Comments on CFIA's July 2018 proposal

Maximum Nutrient Values Rabbit Feeds

Submitted by the Animal Nutrition Association of Canada

August 24, 2018

The following comments are submitted by the Animal Nutrition Association of Canada (ANAC) and were developed with a team of Canadian animal nutrition experts from ANAC's Nutrition Committee. As we considered the recommendations on proposed maximum nutrient levels, we were mindful of the scope as outlined by CFIA in the proposal:

- to determine those nutrient levels that may impact the health and safety of livestock, humans, and environment;
- to determine those nutrient levels that support a nutritional purpose as opposed to a therapeutic purpose; and,
- to determine those nutrient levels that may produce residues in the resulting food that could be harmful to those consuming the products.

ANAC is the national trade association of the livestock and poultry feed industry in Canada. Our 160 members include feed and ingredient manufacturers and distributors, as well as suppliers of a wide range of goods and services to the feed industry. Taken together, ANAC's membership represents 90 percent of commercial feed manufactured in Canada.

ANAC and our industry team of animal nutrition experts look forward to discussing our comments with CFIA.

GENERAL COMMENTS

ANAC strongly favours the replacement of Table 4 values with scientifically-supported maximum nutrient values based on the impact to the health and safety of livestock, humans, and the environment.

ANAC and its members recognize that the limits being proposed are intended as maximum levels and do not represent target levels for an optimal diet. The elimination of customer formula feeds in the modernized regulations increases the importance of having levels which accommodate the numerous factors considered during the formulation and manufacture of feed. This is especially true in minor

species such as rabbits, where research is notably lacking and recommendations for most nutrients are made based on a very limited number of scientific papers, often with small data sets.

Seasonal and regional variability in nutrient values of commodities available for use in feed must also be taken into consideration. Forages, in particular, can pose a challenge to meeting some of the maximum levels proposed, especially where there is limited data available on actual nutrient levels present in forages (e.g. selenium) or where nutrient levels are inherently high or variable due to the location and environment where they are grown (e.g. potassium). The use of NRC values to determine the contribution of nutrients to the diet from forage is not an ideal source. The NRC values do not accurately reflect regional or even Canadian crop nutrient levels and therefore will be inconsistent with the reality of the Canadian marketplace. ANAC proposes CFIA also consider data from laboratories which are more specific and better reflect regional variations in Canada. To this end, ANAC has convened a committee of animal nutrition experts from across the country to develop a reference for forage nutrient values including regional differences (e.g. selenium) that can be shared with industry and government. To enable industry to comply with the new regulations, transparency will be imperative with regards to the forage values being used by CFIA inspectors.

Below please find our comments on specific nutrient levels proposed as well as our rationale for the levels we recommend.

For rabbits, ANAC supports the proposed levels for calcium, phosphorus, magnesium, sodium, sulfur, cobalt, copper, iodine, iron, manganese and selenium.

POTASSIUM (K)

CFIA is proposing a maximum of 1% potassium in the total diets for all rabbits. Most commercial diets currently contain around 1.5% potassium without any negative effects reported. It will be extremely difficult and often impossible to stay below the 1% maximum proposed by CFIA due to the inherent potassium derived from common ingredients. ANAC thus proposes that the maximum value be 2%.

The unique digestive process of the rabbit means they have unique nutrient requirements. They require dietary fibre, but it must be of good quality as they are not the most efficient utilizers of this fibre. Too much grain, especially if mixed with low quality fibre, can lead to undesirable bacteria flourishing in the rabbit's digestive system leading to enteritis, or diarrhea.

As such, alfalfa often forms the majority of rabbit diets, and is typically the ingredient present in the largest proportion in commercial rabbit rations. However, alfalfa does not pellet well which often limits its inclusion rate in commercial rations to a maximum of about 45-50%. A product that pellets well, such as a cereal grain, must be added to form a strong pellet. Additional protein sources such as soybean meal, corn distillers' grains, and canola meal are added to these commercial rations to improve the protein level and quality. The unfortunate drawback to these ingredients is that, with the exception of the cereal grain, most are intrinsically high in potassium, as can be seen in Appendix I. An example of a typical commercial rabbit ration has been included, which demonstrates how quickly a ration can exceed 1% potassium. It is important to note that nutritionists are not purposely adding potassium into these rations; it is intrinsic to the ingredients.

