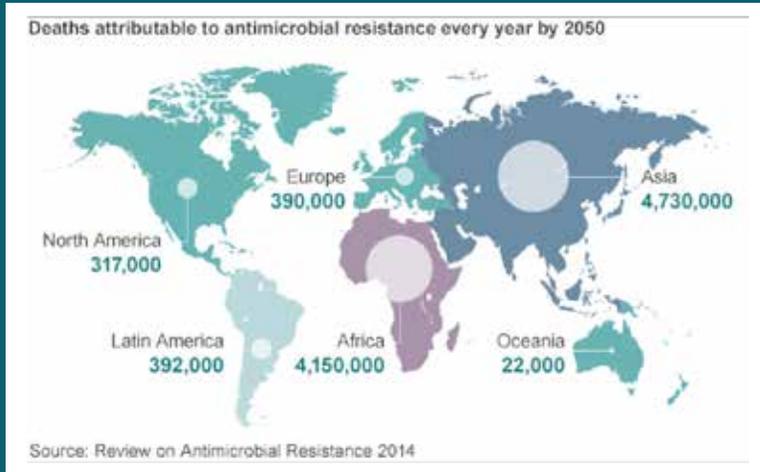


TACKLING AMR IN THE FOOD CHAIN

By Philippe de Lapérouse



Antimicrobial resistance (AMR) has become a major cause of concern for global health. In both developed and undeveloped countries, many common infections are becoming resistant to the antibiotics used to treat them, resulting in extended illnesses and an increase in deaths.

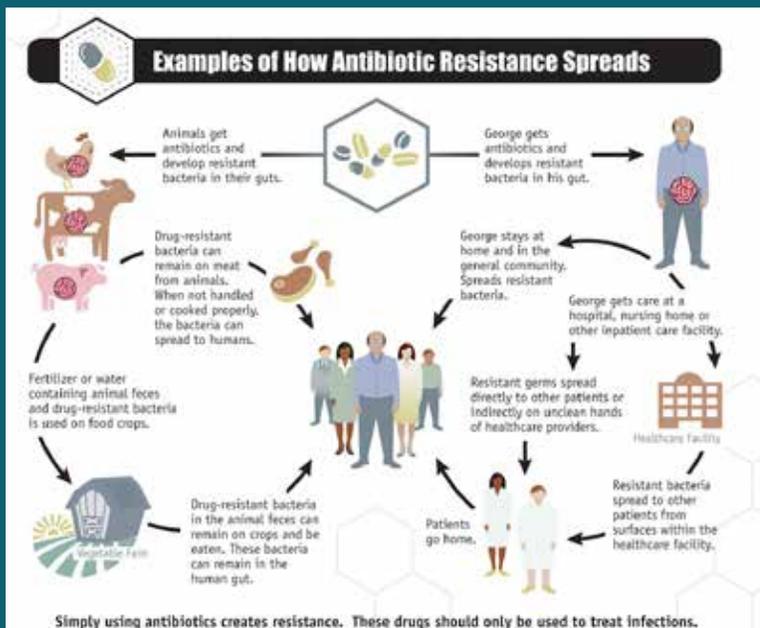


According to the Centers for Disease Control and Prevention, "each year in the United States, at least two million people become infected with bacteria that are resistant to antibiotics and at least 23,000 people die each year as a direct result of these infections." *The Review on Antimicrobial Resistance*, published in 2014 under the sponsorship of the Wellcome Trust and the UK Department of Health, predicts a dire increase in mortality across the globe by 2050 if AMR is not addressed aggressively.

RESPONSE TO AMR CHALLENGE

In September 2016, the United Nations General Assembly held a meeting in New York to address antimicrobial resistance. This meeting was only the fourth time in the history of the U.N. that the General Assembly addressed a health topic, categorizing AMR as a crisis on par with HIV and Ebola.

Consumer advocates, governmental bodies, international health organizations, and the media have increasingly been calling for the reduction of "medically important" antibiotics (those considered critically important for treating human diseases) in food animal production to forestall increasing AMR, which is the ability of a microbe to mutate and develop resistance to antibiotics used repetitively to treat humans and food production animals. Numerous cases of AMR bacteria have been found worldwide on both on farms and in meat products exiting the slaughterhouse, raising concerns over continued use of antibiotics in food animal production, which accounts for a major consumption of antibiotics on a global basis.



