

MANAGING POULTRY WITHOUT ANTIBIOTICS

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When discussing the use of antibiotics in disease management of poultry, one should consider the reasoning behind the use of antibiotics in the industry. In today's regulatory environment, and pressures placed on poultry companies by consumer groups and customers, we are at a point where antibiotic use needs to be justified. This justification cannot be simply financial or for production gains in the absence of disease, but must include environmental impact and any contribution to antimicrobial resistance. The routine use of antimicrobials for growth promotion and use of therapeutic antimicrobials important in human medicine are targets of scientific controversy and public debate. All aspects of food animal production are being tried in the court of public opinion. The influence of consumer groups, human health professionals, and international trends are applying pressures on companies. This paper will give a perspective on the use of growth promotion antibiotics and therapeutics and what may be needed to minimize if not eliminate these from our production. The reality of the controversy regarding antibiotic use is here and now, and, must be addressed.

When addressing the growth promotion aspect of antibiotic use, we must consider the purpose behind such use. The "sub-therapeutic" terminology, which has been used in the industry for years, has been a thorn in our side. Considering the term's strict definition, sub-therapeutic use is not easily defensible. I have tried for years to replace sub-therapeutic with disease prevention. In fact, the majority of our gram-positive antibiotic use that results in growth promotion has, in reality, been preventing clostridial enteritis in the face of sub-clinical coccidia challenge. Other advantages of growth promoting antibiotics such as increased hot and chilled carcass weights, increased breast yield, decreased feed conversions and increased average daily gains, are extremely important in our industry, but are not easily defensible in today's regulatory environment. The use of these antibiotics, over the years, has been a consistent tool for the industry to enhance our production. Now we are potentially faced with how to manage our poultry without these antibiotics. Many companies have already been involved in phasing out feed-grade antibiotic use by a variety of means. In my opinion, one of the fundamental challenges is to control coccidia and avoid the *Clostridial* spp. opportunistic infections. New technology involving coccidia vaccination may play an important role in minimizing the

future use of feed grade necrotic enteritis control antibiotics. The role of nutrition (wheat, fish meal, etc.) has been incriminated in predisposing the intestine to *Clostridial* spp. infections and should also be considered. Growth promotion has not been the only effect of necrotic enteritis control. Another benefit of the use of antibiotics in poultry is maintaining intestinal health and integrity. Automated processing of broilers necessitates a healthy intestine to prevent breakage and carcass contamination during evisceration. Both intestinal disease and systemic infections can have a negative effect on intestinal tensile strength. Reports have been lacking as to the effect of the withdrawal of antibiotic use and its relationship to contamination at processing, but still must be considered as an integral part of antibiotic use in poultry.

Other procedures and/or products that will be considered in lieu of growth promoting antibiotics are: non-antibiotic growth promotants, nutrient density, probiotics, and litter/environment acidification to control resident bacterial populations. To minimize controversy regarding growth promotion antibiotics, those unrelated to therapeutic drugs used in human medicine or non-antibiotic growth promotants may have major roles in the future. The absorption of nutrients from healthy intestine should not be minimized. The absence of antibiotics in the feed may alter absorption of nutrients. Therefore, nutritionists are vital to maintain our current production standards. Acidification of the litter and environment potentially can control/inhibit resident bacteria to aid in the control of intestinal disease. Like many other food animal production industries, probiotics have a potential role in the future of poultry disease management and production. Like antibiotics, these products are limited in their availability, and have regulatory concerns associated with their use.

The future of the poultry industry without our growth promoting antibiotics will have an impact on production and therapeutic use for intestinal disease will most likely increase. Some companies are better prepared to handle the changes that may be needed than others. Preventing coccidiosis, I believe is fundamental. The industry must also be prepared for not having the other benefits of the growth promotion antibiotics (increased carcass weights, maintaining intestinal integrity, improved hot and chilled carcass weights, breast yield, etc.). Genetic research must include intestinal disease resistance while maintaining current production standards.

Minimizing and/or eliminating therapeutic antibiotics present a little different picture for the poultry industry. I personally feel, that taking away our therapeutic arsenal from the industry is a mistake. We have an obligation, as veterinarians and poultry health personnel, to minimize pain and suffering in our poultry flocks through disease treatment. Regardless of how one wants to interpret their use in our industry, healthy and disease-free flocks are more profitable. However, with that said, it is clear that the use of our most potent antibiotic class, the fluoroquinolones, are in danger of being eliminated. The battle for fluoroquinolone survival is ongoing, but we must position ourselves for managing without these effective antibiotics. It is not going to end here, however. There are numerous consumer groups, human health care professionals, and anti-animal agriculture groups that will not rest until all antibiotics used in humans are not available for use in food animal production.

