Consumers—Not Science—Are Driving the Demand for Antibiotic-free Meat

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Abstract

For decades livestock farmers and ranchers have used antibiotics to prevent and treat infections in farm animals as well as for growth promotion. Administered in the animal's feed at sub-therapeutic levels, animals raised in this manner experience lower mortality rates, are in general healthier and weigh more. While the mechanism for this is not completely understood, it is believed that a constant low dosage of antibiotics allows for better nutrient absorption by the animals. The US Food and Drug Administration has strict guidelines for the withdrawal times for antibiotics used in the rearing of food animals in order to assure the US consumer that all meat purchased is free from antibiotic residue, (FDA Compliance Manual 7371.006). Notwithstanding, the clamor from consumers for antibiotic-free meat continues. This survey was undertaken to determine consumers' preferences for meat and their general knowledge about livestock rearing practices including the use of antibiotics.

Why Antibiotics Are Necessary in the Rearing of Livestock

It is forecast that in 2016, the Average American will consume 270 pounds of meat, (Fertel, 2016). Multiply that by all 321,418, 820 of us and that's a lot of poultry, beef and pork.

> In a parallel universe, where we hadn't starved the American Indians from their lands by ruthlessly hunting herds of bison that thundered across the Great Plains several centuries ago, today perhaps we'd all be enjoying lower-fat, denser, grass fed and wonderfully flavorful buffalo meat in our burgers at our family barbecues. But instead, to feed the 300 million or so meat eaters across the United States, we're left to the methods of a livestock industry that raises animals in close quarters under conditions that often cause disease to spread; hence the need for antibiotic treatments, (Rummo, 2011).

For decades, livestock farmers and ranchers have been able to meet the ever growing demand for quality meat through the use of antibiotics to prevent and treat infections in food animals. Additionally, livestock rearing practice has of necessity included the administration of antibiotics at sub-therapeutic levels in the animal's feed to promote overall animal health and growth.

It has been estimated that by feeding livestock sub-therapeutic doses of antibiotics increases weight by as much as 3% (Sneeringer, et al, 2015), an obvious financial gain for the livestock farmer or rancher who sells his product by the pound. Nonetheless, the overall health of the animals also improves resulting in less disease and lower mortality.

Not surprisingly, the reverse is also true. Cervantes (2015) writes "It is generally acknowledged that production efficiency (weight gain, feed conversion ratio, mortality and yield) is adversely impacted in the antibiotic-free production system."

The reasons for this are not completely understood in all species although it is believed that antibiotics allow for an overall better absorption of nutrients into the animal's bloodstream. A report featured on Public Broadcasting's Frontline suggested this has to do with the bacteria that live in the intestines of livestock:

> Although it is still unclear exactly why feeding small, sub-therapeutic doses of antibiotics, like tetracycline, to animals makes them gain weight, there is some evidence to indicate that the antibiotics kill the flora that would normally thrive in the animals' intestines, thereby allowing the animals to utilize their food more effectively, (Modern Meat, PBS.org).

In a position statement (Cervantes) for the AAAP Drugs & Therapeutic Committee, the mechanism for the overall improvement in the absorption of nutrients in poultry is better understood:

> The use of prophylactic levels of antibiotic growth promotants in commercial poultry ensures good enteric health, reduced environmental pollution, and a safer product for the consumer. Antibiotic growth promotants, often referred to as antibiotic feed additives, are commonly used in commercially raised poultry for the primary purpose of maintaining enteric health. Because enteric health is enhanced, the use of antibiotic growth promotants frequently results in faster growth rates, improved feed conversions, and a safer consumer meat supply. This improved growth rate and feed utilization in poultry have been shown to be primarily due to the adequate control of toxigenic strains of *Clostridium perfringens* and by the improved utilization of nutrients by the bird, (Stutz & Lawton, 1974 and Visek, 1978). This improved utilization of nutrients also means that less nitrogen and phosphorus is excreted into the environment.

A USDA agricultural bulletin sheds additional light on the benefits of antibiotics used for growth promotion:

> It is generally conceded that commercial livestock production in the United States, especially confinement production, would be virtually impossible without antimicrobial drugs. ... Low levels of antimicrobial drugs increase daily rates of weight gain and improve feed efficiency in livestock, lowering feed costs (North and Bell, 1990). Antimicrobial drugs in feed also slightly improve carcass quality in cattle (Ensminger, 1987). When steers and heifers are fed low levels of antimicrobial drugs, more fat is deposited and marbling increases, which can increase the value of the animal. When cattle are fed low levels of antimicrobial drugs, they have fewer diseases; therefore, fewer carcasses or livers are condemned during slaughter, (Matthews, 2001).