The FDA estimates that antibiotics used in food animal production in the U.S. account for over 80 percent of all antibiotics sold or distributed in the country, and that over 60 percent of antibiotics distributed for food animals from 2009-2013 were "medically-important" drugs.² In China, which is the largest consumer of antibiotics in the world, it is estimated that over 50 percent of all antibiotics are used in food animal production³

In developed markets, such as the U.S. and the European Union, consumers are focused on the origin of the food products they consume which has led to tremendous growth in demand for both organic and antibiotic-free (ABF) milk, meat, and eggs. Consumer demand in the U.S. for “No Antibiotics Ever” (NAE) production⁴ has experienced significant growth over the past decade. In the 2009-2013 period, retail sales of NAE chicken increased from \$500 million to over \$1 billion. This consumer trend is driving large restaurant chains such as Chipotle and Panera to develop antibiotic-free supply chains, with other restaurant chains such as Subway and McDonald’s announcing plans to do so soon. This trend also is prevalent in developing countries such as Thailand and Brazil where the growing middle classes are also spending more of their budget to assure that the food they consume is free of antibiotics.

To meet rising consumer demand for animal protein products derived from livestock (beef, dairy, and swine) and poultry (broilers and laying hens), producers have been administering antibiotics therapeutically in high doses via injection or drinking water to animals exhibiting a specific illness. In addition, antibiotics have been administered via feed as preventative treatments using sub-therapeutic doses during specific phases of animal production to prevent contagion of a group of animals, and as growth promoters (*Antibiotic Growth Promoter* or *AGP*) administered at a low dosage on a continuous basis to increase production.

The EU, which has been at the forefront in regulating antibiotics usage in food animal production, banned the use of AGP’s in 2006 and is currently drafting legislation to ban the use of antibiotics for preventative treatments. Several member states of the EU have enacted regulations at the national level to further restrict the use of antibiotics in food animal production. In 2013, the U.S. enacted guidelines limiting the use of “medically important” antibiotics in food animals. This was followed by legislation going into effect this year that prohibits the use of “medically important” antibiotics as growth promoters and requires increased veterinary oversight for antibiotic usage.

Due to heightened media coverage and consumer awareness of the issue, the use of antibiotics for preventative applications is also expected to be phased out in the U.S. in the near-future. Other countries with significant food animal production sectors that also sell into the export market, such as Brazil, China, Mexico, and Thailand, are expected to adopt similar practices to ensure that they remain competitive, and to address growing consumer concerns in their domestic markets.

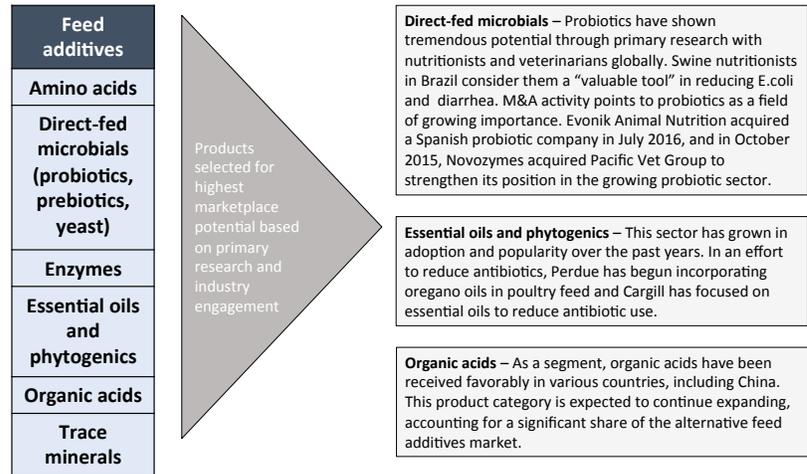
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CHALLENGES FOR PRODUCERS

Not surprisingly, this trend is posing a major challenge to producers and creating opportunities for feed additive manufacturers, including the pharmaceutical sector, to develop alternatives to antibiotics that will provide similar effects to AGP's and some preventative applications of antibiotics. These include direct-fed microbials (probiotics, prebiotics and yeasts), essential oils derived from plants, beneficial microbes, and organic acids.

Direct-fed microbials, essential oils, and organic acids have emerged as three segments for focus



Source: HighQuest analysis.

As nutritionists, veterinarians, and producers conduct field tests of these products, they are coming to the realization that promoting healthy guts in food animals is not simply an issue of replacing antibiotics used for preventative treatments and growth promotion with alternative products, but that a holistic approach will be necessary. In addition to the development of new products used in different modes of application, this will require a willingness to adopt a new mindset regarding information systems and operating practices to manage the production cycle.

Companies active in this sector include well-known multinationals as well as regional players and recent start-ups.

