weeks. Reduction in feed required per unit of gain in favor of DES-fed cattle was, therefore, of about the same magnitude as the improvement in rate of gain.

Carcass data are not shown for these cattle because of the delay between termination of the experiment and marketing of the cattle.

Experiment 3.

The number of steers from each treatment group in the experiment including various levels of DES was not considered adequate to conduct a withdrawal experiment in the same manner as for experiments 1 and 2. It was also desired to have the 7-day period without the various levels of DES to be included as a part of the experiment testing these levels. Therefore, DES was removed from all diets 7 days before marketing the cattle. The cattle were weighed before and after the DES withdrawal period. The control group without DES provided an opportunity to compare the periodic response to DES during the experiment and what happened to the response in relation to the control group when DES was removed.

Results of the experiment with various levels of DES will be presented at a later date in another publication. Periodic performance in comparison to the no DES control and effects of withdrawal are presented here only for the steers fed the 10 mg daily level. These two groups show typical performance obtained with DES during the course of the experiment and during the 7-day withdrawal period. Results have been combined here for the steers with and without 70 mg daily of chlortetracycline (table 3).

It is evident from weight gain data in table 3 that the response to DES was relatively uniform over the 120 days it was administered. Average daily gains on basis of initial and final filled weigths were 3.34 and 3.11 lb. for the steers fed DES and for controls. The difference of 0.23 lb. daily amounted to 7.4% more gain for steers fed DES. This per-

Table 3. Periodic weight gains of steers with and without diethylstilbestrol and during a 7-day withdrawal period. (Experiment 3: Oct. 21 to Feb. 25, 1972—127 days)

	Control No DES	DES 10 mg daily
Number of steers	32	32
Initial wt., lb.	759	759
Weight gain per head		
1 to 29 days, lb.	105	114
% of control		108
29 to 57 days, lb.	120	130
% of control to date		108
57 to 85 days, lb.	83	83
% of control to date		106
85 to 120 days, lb.	65	74
Total for 120 days	373	401
% of control to date		107
Withdrawal period		
120 to 127 days lb.	35	30
Total for 127 days, lb.	408	431
% of control to date		106

centage value is some lower than the average response generally expected from DES for finishing cattle. However, the control steers made exceptionally good rates of gain.

When DES was removed from the diet for the 7-day period, steers previously fed the additive gained at a lower rate than the no DES controls. This was the only period of the experiment when the DES-fed steers had the lowest rate of gain.

It would appear from results of this third experiment that the growth stimulating effect of DES does not decrease with increasing weight and finish. The prompt apparent reduction in rate of gain upon withdrawal is in agreement with results of experiments 1 and 2. It might appear that DES withdrawal results in at least a temporary reduction in gains in comparison to steers not previously fed DES. However, considerable variation was encountered in weight gains by 1-week periods in experiments 1 and 2 when the cattle were weighed over periods of 3 or 4 weeks.

SUMMARY AND COMMENTS

Steers from two experiments where they had been fed DES at 10 mg per head daily during typical drylot finishing periods were used to study the effects of DES withdrawal over periods of 3 or 4 weeks. Pens of steers were paired according to previous treatment with one being continued on DES and the other managed and fed in the same manner except DES was removed from the diet. Six pairs of pens made up one of the DES withdrawal experiments and eight pairs of pens made up the second experiment.

Considerable variation in weight gains was encountered between weeks when the cattle were weighed at 1-week intervals without a period of withholding feed and water. However, weight gains for cattle fed DES exceeded weight gains of those where the compound was withdrawn by 0.38 lb. (11.4%) daily in the first experiment of 3 weeks. In the second experiment of 4 weeks, weight gains favored DES-fed cattle by 0.29 lb. (11.0%) daily. This reduction in rate of gain was rather consistent within pairs of pens in each experiment.

Feed consumption was about the same between steers with and without DES during these two short experiments. Feed was weighed to the cattle daily in amounts to be available at all times. Since feed consumption is increased with DES, this stimulating effect would normally be expected to be lost upon removal of the compound from the diet.

In the third experiment, steers fed 10 mg DES daily gained 7.4% faster than control steers fed no DES over a 120-day experiment. Periodic weights on the cattle showed the response to DES was rather uniform with no evidence of any reduction in the growth promoting effects of the compound with increasing weight and finish of the cattle. When DES was withdrawn from the supplemented group for a period of 7 days prior to slaughter, weight gain was reduced to less than that made by the control group.

Results of these experiments show that the growth response from DES appears rather uniform during the course of an experiment with no evidence of a reduction with increasing weight and finish up to a typical slaughter weight and finish. Removal of DES from the diet results in a prompt reduction in weight gain. The degree of reduction appears to be about equal that of the overall growth stimulation reported to be obtained from DES. This would be in agreement with studies which show that DES is eliminated from tissue within 48 hours upon removal from the diet.

Periods of DES withdrawal in excess of the required 7 days should be expected to reduce rate and increase cost of gain. From these experiments, it would appear that average values of 10% to 12% improvement in gain and feed efficiency from DES should be the expected reductions upon withdrawal of the compound. At typical feedlot gains in late stages of finishing, the reduction in gain is probably in the order of 2 to 3 lb. per week. Any holding of cattle beyond the required withdrawal period should be justified by offsetting favorable conditions for marketing the cattle.

These experiments did not include studies on effects of removing supplements along with DES withdrawal. It would appear that the effects of removing the supplement containing DES as a method of withdrawal would depend upon the adequacy of the diets, total time of withdrawal and likely effects on feed intake. Any effects from a shortage of protein, vitamin A or essential minerals are not likely to be evident within a 1- or 2-week withdrawal period when cattle are fed high-grain finishing type diets and when previous levels of the nutrients have been adequate. However, lower weight gains should be expected when the protein supplement is eliminated from the diet unless intake of other concentrates is increased by an amount to equal the energy value that was furnished by the protein supplement.

An important consideration during the final few days in the feedlot is feed intake. Changes should be avoided which might result in a reduction in feed intake or subject the cattle to added stress conditions such as might be encountered from mixing of strange cattle, movement to new locations or major changes in the diet. Problems in this regard become greater when following a marketing system of topping out cattle from a pen over a period of several weeks. A lengthy DES withdrawal period for all cattle in the pen would not appear advisable. The alternative is to remove those designated for market to a separate pen for the required withdrawal period. Such changes could bring about temporary reductions in feed intake and weight gains. The additional facilities and the labor requirements add to the cost and convenience of the feeding operation, especially for feeders of small numbers of cattle. For these feeders, implanting might be the most logical method for administering DES when following a practice of topping out cattle from a pen over a period of several weeks. Approved procedures should be followed as to

level of implants, frequency of implanting and time of implanting in relation to marketing.

Upon starting the oral DES withdrawal period, either by changing to a supplement without DES or by eliminating the supplement, all feed in the feed bunks at this time must be removed to avoid DES residues in the feed beyond this point. Proper checks should be included in the storage and feeding systems to insure the proper feeds are offered during the withdrawal period. The 7-day withdrawal period is required for all cattle when feeding DES, including those marketed at odd times for various reasons.

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