nor weaning weights were influenced by the vitamin injections. As previously mentioned, the reason for heavier calves out of vitamin A injected cows as observed in Experiment I cannot be explained on the basis of the results of this trial.

Summary

1. The intra-ruminal injection of one million I.U. of vitamin A into range beef cows before calving had no apparent influence on:
   a. Spring weight of cows.
   b. Time of rebreeding of cows.
   c. Survival of calves to 112 days of age.

2. Fewer cows injected with vitamin A were open the following year than untreated cows. Additional research information is needed before general conclusions can be made on this point.

3. Calves from cows which had been injected with vitamin A tended to be heavier at 112 days of age than calves from untreated cows.

   Additional data concerning the observations reported above are now being obtained in a more extensive 3 year study concerning the value of injectable vitamin A for range beef cows.

4. Vitamins A, D and E injected into range beef calves at birth were without apparent affect on the survival and weight of calves at 210 days of age.

Winter Feeding Studies With Range Beef Cows: Value Of Zinc And Constant Vs. Increasing Level of Protein

Robert Totusek

The expense of winter supplement represents the biggest cash cost of maintaining a cow for a year and is a sizeable part of the total yearly cow cost, often accounting for 20 to 25 percent of the total. Any practice which will increase the productivity of the cow enough to more than pay the possible additional cost of the practice should be considered.

The practice of feeding supplemental protein falls into two categories. Either the supplement is fed at a constant level throughout the winter or it is fed in increasing amounts as the winter progresses. It would be theoretically more beneficial for the spring calving cow to increase the amount of supplemental protein as the winter progresses. This is because the protein value of grass decreases as winter progresses and the protein requirement of the cow increases with advancing pregnancy and actually almost doubles after calving and the cow begins to lactate.

Previous research at the Wilburton station (see 1957 Feeder's Day Report) failed to indicate any difference in cow performance between the two practices. The previous research was done with mature cows. It is logical to assume that younger cows, especially two or three-year-old heifers which are still growing, would be more sensitive to a protein deficiency in late winter and early spring than mature cows. Therefore, it was considered desirable to compare the two practices of feeding supplemental protein with younger cows.

Recent experimental work showed that the addition of supplemental zinc to certain feedlot rations often resulted in improved performance of fattening cattle. Although previous research at this station indicated little or no benefit from feeding trace minerals to range beef cows, the trace mineral mixtures previously fed either contained no zinc or very low levels of zinc. Consequently, the value of adding sizeable quantities of supplemental zinc to the winter ration of beef cows was determined in this experiment.

Procedure

The design of this experiment is indicated in Table 1. Note that it is possible to compare the practices of feeding constant versus increasing levels of protein supplement (lots 1, 4 and 7 vs. 2, 5 and 8), and to determine the value of supplemental zinc in the wintering ration of

Table 1. Design of Experiment

Treatment	Lot No.	No. Cows	Age at Calving, Yrs.
Constant protein supplement[1]	1	14	2
Increasing protein supplement[2]	2	14	2
Zinc, constant protein supplement[3]	3	14	2
Constant protein supplement	4	16	3
Increasing protein supplement	5	16	3
Zinc, constant protein supplement	6	15	3
Constant protein supplement	7	22	4
Increasing protein supplement	8	22	4
Zinc, constant protein supplement	9	22	4

[1] Cottonseed cake was fed at a level of 2.5 lb. per cow daily from Nov. 10 to April 20.
[2] Cottonseed cake was fed from Nov. 10 to April 20 at an increasing rate as follows (lb. per head daily): starting November 10—1.0, December 15—2.0, January 1—2.5, February 15—3.5.
[3] Zinc was included in the cottonseed cake at a level to provide an estimated intake of 75 ppm of the total feed intake (90% dry matter basis).

beef cows (lots 1, 4 and 7 vs. 3, 6 and 9). It is also possible to observe the relationship between the age of the cow and the feeding practices which were compared. This would be of particular interest in the comparison of the two methods of feeding the protein supplement.

The cows were wintered on native range and received in addition to the indicated supplements approximately 10 lbs. of prairie hay per head daily from February 10 to April 10. All cows had access to a mineral mixture composed of 50 percent salt and 50 percent dicalcium phosphate.

Observations were made concerning the weight changes of the cows, the weight of the calves produced and the ability of the cows to rebreed. All of the cows were grade Angus. They were also used to provide progeny test information on sires used in the beef cattle breeding project and, consequently, provided both genetic and nutritional information.

