because this experiment also indicated that: (1) Weaning fast gaining lambs slowed them down slightly so that they reached market weight later, and (2) weaning slow gaining lambs had little effect on their rate of gain. Therefore, weaning may cause more lambs to reach market together.

In general, this experiment strongly suggests that weaning lambs at approximately 50 pounds should be given consideration. This is especially true if the available wheat pasture for fall born lambs is not abundant. It should be remembered that the weaned lambs must have all of a *good* creep feed that they want and should also have good green pasture. Fine stemmed, leafy, green alfalfa hay is the best substitute for green pasture.

Stilbestrol Implants and Urea in Protein Supplements For Wintering Steer Calves and the Effect Of Stilbestrol Implants on Subsequent Summer Gains

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The use of stilbestrol (implanting and feeding) in various systems of beef production has increased considerably. Its use with fattening cattle is generally accepted as a means of increasing gain and feed efficiency. There are indications that the response from stilbestrol is less when the energy content of a ration is low, such as is the case with our usual wintering rations. Our interest in this particular report is the value of stilbestrol implants for steer calves wintered on dry range grass.

Cattle and sheep are able to utilize, to varying degrees, the nitrogen from urea. This utilization is possible because of the microorganisms in parts of the ruminant stomach. Efficient utilization of urea will result only when other nutrients are present in amounts needed by the microorganisms. There have been many studies which indicate that urea may satisfactorily replace part of the protein in the rations of fattening cattle. There is a lesser number of tests on the value of urea in wintering rations in which the quantity of concentrate feed offered as a supplement to grass hays or dry range is very limited.

Tests conducted at this station in recent years have indicated that apparently urea is not efficiently utilized by cattle wintered on dry range grass when it is added to a mixture of corn and cottonseed meal to produce a pellet containing 40 percent protein with one-third of the nitrogen furnished by urea. However, the addition of trace minerals or dehydrated alfalfa meal to the urea-containing pellet, resulted in increased gains in 1956-57, but not in 1957-58. An additional test on the use of urea in wintering rations has been conducted during the 1958-59 season.

Part 1. Urea in Protein Supplements for Wintering Steer Calves

Procedure

Seventy-five grade Hereford steer calves were divided into 5 lots of 15 each on November 6, 1958, and were allowed to graze the native grass pastures at the Lake Blackwell range area. In addition to the dried grass, they were fed an average of 2 pounds per head daily (twice the daily allowance every other day) of the following protein supplements:

Lot 1—40 percent protein supplement.
Lot 2—40 percent protein supplement containing urea.
Lot 3—Same as Lot 2, plus trace minerals (iron, copper, cobalt, manganese, iodine, and zinc).
Lot 4—Same as Lot 2, plus iron, copper, cobalt, and zinc.
Lot 5—Same as Lot 2, plus dehydrated alfalfa meal.

The 40 percent protein supplement was 97.9 percent cottonseed meal, 1.1 percent dicalcium phosphate, and 1.0 percent monosodium phosphate. The latter two ingredients were added at such rates that the calcium and phosphorus contents of all pellets were approximately equal.

The 40 percent protein supplement containing urea was 59 percent cottonseed meal, 33 percent ground yellow corn, 5 percent urea*, and 3 percent dicalcium phosphate. Urea furnished approximately one-third of the nitrogen in this pellet.

The third supplement was the same as that fed to Lot 2, except trace minerals** were added at the rate of 0.1 pound per 100 pounds of the supplement. According to the manufacturer's recommendations, the additional minerals provided were, in milligrams per pound of pelleted supplement: manganese, 55.4; iodine, 1.72; cobalt, 1.18; iron, 43.6; copper, 3.3; and zinc, 3.04. At the rate fed, the trace minerals cost only 1 or 2 cents per head during the winter.