Furthermore, rabbits will also often be offered forage alongside these commercial feeds. However, forages are often alfalfa or timothy, both of which have high potassium levels which would further increase the amount of potassium in a rabbit's total diet.

TRACE NUTRIENT COMMENTS

As rabbit is a minor species, there is less demand for rabbit feed compared to major species. This means it is often not financially feasible to create custom rabbit preblends. Rather, companies commonly utilize micro premixes from other major species (typically swine or poultry) to meet the nutrient requirements for rabbit. Customizing micro premixes for a rabbit species would result in greater challenges in meeting minimum order production requirements, shelf-life, and keeping the feed reasonably-priced. Consequently, ANAC recommends maximum flexibility for these diets as long as toxicity or safety issues do not exist.

Usage rates of micro premixes formulated specifically for rabbits range from 1 kg to 12.5 kg per tonne of complete feed with the majority around 5 kg per tonne. Higher usage rates are typically required to account for the recommended shelf-life of six to nine months from the date of manufacture. With a typical minimum order quantity of 250 kg (necessary to ensure efficient mixing based on the capacity of the mixers in the vitamin premix facility), 50 tonnes of rabbit feed at 5 kg/tonne would be manufactured. With low feed volume, these rabbit-specific feed premixes would tend to be stocked for a long time with significant portions being thrown out because their shelf-life has been exceeded. This is not financially feasible.

The most typical use rates for poultry and swine vitamin premixes tend to be around 1 kg/tonne. This is often due to the scale capabilities within feed facilities. They are often unable to weigh lower weight measurements within an acceptable accuracy. In order for rabbit feeds to meet the proposed vitamins A, D and E levels by CFIA, feed facilities would have to have the capability of weighing to 0.5 kg to be able to use existing major species premix blends. This would pose problems for a number of feed manufacturing facilities. With no reported issues with the current Table 4 maximums, maintaining the current nutrient maximums for rabbits would allow more flexibility to accommodate use of major species premixes in the manufacture of minor species feed.

ZINC (Zn)

CFIA has proposed a maximum of 150mg/kg of diet DM for rabbits. ANAC proposes a maximum level for zinc of 250 mg/kg of diet DM. This would allow nutritionists flexibility to continue using premixes for other major species in rabbit diets, which is the current practice, while also allowing for a 50 percent reduction from the current maximum.

From a practical perspective, zinc is usually part of the micro premix. As micro premixes from other major species are typically used for rabbit, a maximum of 150 mg/kg of diet DM would be too restrictive.

The maximum tolerable level for zinc as outlined in the Mineral Tolerance of Animals (NRC, 2005) is 500 mg/kg for all classes of animals. This reference states "zinc is relatively nontoxic to birds and mammals. Rats, pigs, poultry, sheep, cattle and humans exhibit considerable tolerance to high intakes of zinc."

Beyond nutritional considerations, the EU on July 20, 2016 lowered the zinc maximum to 180 mg/kg for calves (from 200 mg/kg) and 120 mg/kg (from 150 mg/kg) for all other classes in an effort to reduce zinc excretion in the environment. This reduction is expected to reduce zinc excretion by 20% (EFSA, 2014). However, there is no supporting data at this time to substantiate the effectiveness of this decision.

VITAMIN A

CFIA is proposing a maximum of 16,000 IU/kg in the total diet for all rabbits. This is too restrictive, considering that rabbit feeds commonly contain micro premixes formulated for major species that may have considerably higher levels of Vitamin A. We recommend that the maximum level for Vitamin A be set at 35,000 IU/kg of total diet DM for the reasons below.

Vitamin A levels in poultry feeds typically range from 10,000 IU/kg to 15,000 IU/kg as fed with a current Table 4 maximum of 40,000 IU/kg. In swine, levels range from 5,000 IU/kg to 20,000 IU/kg depending on stage of life. The current Table 4 maximum is 20,000 IU/kg.

In proposing a maximum level of 16,000 IU/kg level, CFIA references the NRC 1987 Vitamin Tolerances of Animals report, which refers to only one study for rabbits where they were fed levels of Vitamin A of 400,000 IU/kg of body weight and toxicity symptoms were observed. In the study, the 16,000 IU level was arbitrarily chosen as a safe upper limit because it was above the requirement for Vitamin A at 580-1,160 IU/kg and below toxicity and consistent with recommendations for humans.

