Technical Papers

The Effects of Trace Amounts of Diethylstilbestrol in Rations of Fattening Steers*

Wise Burroughs, C. C. Culbertson, Joseph Kastelic, Edmund Cheng, and W. H. Hale

Iowa Agricultural Experiment Station, Ames

Diethylstilbestrol in trace amounts was placed in the feed of fattening steers in three Iowa feeding experiments. Feeding small amounts of diethylstilbestrol was associated with significant increases in liveweight gains and lower feed requirements per unit of gain in each of these experiments.

In the first experiment, three groups of 8 yearling steers each were fed similar fattening rations containing several levels of diethylstilbestrol. During a 46-day feeding period, these additions supplied none, 5 mg, and 10 mg of diethylstilbestrol per steer daily to each of the respective groups.

In the second experiment, four groups of 8 steers each, individually weighing about 700 lb, were fed the following ration for 84 days: corn *ad libitum,* 12 lb silage, 2 lb hay, and 2 lb soybean-oil meal per steer daily. Diethylstilbestrol was added to the soybean-oil meal to provide each steer in the respective groups the following levels: none, 2.5 mg, 5 mg, and 10 mg.

In the third and final experiment, two groups of 8 steers each, averaging initially 775 lb, were full-fed for 84 days a mixture of approximately 65 percent ground shelled corn and 35 percent ground corncobs. Group 1 in this experiment received a simple protein supplement (3 lb per steer daily) consisting of soybean-oil meal with no diethylstilbestrol added. Group 2 received a complex supplement in an amount equal to that fed to group 1 but containing sufficient diethylstilbestrol to supply 5 mg daily per steer.

The results of these experiments are presented in Table 1. The gain data were subjected to analysis of variance in which the total variation was partitioned into three fractions: outcome groups, diethylstilbestrol level effects, and residual error. In all three experiments, the differences in gain among rations were significant at the 5-percent probability level or less. In experiment II, there was a significant linear regression. Quite apart from the internal estimates of the standard errors given in Table 1, the reliability of the conclusions is indicated by the degree of agreement between the individual experiments.

Within each experiment, the data show that incorporation of trace amounts of diethylstilbestrol in the ration of fattening steers markedly increased weight gains when compared with animals not receiving diethylstilbestrol. In every case, steers receiving diethylstilbestrol required less feed per unit of gain than comparable steers not fed this material.

Table 1. Effects of diethylstilbestrol in the rations of fattening steers.

	Diethylstilbestrol per steer daily (mg)				
	0	2.5	5.0	10.0	Standard error of each mean*
Expt. I (36 days)					
Mean daily gain (lb)	2.12		2.84	2.50	±.14
Feed required per 100-lb gain (lb)	1144		929	1065	
Expt. II (84 days)					
Mean daily gain (lb)	2.50	2.71	3.15	3.41	±.16
Feed required per 100-lb gain (lb)	1157	1076	997	915	
Expt. III (84 days)					
Mean daily gain (lb)	2.51		3.15		±.06
Feed required per 100-lb gain (lb)	914		828		

* Each standard error applies to each mean daily gain in the respective experiments.

The steers in experiment I produced carcasses that were graded U.S. high-choice to low-prime. The carcasses produced by the most rapidly gaining animals (fed diethylstilbestrol) possessed quality characteristics similar to those found in carcasses from the control group as determined by grade characteristics and the yield of lean and fat from the 9–10–11 rib sections.

It has been observed previously (*1*) that diethylstilbestrol pellets placed as subcutaneous implants in fattening cattle result in more rapid and efficient liveweight gains. Despite the fact that the advantages of diethylstilbestrol implantations have been known for some time, this method of pellet administration has not been widely practiced by cattle feeders. There are several reasons for this: (i) A potential human health hazard is involved if substantial pellet residues remain in the tissues of treated cattle at time of slaugh-

* Journal Paper No. J-2451 of the Iowa Agricultural Experiment Station, Ames, Iowa. Project No. 1208.

ter. (ii) Diethylstilbestrol-pellet implantation during the fattening period appears to influence adversely carcass quality. (iii) Implanted animals may exhibit undue restlessness or abnormal sexual activity, such as "mounting." (iv) Some animals may exhibit toxicity symptoms from pellets.