Results and Discussion

The weights of cows by age and treatment are shown in Table 2, while a summary of the weight of the cows by treatment is given in Table 3. There was not a large or consistent relationship between the feeding practice used and weight of the cows at intervals during the year. The most consistent trend noted was for cows receiving the increasing level of protein supplement to lose the most weight up to calving time. This would be expected since the cows on the increasing level of protein supplement would have received less supplemental protein up to that point than the cows receiving a constant level throughout the winter. These cows did tend to catch up in weight by spring since their protein supplement intake during the suckling period was greater than that of the cows on the constant level of protein. There was little difference in weight of the cows due to previous winter treatment by the end of the summer grazing season.

Table 2. Weights of the Cows, by Age and Treatment

Lot No.	Age of Cows Yrs.	No. Cows	Treatment	11-8-62	1-31-63	5-7-63	10-4-63
1	2	14	Constant protein	833	785	723	726
2	2	14	Increasing protein	845	758	736	769
3	2	14	Zinc	833	805	730	740
4	3	16	Constant protein	864	861	807	866
5	3	16	Increasing protein	870	852	840	869
6	3	15	Zinc	877	897	823	882
7	4	22	Constant protein	970	963	866	928
8	4	22	Increasing protein	956	892	842	916
9	4	22	Zinc	979	963	831	930

Table 3. Weights of the Cows, by Treatment

Lot No's	No. of Cows	Treatment	11-8-62	1-31-63	5-7-63	10-4-63
1-4-7	52	Constant protein	889	870	799	840
2-5-8	52	Increasing protein	890	834	806	851
3-6-9	51	Zinc	896	888	795	851

Data on calf production and the rebreeding performance of cows are presented in Tables 4 and 5. The fewer calves weaned by the cows on the increasing level of protein should not be considered a reflection of the winter feeding practice used. A study of the calf losses in the footnotes of Table 5 will reveal that the losses are probably not related to winter treatment. The winter treatments had very little influence on the birth weight of the calves or the weight of the calves at weaning at 210 days.

The cows which received supplemental zinc during the winter calved somewhat earlier than the non-zinc supplemented cows. However, it should be noted that practically all of the advantage in calving date was accounted for by the 2-year-old cows. Since there was no corresponding improvement in calving date in the 3 and 4-year-old groups it would be difficult to assume that the feeding of supplemental zinc was beneficial in terms of rebreeding performance. There was little difference in number of open cows the following year.

The results of this experiment substantiate those previously observed at the Wilburton station and further indicate that 2 and 3-year-old cows are no more susceptable to a short time deficiency of protein intake during the suckling period than more mature cows. It appears that the total amount of feed that is used during the wintering period is more important than its distribution. It is also apparent that there is not a critical deficiency of zinc in the winter forage and supplements as ordinarily consumed by range beef cows in this area.

Summary

1. The results of this experiment with 2, 3 and 4-year-old spring calving range beef cows indicate that it makes little difference whether the supplemental protein is fed at a constant level or gradually increased as the wintering period progresses.

2. There was no advantage in supplying supplemental zinc during the wintering period for range beef cows wintered on dry grass supplemented with cottonseed meal and a small quantity of prairie hay.

Table 4. Production Data, by Age and Treatment

Lot No.	Age of Cow Yrs.	No. Cows	Treatment	No. Calves Weaned[1]	Birth Wt.	Weaning Wt.	Calving Date Following Year	No. Open Cows Following Year
					lb.	lb.		
1	2	14	Constant protein	13	58	356	Mar. 29	4
2	2	14	Increasing protein	11	54	328	Mar. 31	3
3	2	14	Zinc	13	55	334	Mar. 1	1
4	3	16	Constant protein	16	61	378	Mar. 8	1
5	3	16	Increasing protein	12	62	390	Mar. 17	0
6	3	15	Zinc	14	62	388	Mar. 7	1
7	4	22	Constant protein	21	62	418	Feb. 29	4
8	4	22	Increasing protein	16	64	409	Mar. 1	4
9	4	22	Zinc	22	67	402	Mar. 2	4

[1] See Table 5 for summary of calf losses by treatment.

Table 5. Production Data, by Treatment

Lot No.	No. Cows	Treatment	No. Calves Weaned	Birth Wt.	Weaning Wt.	Calving Date Following Year	No. Open Cows Following Year
				Lb.	Lb.		
1-4-7	52	Constant protein	50[1]	60	384	Mar. 12	9
2-5-8	52	Increasing protein	39[2]	60	376	Mar. 16	7
3-6-9	51	Zinc	49[3]	61	375	Mar. 3	6

[1] Fifty-one calves born: 1 dead at birth.
[2] Forty-seven calves born: 2 dead at birth, 4 died of scours, 2 killed by predatory animals.
[3] Fifty-one calves born: 1 dead at birth, 1 killed by predatory animals.