One of two previous tests indicated that the addition of the trace minerals mixture described above increased utilization of a urea-

*Urea was furnished by Nitrogen Division, Allied Chemical and Dye Corporation.
**Mineral mixture furnished by Calcium Carbonate Company.

containing protein supplement. In an attempt to determine which of the minerals was responsible for the increased utilization, the calves in Lot 4 were fed the same supplement fed to Lot 2 except that four trace minerals (iron, copper, cobalt, and zinc) were added in the same amounts as fed in Lot 3. Many of the minerals in the commercial mixture were present in the form of sulfates. Since sulfates may affect the utilization of urea, the supplement in Lot 4 contained iron, copper, and cobalt as carbonates, and zinc as the oxide.

Dehydrated alfalfa meal contains many minerals needed by livestock. The supplement fed to Lot 5, therefore, included this feed ingredient at a level of 10 percent. The remainder of the pellet was 56 percent cottonseed meal, 26 percent ground yellow corn, 5 percent urea, 2.5 percent dicalcium phosphate, and 0.5 percent monosodium phosphate.

A mixture of 2 parts salt and 1 part steamed bone meal was available in all lots.

Results

The chemical composition of the supplemental feeds is given in Table 1. A summary of the weight data is given in Table 2. The greatest gain was made by the steers fed pelleted cottonseed meal (Lot 1). All other groups were fed the urea-containing pellets and lost weight. Those in Lot 2, fed the urea-containing pellet without added minerals, lost 34 pounds in the 128-day period. Therefore, little, if any, of the urea was utilized.

The addition of trace minerals decreased the weight losses. Apparently microorganisms were better able to utilize the low quality forage when additional minerals were provided. When several trace minerals were added (Lot 3), the average weight loss was 5 pounds, a difference of 29 pounds when compared to Lot 2. The response to the addition of four trace minerals (iron, copper, cobalt, and zinc) was approximately the same, minus 10 pounds per head in the period.

TABLE 1. Chemical composition of supplements.

	Percent Dry Matter	Percentage Composition of Dry Matter						
		Ash	Protein	Fat	Fiber	N.F.E.	Ca	P
40 percent protein pellet	93.4	7.8	42.7	4.8	12.6	32.1	.34	1.08
Urea-containing pellet	93.0	7.3	45.3	4.6	8.9	33.9	.69	1.17
Urea plus trace minerals	93.4	7.2	44.9	4.8	9.2	33.9	.63	1.14
Urea plus 4 trace minerals	93.3	7.2	43.7	4.5	8.7	35.9	.70	1.15
Urea plus dehy. alf. meal	93.1	8.3	44.8	4.9	10.9	31.1	.60	1.18

TABLE 2. Urea in protein supplements for wintering steer calves grazing native grass.

	Lot 1 C.S.M.	Lot 2 40 Urea	Lot 3 40 Urea Plus Trace Minerals	Lot 4 40 Urea Plus 4 Minerals	Lot 5 40 Urea Plus Dehy. Alf. Meal
Number of steers per lot	15	15	15	15	15
Average weight per steer (lbs.)					
Initial 11-6-58	502	508	499	530	500
Final 3-14-59	516	474	494	520	490
Gain (128 days)	14	—34	— 5	—10	—10

The addition of 10 percent dehydrated alfalfa meal was as effective as adding the trace minerals. These data are in agreement with results obtained in 1956-57.

Other data have indicated that the provision of supplemental trace minerals will not result in increased gains of beef cattle wintered on dry range grass and fed protein supplements such as cottonseed meal or soybean oil meal. When urea is added to a ration, the quantity of cottonseed meal or soybean oil meal is reduced. This reduction not only removed protein but apparently also certain minerals.

When formulating rations containing urea, consideration must be given to the quantity of trace minerals present. The addition of trace minerals did not, however, result in gains equal to the gains of those steers fed cottonseed meal. Apparently other factors which affect the utilization of urea are lacking in our rations.

Part 2. Stilbestrol Implants for Wintering Steer Calves

Procedure

The steers used in this test were those fed the various protein supplements as described in Part 1. Within each lot, 4 steers served as controls, 4 were implanted with 12 milligrams of stilbestrol, and 4 were implanted with 24 milligrams of stilbestrol.

