

Effects of Low-Level Stilbestrol on Weaner Steers and Suckling Calves on Rangeland¹

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Stilbestrol has increased the gain of steers in feedlots, in winter drylots and of both steers and calves on green pasture. Few stilbestrol experiments, however, have been conducted with cattle on winter range.

The present studies with beef cattle on rangeland were conducted to determine the effects of low stilbestrol levels on winter and summer steer gains, gains of suckling calves, physical and behavior characteristics of cattle, on economic returns and on efficiency of converting winter-dormant grass to beef. We were also interested in the effects of stilbestrol re-implants in yearling steers in the spring following fall implanting, and in the effect of 8 milligrams of stilbestrol fed daily during winter as compared with a single 12-milligram implant in the fall.

Procedure

Stilbestrol was implanted or fed at low levels to Hereford steers grazed on rangeland in three studies conducted during 1955-60 on the Southern Plains Experimental Range near Woodward, Oklahoma. The predominant soil type on the Experimental Range is a single grained, loamy sand. The native vegetation consists of dense sand sagebrush and a mixture of tall-, mid-, and short grasses. Grass

production averages 1050 pounds of dry matter per acre. Annual precipitation averages 23 inches, but varies from 10 to 43 inches. Snowfall averages 15 inches annually. The mean temperature is 44° during winter and 73° F. during summer.

Weaner steer calves were obtained each year from the same herd of grade cows. The stocker grade of the calves was high-good and the calves were in medium flesh. Initial weight of the steers during the studies, November 1, averaged 485 pounds. Steers were allotted to treatments at random within weight classes with a few subsequent adjustments to reduce differences in average weight, grade, and condition of lots. All cattle were individually weighed on two consecutive days at the beginning and end of the winter and summer seasons and on a single day at the end of each month. The cattle were gathered and weighed in early morning directly off the range but after a 12-hour period without water.

All implants of stilbestrol (diethylstilbestrol) were made at the base of an ear. All steers were fed an average of 1.5 pounds of 41 percent protein cottonseed meal per day during winter. Salt was the only other supplement. The winter season began in early November and ended in late April, and the summer season ended in early October.

All cattle were carefully observed throughout the trials for undesirable side effects such as changes in tail heads, loins, teats, disposition, and behavior.

Implanting Weaner Steers

The effects of stilbestrol implanted at the 12-milligram level were studied with four groups of weaner steers on yearlong range during the 1958-59 and 1959-60 grazing years. One group of steers was implanted on November 1, another on May 1, and another on both November 1 and May 1. A fourth group was not treated. A total of 265 steers was used the first year and 176 the second year. The average yearlong stocking rate was 8 acres of native range per steer. Each pasture was stocked with an equal number of steers from the four treatments.

Feeding Weaner Steers

Four lots of weaner steers were fed a low level of stilbestrol while on winter range in comparison with four similar lots of untreated calves. The study was conducted with a single 6-steer lot per treatment in 1955-56 and in 1956-57 and with duplicate 7-head lots in 1957-58. The treated steers were fed 8 milligrams of stilbestrol per day in cottonseed meal during the winter. Average yearlong stocking rate was 9 acres of native range per steer. Lots were rotated among pastures at 2-week intervals to reduce pasture variables. The steers were appraised by experienced feeder buyers in October 1957 and 1958.

Implanting Suckling Calves

The effects of implanting 12 milligrams of stilbestrol in suckling steer calves were studied during the summers of 1958 through 1960. An average of 11 pairs of steer calves were selected each year from an experimental herd of grade cows. The calves were paired on the basis of age, weight, and average weaning weight of their dam's previous calves. On a random basis, stilbestrol was implanted on June 1 in one calf of each pair. Calves averaged 90 days of age at treatment, and were weaned on October 15 each year.

¹Based on cooperative investigations conducted by the Crops Research Division and the Animal Husbandry Research Division, Agricultural Research Service, U. S. Department of Agriculture. The initial phases of these studies were made under supervision of the late A. L. Baker, senior animal husbandman.

