

Using Meat Labels to Communicate the Risk of Antimicrobial-Resistant Bacterial Infections from Foods of Animal Origin:

The Case for a Balanced One Health Approach to Raising Food Animals

G. Donald Ritter, DVM, ACPV

Poultry Business Solutions LLC, Salisbury, Maryland

Abstract

Consumers are increasingly confused by the numerous meat labels confronting them in the meat case. Most meat labels do not provide actionable information and many labels only add to consumer confusion. While many consumers are willing to pay a premium for products with specific attributes, the trade-offs and unintended consequences associated with various animal raising programs are not transparent and often poorly understood. Adding to this confusion is a tendency toward the use of “absence labels” on meat products that can create a negative perception of unlabeled conventional products that may or may not include the attribute in question. Communicating with consumers about the complex issue of antimicrobial resistance (AMR) is challenging. A more balanced approach to raising food animals is a new consumer choice label program based on principles of One Health that provides transparent information to consumers with mandated antibiotic stewardship practices to reduce risk of AMR originating from food animals. This holistic program strives to provide optimal health outcomes for animals, people, and the environment and avoid the negative consequences sometimes associated with more narrowly focused programs.

Introduction

The removal of all antibiotic use when raising food animals, a practice known as “no antibiotics ever” (NAE), has become a valuable marketing tool for many meat producers. A major concern of the use of antibiotics in food animals is that it may increase the risk of antibiotic-resistant bacterial infections in humans through several pathways.¹ For antimicrobial resistance (AMR) to spread from farms to consumers via handling or consuming foods of animal origin, numerous sequential events must occur, and for many of these events the risk is uncertain. Non-foodborne spread of AMR from animal agriculture may also occur via other mechanisms such as direct contact with food animals, environmental spread of antibiotic-resistant bacteria from the farm or from secondary human-to-human transfer of farm acquired resistant bacteria in the community. Government mandated labels only address safe food handling, while voluntary labels target actual or perceived quality attributes related to specific animal raising practices. All voluntary label claims on meat and poultry products require prior approval from the United States Department of Agriculture, Food Safety Inspection Service (USDA-FSIS), while similar claims on milk and egg products are regulated by the Food and Drug Administration (FDA). One popular voluntary label claim, “no antibiotics ever,” is primarily marketed on chicken products and indicates the total absence of antibiotics used in raising the animals. Research suggests that there is widespread confusion and frustration among consumers surrounding such negative “absence labeling,” a practice that implies that similar unlabeled products may include the attribute or practice in question, which may or may not be true. A survey completed by ORC International found that 73% of consumers believe that antibiotics are present in most chicken

meat despite federal regulations prohibiting unsafe levels of antibiotic residues from being present in any meat sold in the United States.^{2,3} Removing all antibiotics from animal production may at times put the health and welfare of animals at unnecessary risk and has negative environmental impacts. A more enlightened approach to raising food animals is to follow a balanced and holistic program based on the principles of One Health that seeks to minimize these negative tradeoffs. Such a program provides guidelines outlining best responsible animal care practices for animal producers to follow with uniform labeling to provide a new consumer choice label on meat packages. This brief article will describe the risk of AMR infection from antibiotic use in food animals and new steps that are being taken to provide more transparency in voluntary meat labels regarding this important topic.

