Feeding strategies to address vitamin A and E shortage

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These are remarkable times in the world vitamin market. Due to environmental issues in China and a destructive fire in Germany, the availability of vitamin A has become extremely limited.

The Chinese government has forced emission regulations on manufacturers, which have caused them to reduce production until plant modifications can be completed. The October 2017 plant fire in Germany disabled the facility that produced the starter compound for vitamin A production, which impacted 45 percent of the world market.

Vitamins D and E also have limitations to a lesser degree. With this inventory depletion and the inability to manufacture at a pace to meet demand, the price of vitamins has been increasing dramatically. A number of feeding strategies for dairy herds have been proposed. These strategies range from maintaining current fortification levels to removing vitamins from the diet.

Vitamins are required by living creatures to sustain life. In ruminant animals, vitamin K and many B vitamins are produced by rumen microbial fermentation. There is ongoing debate whether the fermentation can meet the full requirement, and some of the B vitamins are supplemented in the ration, especially in times of stress. Vitamin D can be produced in the animal system as ultraviolet radiation from the sun comes into contact with the skin and facilitates the formation of vitamin D. Animals in confinement do not have the ultraviolet light

exposure needed for vitamin D conversion. Vitamin D is supplemented to dairy cattle frequently, even to those in drylot systems, to ensure an adequate supply for the animal. Vitamin D is important in bone structure, immune function and insulin release.

Vitamin A and vitamin E are unique in that these compounds can only be presented to the ruminant animal from the diet. There is not an internal source of these vitamins for cattle. Vitamin A has a role in growth, reproduction, immunity and vision. Vitamin E is a potent antioxidant and has involvement in cell membrane health, reproduction and immunity.

Fresh forages and grains have vitamin or vitamin precursor contents that can supplement some of the needs of animals. As storage time and fermentation increase, the levels of vitamins decrease. As a result of the unknown quantities in the forages and grains, vitamins A, D and E are typically supplemented to ensure adequacy. The timing of this global vitamin shortage does not give much opportunity to feed fresh forages in many parts of the U.S. Many diets in our current systems feed larger quantities of ensiled feeds, especially corn silage, which have reduced vitamin levels.

Fat-soluble vitamins, which include vitamins A, D, E and K, can be stored in the fat tissue of the animal for access at a later time. This leads to the theory that it won't be detrimental to reduce the feeding rate or remove vitamins from the diet for a period of time. How long that period is for an animal is up for debate.

Where does that leave the fortification options during this time of limited supply? One thing that is not an option is to remove fortification from the diet unless it is a last and only resort. It is not a feeding strategy to ignore the requirement of the animal.

The National Research Council (NRC) publishes vitamin recommendations for dairy cattle. These recommendations are determined to be vitamin levels needed to maintain the animal and support production. It is worth noting the research to establish these levels was performed at a time when production levels were well below our current production. Updates to these levels have been made but are not based on direct research. The recommendations vary by life cycle stage and stage of lactation for milking cows. Pre-fresh animals, fresh cows and calves are the most sensitive to vitamin levels supplemented, and care should be taken to provide what these animals need. There is some discussion that these groups need supplementation in excess of NRC.

The NRC recommendations for vitamins A, D and E should be the target supplementation for the lactating animals in this time of shortage. If an absence of supply makes it necessary to reduce supplementation below NRC, this is the place to start. Not supplementing vitamins in dairy rations, as a means of reducing ration cost, will have an unintended cost that will not be realized until breeding and immunity begin to falter. There is usually a price to pay when attempting to shortchange diet ingredients for the sake of saving money.

One alternative strategy would be to feed ingredients that can substitute or extend the effects of vitamins A and E in the ration. In the case of vitamin A, the options are more limited as beta-carotene can be supplemented but at an increased cost to get the level of fortification to

replace the vitamin A. The antioxidant effects of vitamin E can be stretched by fortifying the diet with organic selenium sources or other antioxidant-containing supplements. The cost-effectiveness of these substitutions should be evaluated.

Know what your supplier is providing to your herd. Understand the pitfalls of shorting or removing supplementation from the diet. If the vitamins are removed from the ration, is it because there is not access to supplementation? This is the case for certain suppliers.

Indications are that the precursor for vitamin A will be back in production in March and there will be the need for six to 12 weeks to get the Citral product in the pipeline for further production and the beginning to fill the worldwide channels. This would indicate the industry is in this shortage for a potential of six months. If the vitamins are removed from formulas now, how long will the body storage provide the needs of the animals?

Spring is coming and fresh feeds will be available to lighten the burden for those who can incorporate these feeds into their diets. The best system would be to find a fortification level that will allow continued supplementation to the animals. Some supplementation will be better than none at all.

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