The majority of therapeutic antibiotic use in poultry is for the treatment of airsacculitis caused by *E. coli*. We know that *E. coli* is a secondary opportunistic bacteria that predominately complicates primary infections such as infectious bursal disease, chicken anemia virus, infectious bronchitis, *Mycoplasma gallisepticum*, Newcastle disease, *Ornithobacterium rhinotracheale*, and others. In turkeys, hemorrhagic enteritis and *Bordetella avium* must be added to the list. If we are to effectively eliminate the need for treatment of airsac, then prevention of primary infections is paramount. If we look at the history of infectious bronchitis, as an example, we can understand that implementing prevention programs based on vaccine technology is problematic at best. Many remember when the variant Delaware 072 was identified in the industry. The biologic industry responded with a vaccine that, early in its use, controlled this infection quite well. Then we were faced with "072 variants" and found that over the years, the vaccine only partially protected against these isolates. This same saga continued with variant infectious bursal disease and other infectious agents that have changed over time. Vaccination technology has provided an effective control measure for poultry disease in the past and should continue to be a corner stone in preventing primary disease. Non-specific immune enhancers and other vaccination technology will continue to be of prime importance to the industry.

So we are left with managing our flocks without disease prevention and therapeutic antibiotics, the purpose of this talk. It is clear to me that if we are to be forced into this avenue of raising poultry, thinking inside and outside the box is in order. In my thought process, investigating solutions for this problem will have a potential financial hardship to growers, companies and ultimately the consumers.

First, the importance of down time in controlling many of our diseases has been discussed for years; and we must include this important tool in breaking disease cycles. I am comfortable in placing down time as an important management tool for controlling disease outbreaks that would be treated therapeutically. But how much is enough. We have basic information for the survival of most infectious agents outside the bird. However, laboratory information may not reflect what occurs in the field. When down time is increased, i.e. greater than two weeks, companies and growers suffer financially. Unlike some of our international counterparts, the US does not subsidize poultry production. When flocks are not in the house, the grower is not making money.

Density is another area of investigation. Too much and production is affected, not enough and activity increases with resulting scratches and inflammatory process increasing. There should be a happy medium between the two. Again, when we decrease the potential pounds of meat produced per flock, we reduce both grower payments and financial returns to the company.

Cleaning and disinfecting between flocks helps break disease cycles. However, it is problematic to perform each time a flock is raised. The expense of cleaning and disinfecting and replacement of shavings can be a considerable financial investment. Also, one must ask where that litter is to be placed. There are environmental concerns

with litter clean out. Alternatives may include the use of litter treatment for acidification to control bacterial populations.

Rodent and insect control, especially those incriminated in the harboring and transmitting poultry viruses and bacteria, will be important in our future without antibiotics. Darkling beetle control will continue to be important.

Environmental management has a significant impact on our production. Temperature, ammonia control and ventilation are a constant battle, especially in wintertime, in our confinement houses. We must continue to focus on maintaining adequate ventilation, temperature and ammonia control. Litter moisture is controlled through proper ventilation that will control coccidia oocyst sporulation that helps maintain optimal production parameters and indirectly control necrotic enteritis. Ammonia control helps minimize the effect of viral respiratory infections and prevents secondary opportunistic bacterial infections.

Decreasing or eliminating bacterial contamination on the carcass at the processing plant may be the most powerful tool we have, to minimize the controversy over antibiotic use. Much of the concern over antibiotic use in all classes of food animal production centers around the bacteria on the carcass. It is thought that through the use of antibiotics, commensal bacteria such as *Enterococcus* spp., *Salmonella* spp., and *Campylobacter* spp. are also exposed to these antibiotics. If these bacteria survive the processing procedure, they are a potential for human exposure through food borne illness. Likewise, bacteria can also transfer resistance to potential human pathogens through exposure via the food chain. Whether you agree or disagree with these thoughts, they are the underlying reasons for concern regarding using antibiotics in animal agriculture. Intervention strategies at processing include: irradiation; increased carcass rinses; and antibacterial rinses. I look at these intervention strategies as helping maintain our current arsenal of therapeutics and potentially safeguarding removal of our disease prevention antibiotics.

Last, but not least, biosecurity must be discussed. Preventing the introduction and spread of diseases within and between farms is an important tool. Most biosecurity measures are of prime concern when reportable diseases are diagnosed. Increasing biosecurity for endemic disease has a high price tag and it is often difficult to determine cost effectiveness of such procedures. Nevertheless, ongoing biosecurity programs that prevent introduction and spread of disease should play a significant role in the future.

In 1995 the American Association of Avian Pathologists sponsored a symposium regarding drug and therapeutic use in poultry. Dr. Greg Stewart gave the last talk of the symposium, "The Future of Antibiotic Use in Poultry". Many of the points Dr. Stewart addressed were very effective in predicting the future. He pointed out there were 28 diseases or conditions in poultry that had no drug approved for use, or the current approved drug was essentially not effective. That has not changed and has worsened. He stated, at that time, there was 7 drugs that prices had raised so sharply that made them cost prohibitive, and "consumer interest groups and the regulatory process will impact current approvals and future approvals". So as you can see, the writing has been on the

wall for quite some time. We have been in a “drug use spiral” since the nitroimidazoles and the nitrofurans were removed from the market in the 90’s.

Many areas have been touched upon in this paper. It most likely will take combinations of many of the procedures mentioned to succeed. No single item is the magic bullet. Some companies have already implemented programs eliminating feed grade antibiotics and fluoroquinolone use. Approaches to antibiotic use may be different depending on whether the goal is to prevent antibiotic removal from the market or managing our flocks after their removal. Many questions remain unanswered. Is the proactive approach too late? How much is the industry willing to do to prevent the loss of antibiotics? Will science vindicate food animal production in the human antimicrobial resistance controversy? Will it be too late for the industry? Time will tell.