Risk of AMR Infections from Foods of Animal Origin

Assessing the risk to consumers of acquiring an AMR infection to on farm use of antibiotics is dependent on the occurrence of a specific series of events. First, AMR bacteria or resistance genes emerge on the farm as a direct result of antibiotic use. Secondly, farm-origin AMR bacteria or resistance genes contact humans. Thirdly, a person acquires infection with the AMR bacteria or associated bacteria carrying the resistance genes and lastly, additional public health costs due to antibiotic treatment failures of the affected person may be incurred. To perform an informative risk assessment of AMR infections for consumers from antibiotic use in food animals, it is necessary to assess the risk of each of these events. In the case where the likely exposure risk to consumers comes from retail food products, consumer and retailer food handling practices must be accurately assessed. Factors upstream of these exposures in the supply chain, such as food safety practices used in the facility where the animal was processed, also need to be considered. Publicly available data, usually from ongoing monitoring programs operated by USDA-FSIS, are available to provide information about some of these factors both upstream and downstream from the consumer. However, established programs that collect samples from animals on the farm, at the processing plant, and from retail meat products use different methodologies and sample different parts of the animal such as animal bedding or feces (on farm), skin (processing facility), or meat (retail stores), making comparison between data sets problematic. To help address these issues, international groups such as the World Health Organization (WHO) Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR) are trying to develop standardized surveillance methodologies. Currently, existing programs are reluctant to change their protocols but there is hope that standardization will eventually emerge from these efforts.⁴ Researchers have studied the prevalence and severity of AMR in food animals and retail meat samples from NAE and conventionally raised animals. Study conclusions are divided, with some researchers finding a correlation between NAE practices and reduced findings of AMR bacteria while others have found no difference in the AMR profiles in animals and meat from NAE vs conventionally raised producers.^{5,6} More research is needed to better understand the precise attribution of antibiotic use in food animals to subsequent AMR infections in humans.

No Antibiotic Ever (NAE) Programs in Food Animals

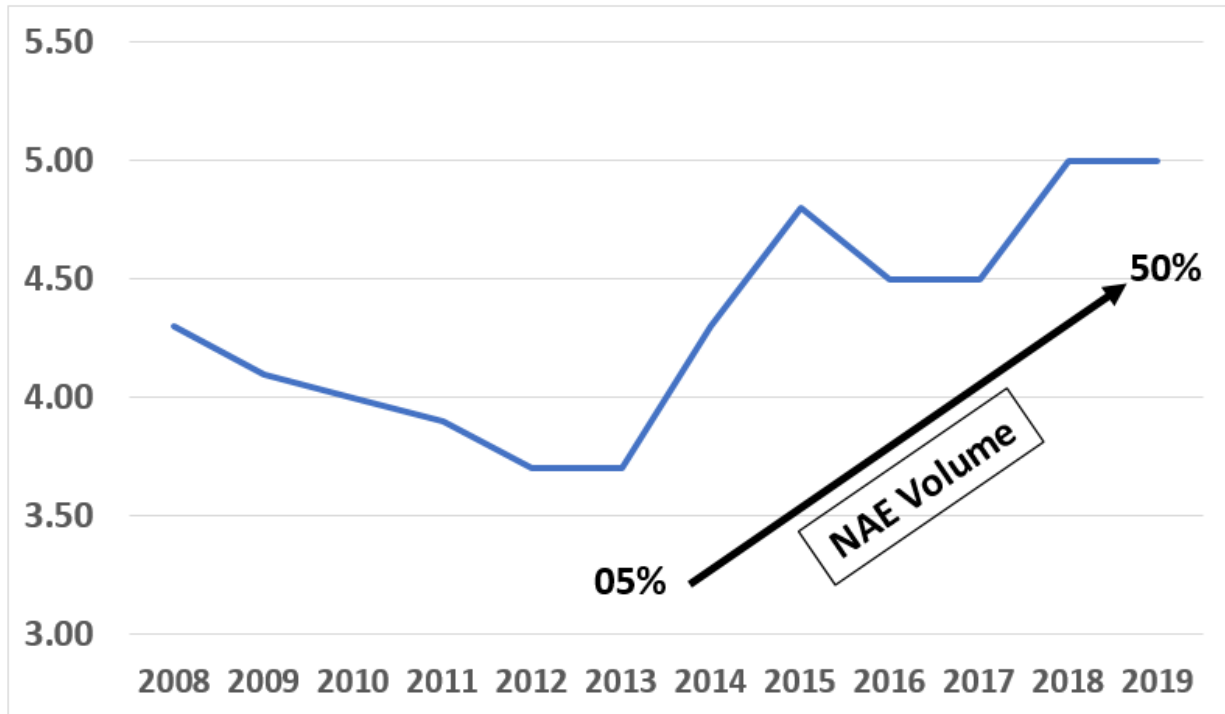
In recent years, consumers, animal activists and public health focused non-governmental organizations have raised concerns about the use of antibiotics in food animals and the potential risk of foodborne AMR infections for people. This has increased demand for meat and poultry from animals raised without ever receiving any antibiotics, a practice known in the marketplace

