



# Research Facts

Research & Technology Development for the Canadian Beef Industry



## Does Vitamin A Affect Marbling?

by Alberta Beef Producers

### Project Title:

Removal of supplemental vitamin A to improve carcass quality of feedlot cattle

### Project Code:

0009-020

### Completed:

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### Researchers:

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### Background:

Vitamin A is involved in many biological processes. Cattle cannot manufacture vitamin A themselves, so it must come from the diet. Vitamin A is found at high levels in fresh green forage, and at much lower levels in weathered forage and grain. Vitamin A can be stored in the liver and fat when the diet contains more vitamin A than the animal needs; this is why forage-finished beef tends to have yellower fat than grain-finished beef. The stored vitamin A can then be released later when dietary vitamin A levels are too low. This allows animals to deal with seasonal fluctuations in dietary vitamin A levels. Vitamin A requirements are fairly well known for beef cattle, but because vitamin A is important and cheap, most feedlot nutritionists err on the side of caution and include more vitamin A in the diet than the National Research Council recommends.

Vitamin A is also involved in fat cell development, so it may also affect carcass yield and quality. Several research studies in Japan, Australia, China and the U.S. have examined the effects of removing supplemental vitamin A from corn- or sorghum-based feedlot diets. None of these studies reported adverse health effects or differences in yield grades, but several reported that removing supplemental vitamin A from the finishing diet increased carcass marbling with no effect on growth rate or efficiency. As the grazing season is generally shorter in Canada, and vitamin A levels are believed to be lower in barley than in corn, determining the effects of removing vitamin A supplementation under Canadian circumstances, rather than extrapolating results from other countries, is necessary.

### Objectives:

To determine whether removing supplemental vitamin A from feedlot diets will improve carcass marbling score.

### What They Did:

The trial utilized 120 recently weaned heifers. Heifers were split into two treatment groups, placed on a backgrounding diet consisting of 40% (dry matter basis) rolled barley for 58 days, then transitioned to a finishing diet consisting of 86% barley grain and 9% barley silage on a dry matter basis. One treatment group was fed supplemental vitamin A at 72,800 IU/kg, while the other group received no supplemental vitamin A. Average daily dry matter intake on a pen basis and gain:feed was measured through the whole feeding period. Levels of vitamin A were measured in both the feed and blood of the heifers on trial. Carcass measurements were obtained through ultrasound and camera grading.

### ***What They Learned:***

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Average calculated vitamin A intake from both diet and supplementation was 2564 IU/head/day for the non-supplemented group, and 28,280 IU/head/day for the supplemented group during the backgrounding period. During the finishing period, average calculated intake of vitamin A was 722 and 38,881 IU/head/day for the non-supplemented and supplemented groups respectively. After the backgrounding period, serum retinol (a measure of the amount of vitamin A in the blood) levels had approximately doubled from the initial levels, but were 11% lower in the heifers that did not receive supplemental vitamin A. The jump in serum retinol levels observed during the backgrounding diet can be attributed to the increased level of barley silage in the backgrounding diet; especially since serum retinol levels had declined by the end of the finishing period when the heifers were on the high concentrate diet. The heifers that did not receive any supplemental vitamin A had 40% lower serum retinol levels at the end of the finishing period.

The heifers that did not receive supplemental vitamin A experienced reduced dry matter intake over the whole trial, however average daily gain was not affected. Removal of supplemental vitamin A had no apparent effects on animal health. Treatment rates for foot rot and BRD were the same between treatment groups. Removing supplemental vitamin A had no effect on carcass weight, dressing percentage, ribeye area, backfat thickness, or yield grade. However, there was an increase in marbling score from the heifers that did not receive extra vitamin A. Approximately 58% of carcasses from the non-supplemented group graded AAA or higher, compared to about 42% of carcasses that received supplemental vitamin A.

### ***What It Means:***

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Removal of supplemental vitamin A from barley based feedlot diets resulted in similar average daily gains, reduced feed intake and increased marbling, with no effects on other carcass traits. Improving marbling without increasing backfat (which may worsen yield grade) is generally difficult to do, but the removal of supplemental vitamin A increases marbling without the expected concurrent increase in backfat. In addition, animal health was not affected by the removal of supplemental vitamin A. Excluding vitamin A supplementation from barley based backgrounding and finishing diets can improve marbling without affecting other carcass characteristics, animal health, or performance.

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