Swine vitamin levels reviewed due to volatility

THE global market for feed-grade vitamins has become extremely volatile over the past few years due to strong demand and the unpredictability of manufacturers.

Recently, large price increases and concerns with supply have occurred for several of the vitamins supplemented to swine diets. In some cases, prices have increased by as much as six times what their cost was a year ago, and some uncertainty exists related to procuring needs at any price.

Swine nutritionists have traditionally erred on the side of excess when it comes to supplementing diets with vitamins, since vitamins represent a relatively small percentage of the cost of producing and feeding a hog to market weight.

This normally low cost — combined with a lack of recent research to define individual vitamin requirements for modern pigs in commercial environments, concerns over the stability of vitamins in mixed feeds and a lack of information on the availability of vitamins in commodity feedstuffs — has led to the common practice of over-formulating with large excesses of supplemental vitamins.

As prices for some vitamins soar in the face of an uncertain supply, it seems prudent to reconsider levels of safety margin and the cost versus reward for over-formulating these nutrients at various stages of swine production.

The National Research Council's (NRC) 2012 *Nutrient Requirements of Swine* publication outlines the vitamin requirements for growing pigs at various stages of growth as well as for the breeding herd, based on existing published research. These values are considered minimum total dietary quantities that should be contained in the diet at the time the diet is fed.

Conversely, Flohr et al. (2016) recently published the results of a swine industry survey that was conducted to characterize supplemental concentrations of vitamins and trace minerals formulated into U.S. swine diets relative to NRC requirements, highlighting the variability in formulated levels and the large safety margins typically utilized.

The Table compares the NRC total dietary requirements for the eight vitamins typically supplemented in swine finishing diets to the weighted average concentrations from the 2016 industry survey for the early- and late-finishing growth periods. Ratios of the weighted average survey values to NRC requirements are also provided in the Table for each growth period.

These ratios suggest that most of the vitamins are typically supplemented at levels two to six times their estimated dietary requirements, with no consideration of vitamins supplied from grain and oilseed-based components of the diet.

An interesting finding of the authors of the 2016 survey was that, among nutritionists who responded, supplemental levels of all vitamins varied by more than 100% from low to high levels during late finishing. Findings on the average vitamin supplementation levels for sows and weaned pigs were also highly variable, with the highest ratios to NRC requirements being 11 times the requirement for vitamin D during the nursery period and seven times the requirement for vitamin K in sow diets.

It is well known that some minimum formulation overages are needed to account for expected losses of vitamin activity during ingredient storage and feed processing, but vitamin stability alone does not require such high formulation levels.

Bottom Line

with
DUSTIN DEAN*

Comparison of early- and late-finishing swine vitamin requirements versus typical industry levels*

		-------Early finishing-------			-------Late finishing--------		
Vitamin	Units	NRC, 25-50 kg	Survey, 23-55 kg	Survey:NRC ratio**	NRC, 100-135 kg	Survey, 100 kg/market	Survey:NRC ratio**
Vitamin A	IU/kg	1,300	5,859	4.5	1,300	4,616	3.6
Vitamin D	IU/kg	150	985	6.6	150	782	5.2
Vitamin E	IU/kg	11	25	2.3	11	20	1.8
Vitamin K	IU/kg	0.5	2.4	4.8	0.5	1.9	3.8
Vitamin B12	mg/kg	0.010	0.023	2.3	0.005	0.018	3.6
Niacin	mg/kg	30.0	24.9	0.8	30.0	19.4	0.6
Pantothenic acid	mg/kg	8.0	17.4	2.2	7.0	13.6	1.9
Riboflavin	mg/kg	2.5	4.8	1.9	2.0	3.7	1.9

*Data adapted from Flohr et al. (2016).
**Calculated using the weighted average mean values for each vitamin from the survey and 2012NRC requirements.
Note: IU = international units.

*Dr. Dustin Dean is a senior nutritionist with NutriQuest.

Additional arguments for higher-than-required vitamin levels relate to concerns regarding the lack of data on vitamin requirements for modern genetics and the possible effects of vitamin status on immune function when pigs are under disease pressure in commercial environments.

The economics of tightening safety margins on vitamins obviously depends upon current levels and how aggressive a producer chooses to be, but as vitamin prices increase exponentially, this difference becomes much more significant. Based on the range of vitamin levels fed in the 2016 survey, it would seem probable that vitamin costs per pig marketed could vary by as much as $1 per pig.

The Bottom Line

Full agreement among nutritionists on vitamin supplementation levels is not likely to occur anytime soon due to the lack of good data on the subject. Nonetheless, feeding large excesses of vitamins as a safety margin does come with a significant cost in the current volatile market environment for feed-grade vitamins.

Conducting a review of vitamin levels to make sure all safety margins are reasonable and logical may offer significant savings.

Further research on individual vitamin requirements for growing pigs and sows with modern genetics and commercial stresses has been needed for multiple decades. Perhaps the increase in the cost of supplementing vitamins will spur research interest and activity in this area.

References

Flohr, J.R., J.M. DeRouchey, J.C. Woodworth, et al. 2016. A survey of current feeding regimens for vitamins and trace minerals in the U.S. swine industry. J. Swine Health Prod. 24(6):290-303.

National Research Council. 2012. Nutrient Requirements of Swine. 11th Rev. Ed. National Academy Press. Washington, D.C. ■