Table 1. Effects of low-level stilbestrol implants on performance of weaner steers on yearlong range.

Item	Date 12 mg. stilbestrol implanted				Sig. ¹ Diff.
	None	Nov. 1	May 1	Nov. 1 & May 1	
1958-59:					
Number of steers	65	64	68	68	.....
Initial wt., 11/4/58, lb.	499	500	508	502	.....
Winter gain to 4/30/59, lb.	47	62	52	59	NS
Summer gain to 10/4/59, lb.	284	291	317	319	4
Yearlong gain (334 days), lb.	331	353	369	378	16
Net return above untreated steers,	\$....	1.59	3.65	4.78	.....
1959-60:					
Number of steers	44	44	44	44	.....
Initial wt., 11/4/59, lb.	499	483	496	482	.....
Winter gain to 4/21/60, lb.	42	62	48	67	NS
Summer gain to 10/6/60, lb.	284	285	307	303	4
Yearlong gain (337 days), lb.	326	347	355	370	16
Net return above untreated steers,	\$....	1.69	3.36	3.66	.....
Two-year average:					
Winter gain, lb.	45	62	50	63	7
Summer gain, lb.	284	288	312	311	3
Yearlong gain, lb.	329	350	362	374	11
Net return above untreated steers,	\$....	1.64	3.50	4.22	.....

¹Largest of Duncan's significant ranges for 4 means, 5%.

Average stocking rate was 18 acres of native range per cow.

Results

Implanting Weaner Steers

Twelve milligrams of stilbestrol significantly increased gains of steers on rangeland. Steers implanted on November 1 gained 17 pounds, or 38 percent, more during winter on dormant forage than did untreated steers. Subsequent summer gain of steers implanted only on November 1 was 4 pounds greater than that of untreated steers (Table 1). The treated steers gained more during May, June, and July, and slightly less during August and September than did the controls. These small differences in monthly summer gains were not statistically significant.

Steers implanted on May 1 gained 28 pounds, or 10 percent, more during summer than did untreated steers.

Steers implanted on both November 1 and May 1 gained 45 pounds, or 14 percent, more yearlong than did the controls.

The steers treated November 1 and May 1 gained 12 pounds more yearlong than those treated May 1 and 24 pounds more than those treated November 1.

The treated steers showed no undesirable side effects due to stilbestrol. Twelve milligrams of stilbestrol increased the net return per steer in all instances. Implanting stilbestrol on both November 1 and May 1 resulted in the greatest net return, \$4.22 per head more than untreated steers (Table 1).

Feeding Weaner Steers

Stilbestrol fed in the winter protein supplement increased gain of steers 34 pounds in win-

ter and 27 pounds yearlong, as a 3-year average. Stilbestrol increased the winter gain 46 percent and yearlong gain 7 percent. Summer gain of steers fed stilbestrol the preceding winter was 7 pounds less than that of untreated steers. Winter and yearlong differences in gains were significant at the 5 percent level, but the small summer differences were not (Table 2).

Feeding 8 milligrams of stilbestrol per day during winter caused no undesirable side effects. Steers fed stilbestrol were appraised 90 cents per cwt. higher than untreated steers in 1957 and 10 cents lower in 1958.

Implanting Suckling Calves

Suckling steer calves implanted with 12 milligrams of stilbestrol at 90 days of age gained 25 pounds more than untreated calves by weaning time, as a 3-year average (Table 3). This was a 10 percent increase in gain during the 136-day period. The treated calves developed no undesirable side effects.

Discussion

Stilbestrol, fed or implanted, increased steer gains on winter dormant forage from 38 to 46 percent. These are large and important differences and similar to those obtained by Nelson and Pope (1959) and Thomas *et al.* (1956). The increased gains obtained in the Woodward studies were not sufficient to make winter grazing programs economically competitive with summer programs. Nevertheless, stilbestrol is a potential tool that can help convert dormant grass into beef.

