

Effect of Three Levels of Carotene Intake During Lactation on the Performance of Beef Cows

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The importance of vitamin A for beef cattle has been recognized for some time. In "normal" seasons, the carotene (provitamin A) requirement of beef cattle may be met by range grass and the ability of mature cattle to accumulate large body stores for use during the winter. However, the prolonged drouth in the southwest has intensified the vitamin A problem.

Previous work at this station has shown that deficiency symptoms can develop in young, suckling calves even though their dams appeared normal and that carotene supplementation of the dam during gestation is apparently not necessary unless the cows have been off green feed for long periods prior to calving.

With cow-calf operations, supplying the beef cow with carotene during lactation in order to protect her calf may be a critical item. The purpose of this experiment was to study the effect of feeding three levels of carotene during lactation on the vitamin A nutrition of the cow and her calf.

Procedure

Twenty-one, bred, two-year-old Hereford heifers were selected from the Experiment Station herd in December, 1955. Initial blood and liver levels of vitamin A and carotene were determined at this time. During gestation, the cows were fed weathered, range-grass hay, cut in December and devoid of carotene, plus 2½ pounds of cottonseed meal and 2 pounds of cracked milo per head daily. In addition, they had access to a mineral mixture of 2 parts salt and 1 part steamed bone meal. This ration was believed adequate with the exception of carotene. None of the cows received any supplemental carotene until after calving.

At parturition, blood and liver samples were taken and the cows were assigned to one of three lots. During the first 3 months of lactation, the cows of lots 1, 2 and 3 received 70, 140 and 210 mg. of carotene per head daily or 10, 20 and 30 mg./cwt., respectively.¹ The carotene was a carrot oil concentrate and was fed individually. In addition, they were continued on the winter-cut hay (free choice), plus 5 pounds of cracked milo and 3 pounds of cottonseed meal per head daily. The 3 levels of carotene were chosen in order to determine the optimum daily allowance that would maintain the liver stores of the lactating cow and protect her calf from vitamin A deficiencies. The calves had access to creep-feed composed of oats, milo and cottonseed meal.

¹ Carotene used in these studies was supplied by Nutritional Research Associates Inc. of South Whitley, Ind.

The calves were removed from experiment at 3 months of age, at which time data were obtained on weight gains and blood and liver levels of vitamin A and carotene for the cows and calves.

Results

Changes in body weight of the cows and gains of the calves to 3 months of age are shown in Table 1. The vitamin A blood and liver data are contained in Table 2.

Table 1.—Average weight gains of beef cows and their calves.

	Lot number and level of carotene during lactation		
	Lot 1 70 mg.	Lot 2 140 mg.	Lot 3 210 mg.
Number of cows per treatment	5	6	7
Average cow weights (lbs.)			
Initial	711	756	726
Parturition	666	738	694
At 3rd mo. lactation	770	803	775
Gain, parturition to 3rd mo.	104	65	81
Average calf weights (lbs.)			
Birth	58	57	58
At 3 months	166	151	148
Total gain	108	94	90

Table 2.—Average vitamin A contents of blood and liver samples of beef cows and their calves.

	Lot number and level of carotene during lactation		
	Lot 1 70 mg.	Lot 2 140 mg.	Lot 3 210 mg.
<i>Cows</i>			
Blood Vitamin A (mg./100 ml.)			
Initial-Dec., 1956	34.47	34.01	34.89
Parturition	9.83	8.76	7.15
3rd mo. lactation	20.03	23.86	26.76
Liver Vitamin A (mcg./gram DM)			
Initial-Dec., 1956	243.94	271.86	225.95
Parturition	21.62	24.73	21.69
3 months	17.74	30.20	35.27
<i>Calves</i>			
Blood Vitamin A (mcg./100 ml.)			
Parturition	3.80	5.70	4.47
3 months	5.47	8.79	8.32
Liver Vitamin A (mcg./gram DM)			
3 months	2.60	3.66	5.20

The weight gains for the cows, from parturition to three months post-partum were 104, 65 and 81 lbs. for lots 1, 2 and 3, respectively. In the same order, calf gains from birth to three months of age were

108, 94 and 90 lbs. There was no consistent effect of varying levels of carotene intake on cow or calf weights.

Most of the calves were weak at birth and susceptible to scours for the first few weeks. Diarrhea was very noticeable in calves of lots 1 and 2 throughout the trial where the cows received 10 and 20 mg. of carotene per cwt. daily.

Two calves were lost in lot 1, and one in lot 2. Severe diarrhea was noted in these calves shortly before death.

The cows of lot 1 were not able to maintain liver vitamin A stores during lactation. In contrast, the liver stores of the cows in lots 2 and 3 had increased by the time the calves were 3 months old. Hence a carotene intake of 20 mg./cwt. appears necessary to maintain body vitamin A stores in the lactating beef cow. Slight differences in blood vitamin A levels in the cows, and liver and blood levels of their calves, reflected the greater carotene intake of lots 2 and 3.

Summary

Three levels of carotene were fed beef cows during early lactation and their effects on the performance of the cows and their calves were studied. The cows were depleted of body stores of vitamin A during gestation and received supplemental carotene to supply 10, 20 or 30 mg./cwt. after parturition. No deficiency symptoms appeared in the cows, and the different levels of carotene intake after calving had no consistent effect on calf weights at three months. Rate of survival was greater in calves from cows receiving the 20 and 30 mg./cwt. levels of carotene intake. It appears that beef cows may use body stores of Vitamin A to maintain health for long periods, but must receive relatively large amounts in the feed in order to protect their calves against a deficiency. Under range conditions, it may be more profitable to give the calves carotene or vitamin A directly (such as in the creep feed) than to feed high levels to their dams.

The Effect of Stilbestrol Implantation on Gains of Steers Grazing Native Grass

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Both the feeding and implanting of stilbestrol have greatly increased the gains of fattening cattle. The degree of response is apparently related to the level of energy in the ration. Experiments have indicated that the greatest response to stilbestrol implantation occurs when cattle are full-fed for rapid fattening with lesser or no response when cattle are "wintered" on a ration of relatively low energy content.

Results of tests with grazing cattle have been quite variable but apparently related to the type of pasture. In tests in other areas of the