as “no antibiotics ever” or “NAE”. NAE indicates that the source animals have never received any antibiotics (including ionophores, an animal use only antibiotic class) in feed, water or by injection during their lifetime.⁷ This practice is on the rise, especially in short-lived animals such as broiler chickens, with the proportion of U.S. broiler chickens raised in NAE programs climbing from 5% in 2012 to 50% in 2019.⁸ As of November 2020, approximately 55% of broilers were raised as NAE, according to data from Agri Stats, an economic benchmarking service for the broiler industry.⁸ However, while production of NAE broilers is currently over 50% of the supply chain, retail sales of chicken meat labeled and sold as NAE only account for approximately 10% of the total volume.⁹ This is because most consumers who seek out and buy NAE chicken are generally only willing to pay a premium for certain parts. Although some consumer surveys indicate that a growing number of consumers say they want to know more details about how their food is produced and are worried about issues such as antibiotic use in food animals, other research suggests that when it comes down to buying meat, most consumers decide what to buy based on price, taste, and freshness while a small subset of consumers seeks out the “no antibiotics ever” label claim on meat packages.¹⁰ Premium prices are typically charged for NAE prime cuts like boneless breast meat, while other nonprime portions are usually sold as unlabeled commodity chicken with no price premium. This oversaturation of NAE produced product has reduced the price premium in the marketplace for NAE labeled chicken over time. For example, in 2013, the premium for NAE boneless skinless breast meat was 60-80 cents per pound, but this has dropped to about 20 cents per pound by 2020.⁸ Both factors make production of NAE broilers economically challenging at current levels. Despite the eroding premiums paid to NAE broiler producers, NAE chicken sold at retail costs consumers 50-200% more than conventionally raised chicken due to variable price premiums added by food retailers, who add a large additional margin on top of the higher cost charged to them by broiler producers.

Unintended consequences of no antibiotic ever programs

When antibiotics are completely removed from food animal production systems, the health and welfare of animals produced under that restriction are at increased risk. Monthly mortality among NAE broiler chickens was 25-50% higher in 2017 compared to conventionally raised chickens in the United States. From October 2017 to May 2018, according to data from Agri Stats, mortality rates of broilers raised without antibiotics averaged 4.2%, while conventionally raised chickens had an average mortality rate of about 2.9% (more than 40% lower).⁸ After falling steadily from 18% mortality to below 5% between 1925 and 2013, there has been an increase in mortality rates coinciding with the corresponding increased amount of NAE production (Figure 1).¹¹

Figure 1. Annually mortality of U.S. broiler chickens from 2008 -2019: Source National Chicken Council



In 2017, researchers conducted an anonymous online survey of 565 food animal producers and veterinarians working with food animals predominantly in the United States. Over half of the respondents currently worked with or had previously worked with animals being raised in NAE programs, and thus had direct experience with NAE production. Over 80% of producers and veterinarian survey respondents with NAE production experience said that they thought that NAE either slightly or significantly worsens animal health and welfare.¹² A troubling finding from the survey revealed that respondents with NAE production experience somewhat or strongly agreed that maintaining an NAE label at times took priority over animal health and welfare.¹² NAE producers face various pressures to not treat sick animals with antibiotics and subsequently lose the value of the NAE product. A council of scientists studied NAE production and determined that it caused and may continue to cause producers and veterinarians to withhold [antibiotic] treatment for animals intended for the consumer market. They concluded that, “negative impacts on animals’ welfare resulting from disease that could be prevented and/or that cannot be controlled and treated are significant and unacceptable.”¹³

