

The Greatest Challenge Facing Agriculture over the Next 5 Years

LaTisha Judd, Doctoral Student

Department of Animal and Avian Science, University of Maryland

Over the last 100 years, the field of agriculture has focused on improving the efficiency of production. The emphasis has been on growing crops and livestock bigger, better, and faster. Although we have remained within the guidelines of policy and procedure passed down by the USDA and FDA, we have still unleashed unforeseen consequences in our quest to improve food sources. We have become more focused on quantity rather than quality and are now facing issues of antibiotic resistance due to overuse in both crops and livestock. As a result of these challenges, I foresee agriculture as having to now try to merge conventional practices with new readily available technology. In the next five years, the key focus will be on improving animal health, reducing antibiotic overuse/resistance, as well as finding a way to effectively use techniques that will allow genetic modification of crops that aid in retaining the nutritive value of the crops but not creating a super plant that can have adverse effects on the livestock or humans consuming them.

The common use of antibiotics has been therapeutic and preventative. Animals are given antibiotics in their feed or water to prevent disease and infection. While this practice has reduced the mortality of animals from disease, thereby increasing the number of animals available for consumption, it has also resulted in a severe increase of resistance to the antibiotic by pathogens. Microbes are now becoming stronger and more infectious due to increased exposure to our commercial antibiotics. In recent years, as this issue has been more prevalent there has been a shift of focus in trying to produce organic crops and livestock. Antibiotic use as a preventative measure will not be an allowed practice in the US starting this year. Several countries outside of the United States have already stopped using antibiotic supplements, and the United States will begin to prohibit them in 2015. While this may result in an increase of infection in animals, or reduce the amount of cultivatable crops, it is a step in the right direction.

Microbiome studies are at the forefront of research as more and more evidence shows that gut microbes have an influence on our genetics, immunity, environment, and a host of other factors. Current research has begun to link the microbiota of humans to certain diseases such as obesity and diabetes. As agricultural scientists we would be remiss if we did not at least pose the

question of, “What role do microbes play in animal health?” and most importantly, “How can we manipulate these microbes in a safer and more cost-effective way than using antibiotics?”

Researchers have identified the areas that need improvement in agriculture. I believe the next five years should be spent bridging the gap between general practices in raising livestock and crops and the technological aspects that can improve these methods. For livestock, understanding their microbial environment will aid in learning how to reduce infection of pathogenic agents. There needs to be other practices and policies implemented that will yield alternative treatments to antibiotic use. Understanding the mechanisms and mode of actions behind microbial infections will allow researchers to combat infection on a genetic level.

The use of genetically modified (GM) crops will most likely increase over the next five years, as the demand for food sources continues to grow. GM crops can not only improve yields and cost efficiencies, but can also help decrease environmental damage and improve nutritional health. For example, GM crops can improve vitamin or amino acid composition or decrease the need for pesticides. I believe that technologically these practices of growing GM crops have already been well implemented. The next step for agriculture as far as plant products are concerned is to have extension programs that help consumers understand the growing need for these crops. The general public has concerns on the use and effects of GM foods. I believe that a program should be initiated to deal with irrational fears. People hear the term “genetically modified” and instantly assume that the plant is in some way harmful to them. If people were better informed, it would alleviate some of the concern and possibly allow these GM foods to become a source of widespread consumption.

Over the next five years, agriculture will continue to expand and grow. There have already been positive steps to steep some of our common practices in raising livestock for production and consumption. There are many challenges that continue to face agriculture but I think the initial goals need to focus on finding an alternative use to antibiotics in animals, and outreach to the consumer to further the understanding of genetically modified foods and their potential benefits to reduce hunger. As our population continues to grow, there is a sense of urgency in regards to a need for newer practices, and innovative use of the technological tools we have readily available. If we are able to facilitate these concepts not only in the coming years but on a long-term basis, there will be potential benefits to animal health, human health, and the possibility of meeting the world’s growing needs for supply in an environment of limited demand.