Table 2. Seasonal gains of weaner Hereford steers as affected by feeding stilbestrol on winter range, 1955-58.

Item	No stilbestrol	Stilbestrol in supplement	Sig. ¹ Diff.
Number of steers	26	24	.....
Initial wt., 11/1, lb.	472	473	.....
Winter gain to 4/30, lb.	74	108	10
Summer gain to 10/1, lb.	294	287	NS
Yearlong gain (334 days), lb.	368	395	26

¹Difference required for significance (5%) by Duncan's range test or LSD.

Table 3. Influence of stilbestrol implants on gains of suckling steer calves on native range, 1958-59-60¹.

Item	No stilbestrol	12 mg. of stilbestrol	Sig. ² Diff.
Number of calves, 3-year total	33	33	.....
Av. initial wt. on June 1, lb.	235	252	.....
Av. gain after June 1, lb.	242	267	17

¹Stilbestrol was implanted June 1 and calves were weaned Oct. 15 each year.

²Difference required for significance (5%) by Duncan's range test or LSD.

Steers implanted with stilbestrol at the beginning of the winter season gained slightly more during the following summer than did untreated steers. In contrast, steers fed stilbestrol during winter made slightly smaller gains than did untreated steers. Nelson *et al.* (1960) also found subsequent summer gains made by steers implanted in early winter with 12 or 24 milligrams of stilbestrol were slightly greater than gains of untreated steers. Radabaugh and Embry (1959) reported that steers which received stilbestrol only while wintering in drylot gained on summer pasture at a rate similar to steers which received no stilbestrol and that the greatest summer gains were made by steers first implanted at the beginning of summer.

The indication secured from monthly weights that stilbestrol implanted on November 1 continued to increase gains during the early part of the following summer is supported by the finding of Hale *et al.* (1959). This suggested that the half life of a 12-milligram stilbestrol implant varied from 73 to 96 days.

In these studies, the 12-milligram level of implanting produced no undesirable side effects. Side effects have been reported from implant levels higher than 12 milligrams (Fontenot *et al.*, 1959; Rogler and Strum, 1958; and Radabaugh and Embry, 1959). Undesirable side effects from premature retreatment would be less liable in steers initially implanted with 12 milligrams of stilbestrol than in

steers treated with higher levels. Much of the criticism that livestock buyers have of stilbestrol is concerned with the undesirable side effects of high implant levels. Use of 12 milligrams as a maximum implant level for steer yearlings and calves on rangeland is worthy of consideration.

Summary

Stilbestrol was implanted or fed at low levels to Hereford steers and suckling calves on rangeland in three studies conducted in northwestern Oklahoma during 1955-60.

Weaner steers on yearlong range were implanted with 12 milligrams of stilbestrol during a 2-year period. An average of 110 steers was used for each of the four treatments. Steers implanted November 1 outgained comparable untreated steers by 17 pounds in winter and 4 pounds the following summer. Steers implanted May 1 gained 28 pounds more during summer than untreated steers. Steers implanted November 1 and again May 1 gained 45 pounds more yearlong than did untreated steers, and 24 pounds more than those treated November 1 only.

Winter feeding of 8 milligrams of stilbestrol per day was studied over a 3-year period with 24 weaner steers per treatment on dry winter rangeland. Stilbestrol increased winter gain an average of 34 pounds and yearlong gain 27 pounds as compared with steers fed equivalent quantities of protein supplement without stilbestrol. Winter gains were in-

creased 46 percent by feeding stilbestrol and 38 percent by implanting it. These percentage increases on dry, winter-dormant forage far exceeded the consistent 10 percent increase in gain on green forage in summer.

Suckling-steer calves were implanted with 12 milligrams of stilbestrol on June 1 at an average age of 90 days, in a 3-year study. Thirty-three pairs of calves were used for the study. The treated calves gained an average of 25 pounds more than untreated calves during the following 136 days.

None of the steers or calves implanted or fed low levels of stilbestrol developed undesirable side effects. All stilbestrol treatments netted a substantial profit.

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