Livestock Administered Antibiotics Are Already Antibiotic-free

The US Food and Drug Administration (FDA) has strict guidelines for the production of food animals specific to the use of antibiotics and withdrawal times in order to ensure that all meat sold in the US is free from antibiotic residues. The role of various government agencies in assuring the safety of the meat supply in the US is outlined in an FDA compliance program guidance manual:

> Protection of the public by assuring a safe meat and poultry supply is a responsibility shared by the USDA Food Safety and Inspection Service (FSIS), the Grain Inspection, Packers and Stockyards Administration (GIPSA), the Animal and Plant Health Inspection Service (APHIS), the Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA), The FSIS exercises supervision over the slaughter and processing of meat and poultry products in federally inspected establishments and is responsible for the safety of these food products. FSIS

> reports violative residues of drugs, and both violative and non-violative reisidues of pesticides, and other contaminants in meat and poultry to FDA for follow-up, (FDA Compliance Program Guidance Manual 7371.006).

Further clarification is offered in an industry white paper published by the National Institute for Animal Agriculture titled Antibiotic Use in Food Animals, (NIAA October 2011):

> If antibiotics are administered to cure a sick animal, the animal itself —in the case of meat production, or animal products —such as milk —are not allowed to enter the food supply until the withdrawal period has passed and the medicine has sufficiently cleared the animal's system. The required periods for withdrawing medication are specific for each drug and species and are approved by the FDA based on research studies of residues in edible tissues.

A Message Largely Lost On Consumers

Consumers are easily swayed by reports in the media, whether founded on science or not, about the food they eat. It was only a few years ago that "pink slime" made the headlines. Pink slime was the media's characterization for lean finely textured beef (LFTB) a natural, healthy meat based product used as an extender to ground beef to reduce its overall fat content. Writing in Slate Magazine Daniel Engber (2012) noted: "The story of this activist rebranding—from *lean finely textured beef* to *pink slime*—reveals just how much these labels matter." Not only did the ensuing media-created firestorm influence consumer perceptions, it resulted in the loss of 650 jobs at Beef Products Inc. which was forced to close permanently 3 of the company's plants in Iowa, Kansas and Texas, (USA Today 2012).

A similar disconnect exists among consumers and the antibiotic-free characterization of meat. Despite the industry's adherence to withdrawal times for antibiotics, decades of well-documented studies, the science behind their judicious use in the rearing of livestock and strict government

oversight, the message that all meat sold in the US is already free from antibiotics has largely been lost on the US consumer. Cervantes (2015) sheds additional light:

> Trends in consumer preferences like buying ABF [antibiotic-free] products are largely based on perception than scientific facts. For example, most consumers do not realize that all chicken meat is ABF or contain levels below tolerances considered safe for humans. Regulatory agencies… for decades have routinely monitored drug residues by sampling and testing tissues to ensure that no drug residues (including antibiotics) are found above the tolerance or maximum residue limit (MRL) Established for each drug.

The spring issue of *Amazing Wellness Magazine* offers a typical mischaracterization of beef raised according to current industry practices. In an article entitled "Smarter Fats" the author writes, "Grass fed meat is a health food. Factory-farmed meat is a toxic waste dump," (Bowden, 2016). Consumer-directed messages based on junk science and repeated frequently by the media are what form consumers' preferences for grass-fed, natural, and antibiotic-free poultry, beef and pork.

And so it continues. Meat producers like Tyson and Perdue have both made recent announcements that they are moving towards more antibiotic-free offerings in the years ahead.

The Wall Street Journal recently reported that the number 3 U.S. poultry producer, Perdue Farms, Inc. will be eliminating antibiotics completely from some of their chickens that are reared for manufacture into processed products such as nuggets and strips, (Bunge, Jacob, 2016). Dubbed *No Antibiotics Ever*, Perdue assures its customers, "Chickens raised for Perdue Foods never receive antibiotics for growth promotion, nor do we add human antibiotics to the feed… Chickens marketed as no-antibiotics-ever and organic never receive any antibiotics. But Perdue includes a disclaimer at the bottom of the same page of their website:

> Chickens not raised for the organic and no-antibiotics-ever program are generally treated to prevent common intestinal illnesses using ionophores. Ionophores are a type of animal-only antibiotic not used in human medicine, and are not associated with antibacterial resistance in human medicine. - As part of our animal welfare commitment, should animals become ill – including organic and no-antibiotics-ever – they will be treated as medically appropriate. However, if antibiotics are used, those animals are not marketed as no-antibiotics-ever or organic. In those rare cases, federally mandated withdrawal periods ensure products are free of antibiotic-residue as defined by the USDA, (Perdue Farms Inc., News Room Statements and Comments).

With Perdue Farms all but admitting that chickens treated with antibiotics will still result in products that are antibiotic-free, what is the difference to the consumer?

The Issue of Antibiotic-resistant Super Bugs

Antibiotics and similar drugs called antimicrobials have been used for the last 70 years to treat infectious diseases, (Centers for Disease Control and Prevention, 2015). In some rare cases, bacteria have acquired antibiotic resistance to increasingly stronger antibiotics posing serious, life-threatening consequences.