The results obtained in the current experiments indicate that oral administration of diethylstilbestrol produces the desirable effects of pellet implantation without any of the undesirable side effects. The ease with which this material can be supplied to cattle by incorporating it in their feed is an important advantage. Also, the material can be easily removed from the rations of cattle should errors be made in amounts administered, or other unforeseeable situations develop. Still another advantage of the oral method of administering diethylstilbestrol is the ease with which a constant daily intake of an extremely small amount can be supplied to cattle over a feeding period of any given length of time. In contrast to this last advantage, when diethylstilbestrol is implanted as a pellet, the rate of release of the active material cannot be adequately controlled, and thus it may be released too rapidly initially and too slowly in the latter part of the feeding period for best results.

In conclusion, the placing of trace amounts of diethylstilbestrol in the feed of fattening steers increased live-weight gains as much as 35 percent over control animals not receiving diethylstilbestrol and reduced feed costs per unit of gain as much as 20 percent. No reduction in the fatness of the cattle or in the quality of the meat produced was noted when the diethylstilbestrol was incorporated in the steer feeds.

Reference

1. J. F. Sykes *et al., National Research Council Publ. No. 266* (1953), p. 31.

January 28, 1954.

A Note on a Chemographic Artifact in Autoradiography

L. E. Preuss and C. Harrison

Edsel B. Ford Institute for Medical Research
Detroit, Michigan

Boyd and Board (*1*) have defined the histochemograph as a gross image or grain grouping produced by chemical action when a specimen is in contact with the emulsion (*2*). Fitzgerald *et al.* (*3*) apply the term *pseudophotographic* to agents, other than radiation, that will reduce the photographic emulsion. Such artifacts have been found superimposed upon autoradiographs of Cr^{51} and Au^{198} plaques.

These chemographs corresponded to the debris dusted on the emulsion from a conventional lead pencil that was used to mark the emulsion near the autoradiograph. They were first observed on medium lantern slide emulsion that was used for the production of gross autoradiographs of very thin metallic films

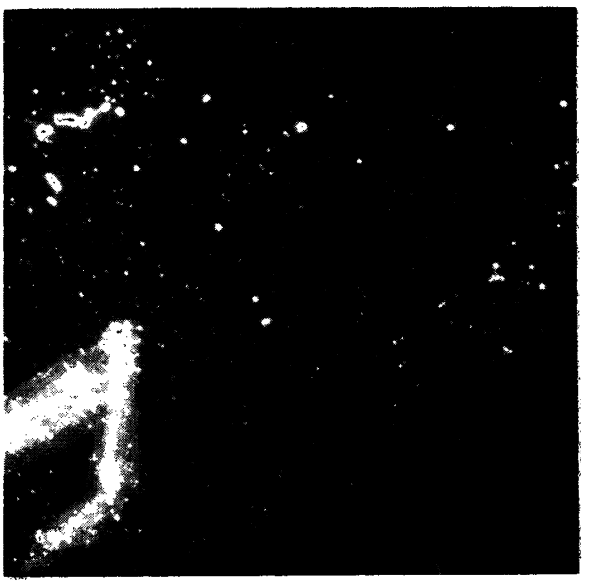

Fig. 1*a*. Appearance in dark field, showing the dispersion of the chemographic agent from the pencil mark at the left. Note the typical "halo" effect of the chemographs superimposed on the pencil mark.

of Cr^{51}, which was exposed for 1 mo at room temperature and developed in D-72 at 20°C for 3.5 min. The area on which the pencil-chemographs appeared was not submitted to pressure during the exposure. The

Fig. 1*b*. View in bright field at × 30, clearly demonstrating the absence of developed grains in the central area. The silver grain is represented here as a black region.