Investigations into the causes of increased mortality in NAE broilers have identified increased occurrence of specific disease conditions such as necrotic enteritis and bacterial osteomyelitis, corroborating that NAE practices are jeopardizing animal health and welfare. The increase in these conditions in NAE broilers is presumably due to the increased potential for intestinal disease, which in turn leads to more bacterial escape from the intestine to cause lesions elsewhere (such as in bones) and the associated diarrhea adds excess moisture to the poultry litter, causing ammonia levels in poultry buildings to increase. NAE flocks are at 3.5-fold greater risk of ammonia burns in the eye and have 1.4-fold greater risk of having manure burn foot lesions compared with conventionally raised flocks.¹⁴ NAE broilers have also been shown to have reduced daily weight gain and higher feed conversion ratio (pounds of feed required to produce pounds of live chicken) when compared with conventionally raised flocks, despite the reduced stocking density usually used for NAE flocks.¹⁵

The higher mortality in NAE chickens, along with the lower stocking density, higher feed conversion ratio, reduced body weights for age and increased downtime between flocks (a common practice in NAE production) results in a negative environmental impact compared to chickens raised in conventional programs. Researchers estimate that if all nine billion meat-type chickens raised annually in the United States were raised in NAE programs, an additional 680-880 million more birds per year would need to be raised to maintain the current level of chicken meat supply.¹⁶ To raise these additional chickens would require 5.4-7.2 million more tons of feed and 1.9-3.0 billion more gallons of water each year, and produce 4.6-6.1 million more tons of manure.^{17,18} To truly assess the environmental impact of NAE production more accurately, a full life-cycle assessment analysis, a tool used to calculate the total environmental costs attributed to animal production systems, is required.

Antibiotic Use Claims on Meat Labels

Although some surveys indicate that a growing number of consumers say they want to know more details about how their food is produced and are worried about issues such as antibiotic use in animal agriculture, other research suggests that when it comes to buying meat, most consumers decide based only on price, taste, and freshness.⁹ Retail meat sales in the United States follows a “good, better, best” marketing strategy. The least expensive (good) option contains many store branded products that usually lack special antibiotic or other voluntary label claims. The intermediary options (better) are meat products from national branded companies, some of which have voluntary label claims regarding antibiotic use. For example, chicken products from national branded company Tyson, currently the largest U.S. NAE chicken producer, carry the “no antibiotics ever” label claim. The most expensive (best) meat products available may contain multiple health and welfare voluntary label claims, stating that the animals were raised in systems that differ substantially from conventional farming practices, such as USDA certified organic or privately managed programs such as Global Animal Partnership (GAP), a program featured primarily at Whole Foods Markets. The label “no antibiotics ever” is an example of what is known as an “absence claim” label. Absence labels refer to an attribute or practice that was not used in the raising of the animals so labeled. All meat labels must first be approved by FSIS Labeling, and verification of claims related to animal raising practices is required prior to their approval. The use of antibiotics in food animal production is poorly understood by consumers, who often associate antibiotic use during animal raising with the presence of harmful antibiotic residue levels remaining in the meat after the animal is harvested, even though federal regulations prevent the sale of any meat containing antibiotic residues above safe maximum residue levels as determined by the FDA.^{17,18} The FDA establishes “withdrawal times,” which are times after drug treatment when milk and eggs are not allowed to be used for food and during which animals are not to be slaughtered. This allows time for the animals to eliminate the drug residues and ensures that all meat sold in the U.S. does not contain harmful drug residues, no matter what label claim is displayed on the meat package.

