The Current Status and Future Outlook of Poultry Nutrition in the USA

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Introduction

A few major topics have dominated the discussions surrounding feeding poultry in the last few years. The first among these is how to deal with the historically high feed prices during a time of meat oversupply. As margins for poultry have improved and feed prices settled to the new normal, poultry nutritionists must begin again to look at the new challenges and opportunities. Some of the concerns of poultry nutritionists today are: (1) use of new ingredients to lower feed cost, (2) evaluation of feed additives to improve animal performance and reduce the impact of animal waste with the use of fewer traditional medications, (3) determining the optimal nutrient requirements for bird performance and, (4) how to keep up with new technology for animal production. This paper will discuss these subjects with a look forward to how changes will affect poultry nutritionists.

Ingredients

In some respects, the basis for animal diets in the USA has not changed at all. Just as it was 50 years ago, roughly 60-75% of the total makeup of poultry diets today is corn and that will not likely change. What has changed and will continue to change is the corn itself. Practicing nutritionists see this today with the lower amount of protein over previous years. That protein has been replaced with starch as yields have increased. While this has been good for the corn farmer, many nutritionists feel it has been detrimental to feeding poultry. I differ with this point because the major purpose of corn is to provide energy. As yields increase, more bushels are available and protein is always available from other sources. However, corn genetic companies are working to improve the nutrient package of corn to provide higher amounts of protein, fat and potentially other components, such as enzymes. It is uncertain which of these will take root, but be sure that the corn kernel will continue to change as companies look to improve both end use and agronomic traits.

The second mainstay of animal feeds is soybean meal. The major change in soybean meal over the last several years has occurred on the processing end. The consistency of the soybean meal in the USA is second to none, and it is seldom that you hear of performance problems due to under or over processed meal. Although changes in oil:protein ratio of soybeans has occurred, most of the work in soybean composition has centered around the fatty acid composition of the oil. However, the major improvement to soybean meal going forward must center on improving the carbohydrate portion. The indigestible carbohydrate portion of soybeans is largely responsible for meal's low energy value in poultry. Use of genetic stock with more available carbohydrates will allow meal to provide higher value to the feed and keep its place as the major protein supplier to animal feeds.

The third constant bulk ingredient for poultry feeds is fat. In the past it was common place to add 3 to 6% fat to broiler diets and up to 10% or more fat to turkey diets. The standard inclusion in today's broiler diets is around 1-3%. Some diets with higher energy by-products may actually get below 1% inclusion. The reason for the change is multifaceted, including: (1) modern higher yield strains in modern housing seem to respond less to dietary energy, (2) increased cost of fat, (3) use of exogenous enzymes, and (4) focus on caloric conversion versus feed conversion. The biggest change in feed fat prices today is they follow the energy market instead of the corn market (Gilbert, 2009). Therefore energy policy and the availability of alternative markets for fats that traditionally went to animals will have a major influence on the amount of fat used in feeds in the future. I can imagine a day when no exogenous fat is added to poultry diets.

Dried Distillers grains (DDG) is fast becoming a staple of poultry diets in many areas of the country. This ingredient is available today in vast quantities because of energy policy. Camelina meal was recently approved for broilers and is grown mainly as a fuel oil crop in areas not adapted to other crops. Will it become another DDG? Doubtful, but other potential by-products from the biofuels industry, whether from camelina or seaweed, may find their way into poultry diets in the future.

Feed Additives

Feed additive is a broad term that usually refers to low inclusion ingredients such as premixes, enzymes, medications and amino acids. Enzymes have evolved greatly over the last 10 years and thanks to improved heat stability and lower cost liquid application systems, enzymes are now included in most tons of broiler feed. Today there is a confusing array of phytases, proteases and NSP enzymes available to nutritionists. The decision around the use of enzymes is one of the most difficult that nutritionists have to make for several reasons. First, the companies marketing enzymes have different methods for analyzing similar enzymes. Secondly there is a lack of information on the substrates for these enzymes. Thirdly, enzymes activity is not linear and does not fit well in a linear formulation package. Finally, the impact of enzymes on the physiology of the GI tract is very difficult to predict and has a major influence on responses of the animal.