Competitive landscape for health promoting feed additives

Product	Description	Major Players
Amino Acids	Synthetic feed additive used to optimize nutritional requirements of the animal. Category includes several amino acids but largest market is for methionine.	<ul style="list-style-type: none"> • Adisseo • Ajinomoto • Evonik • Novus
Direct-fed microbials (DFM's)	Products containing live bacteria and fermentation products, including prebiotics, probiotics, symbiotics, and yeast. Improve animal performance and gut health through production of antimicrobials and stimulating the immune response of the animal.	<ul style="list-style-type: none"> • Adisseo/Novozymes • AB Vista • ADM • Alltech • Biomim • Zoetis • Danisco Animal Nutrition • DSM • Evonik • Kemin • Lallemand
Enzymes	Compounds derived from various sources that improve digestion efficiency by breaking down of specific nutrients in the feed. Different enzyme products such as phytases, carbohydrases, and proteases are commonly used.	<ul style="list-style-type: none"> • AB Vista • Adisseo • BASF • Danisco Animal Nutrition • DSM/Novozymes • Kemin • Novus
Essential Oils & PhytoGENICS	Plant-based products that promote digestion and animal health by promoting antimicrobial activity and stimulating the immune response. Essential oils derived from thyme, cinnamon, and oregano are commonly used.	<ul style="list-style-type: none"> • Biomim • Danisco Animal Nutrition • Delacon • Provimi (Cargill)
Organic Acids	Acids that lower the pH of the GIT so that the growth and propagation of undesired microorganisms is largely inhibited. Additional benefits include improved protein digestibility, improved litter quality, and increased shelf stability of feed.	<ul style="list-style-type: none"> • Addcon • BASF • Conbion-Purac • DSM • Provimi (Cargill) • Selko • Anpario • Kemin • Novus • Pancosma • Perstorp • Bayer
Trace Minerals	Minerals such as copper, zinc, and manganese that are added to feed in small quantities. Trace minerals have been shown to increase numerous health and performance factors, including immunity/livability, reproductive health, and eggshell quality.	<ul style="list-style-type: none"> • Novus • Selko • Zinpro

OPPORTUNITIES FOR PRODUCERS AND INVESTORS

Broiler production in the U.S., the world's second largest broiler exporter, is dominated by integrated, large-scale, and highly professionalized large producers such as Tyson, Pilgrim's Pride, and Perdue. In recent years, these companies, which drive trends and innovation within the industry, have responded to consumer concerns over food safety/security and improved nutrition by adopting new production practices, including launching organic and ABF products. It is interesting to note that whereas pressure for reducing antibiotic usage in markets such as the EU and China is coming from regulators, in the U.S. it is coming from the large retailers such as Costco, Wal-Mart, and Whole Foods, which are responding to consumer demand. This situation is providing established animal protein companies as well as start-ups with opportunities to offer new products to consumers.

Based on interviews HighQuest recently conducted with livestock and poultry producers, nutritionists, veterinarians, and government regulators across several key markets in North and South America, Europe and Asia, opportunities were identified to develop alternative products to replace antibiotics and new hardware/software solutions to support the adoption of new management practices in food animal production systems. We estimate that the potential market for replacing antibiotics used as AGP's alone will exceed \$5 billion within the next five years. Given the risks at stake and the likelihood that increased restrictions will continue to be placed on the use of antibiotics in food animal production, we expect that the possible market potential for this sector will increase dramatically over the next decade. Companies that develop effective products and services that support increased production of meat, milk, and eggs to meet growing global demand while minimizing antibiotics usage stand to gain handsomely. 🌍

SOURCES:

1. CDC - <http://www.cdc.gov/drugresistance>
2. FDA – "2013 Summary Report on Antimicrobials Sold or Distributed for Use in Food-Producing Animals."
3. Wu, Alex (12 January 2012). "Livestock in China Given Too Many Antibiotics". The Epoch Times. 28 August 2013
4. In the U.S., there is a distinction between meat labeled "antibiotic-free" and "no antibiotics ever." The former refers to a lack of antibiotic residue in the meat, while the latter refers to a guarantee that no antibiotics were used during the production of the meat.

ABOUT THE AUTHOR

Philippe de Lapérouse is managing director of HighQuest Partners, a leading strategy advisory and consulting firm with offices in Boston and St. Louis. HighQuest advises strategic players – those operating in, and financial investors allocating capital to – on the global food and agricultural value chains in regard to making informed decisions on strategy and resource allocation.

Lapérouse chairs the Global AgInvesting conference series. He can be reached in St. Louis at +1.314.994.3282 or via email at pdelaperouse@highquestpartners.com. For more information on investing in the agricultural sector, visit www.globalaginvesting.com.