More recent research on Vitamin A supplementation in rabbits sheds light on the upper limits of Vitamin A in the diet. Lebas (1997) lists toxicity as occurring at 75,000 IU/kg in the diet, and Lebas (2000) describes both an experiment and a case study where supplementation of approximately 100,000 IU/kg in the diet restricted growth and resulted in higher rates of stillbirth and birth defects in kits. Mateos et al. (2010) mentions 50,000 IU/kg as being a high rate of supplementation which results in reduced plasma calcium, bone weight, bone ash, and body weight gain. Cheeke (1987) reports that levels above 40,000 IU/kg diet may result in adverse effects on reproduction and increased rates of stillbirth and birth defects. ANAC's recommended level is lower than the levels mentioned in these studies.

VITAMINS D & E

As discussed above, it is not practical for industry to manufacture premixes specifically for rabbits and so major species premixes are utilized. For this reason, vitamin levels for rabbits must align with those of major species. There is room to safely do so as demonstrated by Ringler and Abrams (1970, 1971) who observed probable vitamin D toxicity in rabbits fed a diet containing 23,000 IU of vitamin D per kg (NRC 1977). No vitamin E toxicity has been noted (NRC 1977).

Therefore, for vitamin D, ANAC recommends 2,200 IU/kg of total diet DM as the new maximum. For vitamin E, ANAC recommends 2,000 IU/kg of total diet DM. Both of these levels would be consistent with the maximums allowable in swine premixes (as per the CFIA's consultation summary), which would enable industry to continue to utilize them in rabbit formulations.

Appendix I

Dehydrated Alfalfa		
Potassium, %	**Sulfur, %**	
2.5	0.28	NRC Small Ruminants (2007)
2.32±0.7	0.28±0.01	NRC Beef (2016)
2.37	0.26	NRC Horses (2007)
2.09±0.67	0.2±0.08	Cumberland Valley Forage Lab, average results for Canadian samples analyzed Dec 2013 to present
2.226±0.464	0.253±0.08	Dairy One Forage Lab (2000-2016, average values)
Soybean Meal		
Potassium, %	**Sulfur, %**	
2.2	0.49	NRC Small Ruminants (2007)
2.36±0.22	0.41±0.03	NRC Beef (2016)
2.41	0.39	NRC Horses (2007)
2.35±0.24	0.46±0.05	Cumberland Valley Forage Lab, average results for Canadian samples analyzed Dec 2013 to present
2.295±0.342	0.398±0.055	Dairy One Forage Lab (2000-2016, average values)
Corn Distillers Grains		
Potassium, %	**Sulfur, %**	
1.0	0.45	NRC Small Ruminants (2007)
1.05±0.18	0.66±0.16	NRC Beef (2016)
1.1	0.44	NRC Horses (2007)
1.22±0.18	0.71±0.32	Cumberland Valley Forage Lab, average results for Canadian samples analyzed Dec 2013 to present
1.067±0.272	0.649±0.199	Dairy One Forage Lab (2000-2016, average values)
Canola Meal		
Potassium, %	**Sulfur, %**	
1.3	0.78	NRC Small Ruminants (2007)
1.26±0.18	0.71±0.1	NRC Beef (2016)
1.41	0.73	NRC Horses (2007)
1.22±0.18	0.722±0.13	Cumberland Valley Forage Lab, average results for Canadian samples analyzed Dec 2013 to present
1.289±0.165	0.87±0.18	Dairy One Forage Lab (2000-2016, average values)

Example of a typical rabbit ration, using Small Ruminant NRC values				
Ingredient	**Amount (%)**	**K, %**	**K % provided**	
Dehydrated Alfalfa	50	2.5	1.25	
Barley	14	0.6	0.084	
Beet Pulp*	10	1.4	0.14	
Canola Meal	8	1.3	0.104	
Soybean Meal	8	2.2	0.176	
Corn Distillers Grains	5	1	0.05	
Vitamins & Minerals	5	0	0	
Total	100		1.804	% K in total diet
*value from Small Ruminant NRC (2007)				

Example of a typical rabbit ration, using Small Ruminant NRC values				
Ingredient	Amount (%)	S, %	S % provided	
Dehydrated Alfalfa	50	0.28	0.14	
Barley	14	0.16	0.0224	
Beet Pulp*	10	0.22	0.022	
Canola Meal	8	0.78	0.0624	
Soybean Meal	8	0.49	0.0392	
Corn Distillers Grains	5	0.41	0.0205	
Vitamins & Minerals	5	0.05	0.0025	
Total	100		0.309	% S in total diet
*Value from Small Ruminant NRC (2007)				