Does Vitamin A Impact Quality Grade?

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There is a resurgence of interest in defining vitamin A requirements for growing and finishing cattle. The reason – there is growing evidence that vitamin A (retinoids) can inhibit fat synthesis. In addition, the National Research Council (NRC) recommended level of vitamin A in cattle diets is based on sparse information published more than 35 years ago, long before modern techniques to assess vitamin A status were developed.

Vitamin A precursors (carotenoids) are generally low in most feedstuffs, but are relatively plentiful in yellow corn and high quality forages. The major source of vitamin A in feedlot diets is through supplementation. Traditionally vitamin A has been included at levels exceeding NRC recommendations in feedlot diets because it is readily available, relatively inexpensive, and has been associated with benefits in immune response. A 2002 survey indicated that most feedlot nutritionists suggested feeding levels greater than the NRC recommendation of 1,000 IU per lb of dry matter. Nutritionists surveyed recommended inclusion of vitamin A at an average of 3,650 IU/lb for receiving rations and 2,050 IU/lb for finishing rations.

A total of seven individual trials from the University of Illinois (Pyatt et al., 2005), The Ohio State University (Gorocica-Buenfil et al., 2007), and Kansas State University (Arnett, personal communication) are summarized in Table 1. Although marbling and resulting quality grade were improved or tended to be improved in three of the experiments, there are not yet conclusive data on the potential for vitamin A restriction to improve marbling. In general, none of these studies found vitamin A to significantly affect finishing weight gains, dry matter intake, feed efficiency or carcass yield. No significant differences in morbidity were reported and there were no observations of deficiency symptoms in cattle fed no supplemental vitamin A in these trials. Additional research indicated no changes or improvements in display color or color stability of steaks from cattle fed no supplemental vitamin A compared to those supplemented with vitamin A (Daniel et al., 2007).

It should be noted that previous research has shown that vitamin A deficiency is possible with prolonged low levels of dietary vitamin A. However, the duration and threshold level of vitamin A to create deficiency induced symptoms (i.e. night blindness, reduced feed intake, poor growth) are not clear. In summary, vitamin A

restriction may be effective in allowing more intramuscular fat to develop thereby improving quality grade, however more research is needed to determine threshold vitamin levels, length of restriction, previous nutrition effects, and other factors that may contribute to enhanced beef quality.

Table 1. Summary of research examining the effects of dietary vitamin A and carcass quality

			Approx. Dietary vitamin A, IU/lb DM		Low vitamin A significantly increased		
Researchers	Cattle type	Primary feed type	Low	High	Marbling score	Avg. quality grade	Mid-Choice and higher
Pyatt et al., 2005	Early weaned heifers (310 lb)	Dry corn	1,050	3,350	No	No	No
Pyatt et al., 2005	Early weaned steers (405 lb)	Dry corn	1,050	3,350	No	No	No
Pyatt et al., 2005	Yearling steers (820 lb)	Dry corn	1,050	3,350	No	No	No
Gorocica-Buenfil et al., 2007	Steers (650 lb)	HM corn	590	1,810	Tendency	Tendency	No
Gorocica-Buenfil et al., 2007	Steers (650 lb)	HM or dry corn	540	1,540	Yes	Yes	Tendency
Gorocica-Buenfil et al., 2007	Holstein steers (480 lb)	HM corn	430	1,430	No	No	No
Arnett, personal comm.	Early weaned steers (420 lb) Normal weaned steers (515 lb)	Sorghum	n/a	+42,180 IU/hd/d	Yes	--	Tendency