Today, three synthetic amino acids, methionine, lysine and threonine, are available to the industry at competitive prices. Threonine was introduced most recently and is still being adopted in the industry. These amino acids have allowed nutritionists to improve performance and yield of modern broilers and turkeys while reducing total nitrogen intake. The next generation of amino acids may promise more of the same. Valine and Isoleucine are seen by many as the next limiting amino acids and are the pressure points keeping crude protein elevated in diets using the three available synthetic amino acids. The availability of these amino acids and others such as arginine, may allow further reductions of crude protein in diets without sacrificing performance or yield.

Control of intestinal disease such as coccidiosis and necrotic enteritis has traditionally been assigned to coccidiostats and antibiotics. Societal pressure on the use of low level antibiotics has led to the evolution of new feed additives to develop a healthy GI tract and help control disease. Probiotics, prebiotics, yeast cell walls, and essential oils are all available today, and although they have been widely

researched, are still not broadly adopted in the industry. Some companies have proactively removed antibiotics with success and it is very possible that the US will follow Europe in banning the use of low level antibiotic use within the next decade, so these products will be used more in the future to improve health. This is especially true as the industry looks for better ways to control coccidiosis as some of the mainstay coccidiostats become less efficacious.

Nutrient Requirements

The systems in which we express nutrient requirements have been widely debated for years and there is little sign the debate is going away. Often times these debates are largely academic and don't affect the actual formulation that much. However, nutritionists want to have confidence in their chosen systems and more importantly they must be consistent in the implementation of their system across all ingredients. Two systems that have received much attention in the last few years are amino acid digestibility and net energy.

Formulating using digestible versus total amino acids is now widely accepted as a more accurate way to express amino acid requirements. Many researchers have suggested that using ileal digestible AA is a more representative way of expressing requirements in broilers versus the traditional system using adult cockerels used by most US nutritionists today. In the end, either system will produce reasonable results, but the IAAD may win out in the long run due to the complications of animal care and use with adult cecectomized cockerels.

Energy systems have received much interest over the years mainly due to the importance of energy to bird performance and diet cost. The debate over TMEn using cockerels versus the traditional ME predates me a few years, but many nutritionists are very passionate about this issue. Several net energy systems have been proposed for poultry within the last several years in Europe (Van Der Kils, 2008), but few, if any, US nutritionists have adopted this approach. The net energy approach holds some appeal to me since it gets closer to Frap's productive energy system, which always seemed to me the most predictive of animal performance. However, before any nutritionist is going to spend the enormous amount of time to convert their system, it will have to show a substantial advantage over the current systems either in terms of accuracy, simplicity or bird performance.

Technologies and Skills for the Future

It is difficult to predict the adaptation of new technologies to any particular area, but the improvements in understanding of nanotechnology and epigenetics hold promise for improving animal health and welfare, food safety and productivity while reducing the impact of animal agriculture on the environment. Just as the adaptation of enzymes did in the last decade and the evolution in the understanding of intestinal microbiology is doing today, these technologies will require the production nutritionists to develop new and broader skill sets. These skill sets may be markedly different than previous generations of nutritionists.

Summary

The current status of poultry nutrition is shaped by the changing economic climate, new developments in ingredients and improvements in technologies such as enzymes and amino acids. The changes in poultry nutrition in the future will be shaped by the counter current forces of the need for higher volumes of low cost, high quality protein and the demand by consumers to feel good about what they are eating. Poultry producers will adapt differently to these forces to meet different niches. The job of the poultry nutritionist will be complex to balance the demands for societal concerns while helping to keep poultry the USA's highest quality, lowest cost source of protein.

References:

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