Since there were 5 lots in the protein supplement study, the total number of steers in each group in this implant study was 20. The implants were injected on November 6, 1958. Weights and observations of any differences in behavior and body conformation were recorded.

Results

A summary of the weight data is given in Table 3. Apparently stilbestrol implants have affected winter gains. The control calves lost

TABLE 3. Stilbestrol implants for wintering steer calves.

Lot number Stilbestrol implant[1]	1 0	2 12 mg.	3 24 mg.
Number of steers per lot	20	20	20
Average weight per steer (lbs.)			
Initial 11-6-58	518	500	505
Final 3-14-59	502	492	508
Gain (128 days)	—16	—8	3

[1] Stimplants furnished by Chas. Pfizer and Co., Inc., Terre Haute, Indiana.

16 pounds in 128 days. The loss was reduced to 8 pounds for those implanted with 12 milligrams and those implanted with 24 milligrams gained 3 pounds. These results are in agreement with the 1957-58 study.

Although the response was not as great in wintering trials as would be expected in fattening trials, stilbestrol administration was effective in increasing weight gains (or reducing losses) of steer calves wintered on dry native range and fed 2 pounds of a supplement containing 40 percent (equivalent) protein. No differences in behavior or body conformation of the steers were recorded.

Part 3. Subsequent Summer Gains of Stilbestrol-Implanted Steers

At the beginning of 1957-58 winter feeding season, steer calves were implanted with no stilbestrol, 12 milligrams, and 24 milligrams of stilbestrol and treated in the same manner as described in Part 2 of this report.

The winter gains were 8, 20, and 32 pounds, respectively (Table 4). During the subsequent summer period, the gains were 258, 244, and 256 pounds, respectively. The summer gains of those previously implanted with 12 milligrams were reduced slightly; however, there were

TABLE 4. Subsequent summer gains of previously implanted steers.

Implant in winter	None	12 mg.	24 mg.
Number of steers	19	20	19
Initial weight (lbs.)	479	476	481
Winter gain (162 days)	8	20	32
Summer gain (133 days)	258	244	256
Total gain (295 days)	266	264	288

no differences in summer gains for those previously implanted with 24 milligrams of stilbestrol and those not previously implanted. Total gains from the beginning of the winter until the end of the summer were greatest for those previously implanted with 24 milligrams of stilbestrol. The total gains of the other two groups were nearly equal.

The response, therefore, was variable and an additional test is being conducted.

Summary

Steer calves grazing dry range grass did not efficiently utilize urea-containing proteins supplements. Those fed pelleted cottonseed meal gained 14 pounds, while those fed a urea-containing pellet without addition of trace minerals or dehydrated alfalfa meal lost 34 pounds. Additions of several trace minerals, four trace minerals, and dehydrated alfalfa meal reduced the losses to 5, 10, and 10 pounds, respectively.

Winter gains of steer calves implanted with none, 12 milligrams, and 24 milligrams of stilbestrol were minus 16, minus 8, and 3 pounds, respectively. Steers which were implanted with none, 12 milligrams, and 24 milligrams of stilbestrol during the winter of 1957-58 gained 8, 20, and 32 pounds, respectively.

When the steers were allowed to graze native grass pasture during the subsequent summer as yearlings, the summer gains were 258, 244, and 256 pounds, respectively. Therefore, the greatest total gain (winter plus summer) was for those previously implanted with 24 milligrams of stilbestrol, with the total gains of the other two groups nearly equal.

Effects of Feeding or Injecting Certain Tranquilizers on Beef Cattle Performance, and Residues in the Carcass*

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The wide interest in tranquilizers as related to meat production has stimulated more detailed investigations of their effect on weaning calves, feed lot performance, and slaughter animals. It was considered also important to learn if this type compound will remain as residues in the edible tissues of the animal body.

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