Raising Animals Using a More Holistic Approach

Narrowly focused animal raising practices such as “no antibiotics ever,” which only provide guidance about how antibiotics are used in food animals, often create unintended consequences or negative trade-offs in other attributes, such as animal health and welfare or environmental impacts. A more enlightened approach to raising animals is to follow more balanced and holistic guidelines that by design seek to avoid such unintended negative outcomes. One such program

that follows this paradigm, One Health Certified™ (www.onehealthcertified.org), was publicly launched in January 2020. This new consumer choice label program follows a One Health philosophy and strives to provide optimal health outcomes for animals, people, and the environment. One Health is a multidisciplinary concept that recognizes that the health of humans, animals and the environment are inseparable and that activities in one compartment of the triad directly impact the other compartments. The One Health Certified™ program provides public transparent guidelines outlining best responsible animal care practices for food animal producers to follow in five core areas: disease prevention, veterinary care, responsible antibiotic use, animal welfare and environmental impact. The program has several unique aspects relative to current meat label offerings. One Health Certified™ is a public program open to all producers, and offers participants a unique way to market their products using clearly defined, implemented and transparent process points. Program guidelines are verified through annual government audits via the USDA Process Verified Program (PVP) procedures operated by the USDA Agricultural Marketing Service (USDA-AMS). Companies that align their procedures to meet the program standards and achieve certification can label their retail and wholesale products with a simple logo that conveys that responsible animal care practices have been followed and verified. One Health Certified™ programs are currently available for chicken and turkey, and additional programs are being developed for the other major animal protein commodities - pork, beef, egg, and dairy.

Some of the unique features of One Health Certified™ include aspects of veterinary care, responsible antibiotic use, environmental impact, and central oversight with annual reporting requirements. The veterinary care program requires a comprehensive animal health plan that mandates prompt treatment of sick animals. Farmers must act at defined action thresholds to quickly respond to changes in the health status of animals. If an infectious disease is suspected, a veterinary action plan that outlines actions and prescribes appropriate treatments must be completed. A treatment outcome assessment is required if a veterinarian ordered treatment was administered. Responsible antibiotic use guidelines have restrictions on the use of antibiotics important in human medicine intended to minimize the development of AMR bacteria important in human illness originating from the farm. Human medically important antibiotics may only be used when deemed medically necessary to treat and control animal illness when prescribed by a licensed veterinarian with a valid client patient relationship with the farm owner. Antibiotics that are considered not important in human medicine may be used to maintain animal health and welfare according to FDA regulations. When used properly, these low risk or animal-only antibiotics greatly reduce the need for administration of antibiotics important in human medicine. All information related to antibiotic use must be documented and maintained. One Health Certified™ is the first animal raising standard to address environmental inputs of animal agriculture and to measure their impact. The program supports environmental stewardship practices related to food animal production by requiring annual measurements that calculate the carbon footprint to produce the meat and requires that waste management programs be properly maintained on each farm. One Health Certified™ is a dynamic program based on a continuous improvement process with standard updates planned every three years. Program participants are required to submit a detailed report annually to the One Health Certified Foundation, a non-profit organization within the National Institute of Antimicrobial Resistance Research and Education (NIAMRRE) located at Iowa State University that administers the One Health Certified™ program. Evaluations of submitted data and new scientific research will drive program improvements to assure that the program continues to evolve over time.

Conclusions

The potential risk of AMR originating from farms raising food animals is an important concern for public health. Research and primarily governmental monitoring programs of farms, animal processing facilities and retail meat products are ongoing that attempt to determine some factors contributing to that risk. Other involved risk factors, such as environmental spread of AMR bacteria and genes from the farm and safe food handling procedures of retailers and consumers are more difficult to assess. Voluntary meat label claims related to antibiotic use programs in the animals raised is one way to provide actionable information to consumers about this topic to assist in making more informed decisions in the marketplace. Complete removal of all antibiotics from food animal systems such as in “no antibiotic ever” programs may at times unnecessarily put animal health and welfare at increased risk and raises the environmental cost of food animal production. A more enlightened approach to animal raising incorporates a more balanced and comprehensive approach and seeks to minimize the trade-offs often associated with more narrowly focused programs. An example of such a program is One Health Certified™, a new consumer choice label that represents transparent program guidelines outlining best responsible animal care practices in a publicly available continuous improvement process for animal producers to follow and for consumers to understand.

Correspondence

G. Donald Ritter, DVM; donritterdvm@gmail.com

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