In a paper published in Clinical Infectious Diseases (Spellberg, et al 2007) the authors explain the "breadth of effect and significant impact on morbidity" that antibiotic-resistant bacteria place on human health and well-being:

> We are in the midst of an emerging crisis of antibiotic resistance for microbial pathogens in the United States and throughout the world. Epidemic antibiotic resistance has been described in numerous pathogens in varying contexts, including—but not limited to—a global pandemic of

> methicillin-resistant *Staphylococcus aureus* (MRSA) infection; the global spread of drug resistance among common respiratory pathogens, including *Streptococcus pneumoniae* and *Mycobacterium tuberculosis;* and epidemic increases in multidrug-resistant (and, increasingly, truly pan-resistant) gram-negative bacilli... Given their breadth of effect and significant impact on morbidity and mortality, multidrug-resistant microbes are considered a substantial threat to US public health and national security by the National Academy of Science's Institute of Medicine, the federal Interagency Task Force on Antimicrobial Resistance (Interagency Task Force), and the Infectious Diseases Society of America (IDSA).

Add to this concern, that of the USDA regarding the potential for antibiotic-resistant microbes in livestock jumping to humans and the stage is set for imagining a worst-case scenario. Mathews (2001) explains, “The specter of resistant livestock diseases affecting humans, human health, and human health care practices has heightened concerns about livestock drug use and motivated regulatory actions.”

The most recent of these regulatory actions have been two FDA guidance directives; #209 and #213, calling for the voluntary withdrawal of antibiotics used in sub-therapeutic dosages for growth promotion and veterinary oversight of medically important antimicrobials. While many in the industry have issued press releases outlining plans to curb the use of antibiotics used for growth promotion, and all OTC antibiotics will be scripted beginning January 1, 2017, the consensus is that the overall use of antibiotics will not go down, (Animal Health Institute, 2014).

Such was the case in Denmark during the mid-1990s when the European Union phased out the use of antibiotics in livestock for growth promotion, (AFACT, 2009). Denmark was the first, issuing a voluntary ban in 1998 which became compulsory in 2000. The result was an increase in death and disease among livestock and the greater use of antibiotics to control and treat disease. “Although the overall use of antibiotics is still down somewhat, … Total use declined by 30 percent between 1997 and

2005… quantities used for therapeutic purposes increased by 135 percent between 1996 and 2005," (AFACT, 2009). On top of this, there was "little evidence to suggest that antibiotic resistance in humans has declined, which was the purpose of the ban," (AFACT, 2009).

In a document entitled "UK Five Year Antimicrobial Resistance Strategy 2013 to 2018," the report states "Increasing scientific evidence suggests that the clinical issues with antimicrobial resistance that we face in human medicine are primarily the result of antibiotic use in people rather than the use of antibiotics in animals."

Cervantes (2015) explains, "There is little convincing scientific evidence that the use of antibiotics in food-producing animals is contributing to the antibiotic resistance issues that are relevant to human medicine. However public perception in first world countries suggests that consumers believe this to be true."

The Survey

We surveyed 76 consumers to gain a perspective about their preferences for meat and their knowledge about livestock rearing practices including what they knew or *had read or heard* about antibiotic residues in meat and antibiotic resistant bacteria. The sample represented several ethnic backgrounds including White, Hispanic and African-American. Students, housewives and professionals were among the people surveyed. Sixty-seven percent reported they were married, 63% that they were solely responsible for the grocery shopping in their household and 80% said they purchased their meat at a grocery store as opposed to a butcher shop. Meat preferences included chicken, beef, pork, combinations of the three and several respondents wrote in veal, fish and seafood. *Table 1* and *Figure 1* show a clear preference for chicken alone, (50%) which increased to 58% in combination with beef and

to 70% with beef and pork. Only 17% of the respondents preferred beef alone. None chose pork as a sole preference.

Table 1

Preference	Respondents	%
Chicken Only	38	50
Beef Only	13	17
Chicken, Beef & Pork	9	12
Chicken & Beef	6	8
Beef & Fish	1	1

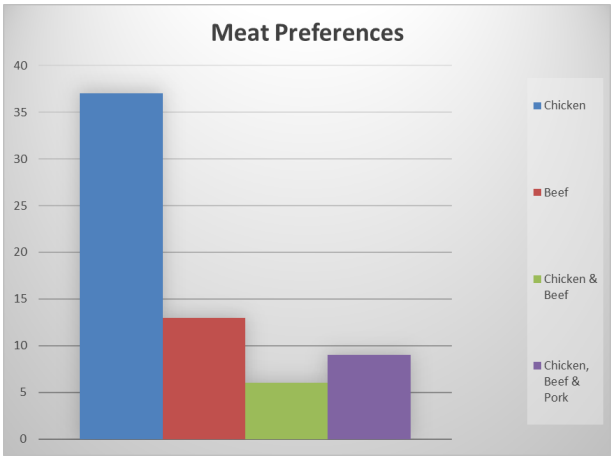

Figure 1

Ages ranged from 21 to 71-years old with a median of 45.5, comprising a population of 26% Millennials, 29% Gen-X-ers, 38% Baby Boomers, 2% Silent and 5% who didn't report their age. This data is represented below in table and graphical form, (*Table 2, Figure 2*).

Table 2

Number of Respondents	76
Married	51
Single	25
Always do the shopping	48
Sometimes do the shopping	25
Buy meat at grocery store	61
Buy meat at butcher shop	5
Buy meat at both places	9

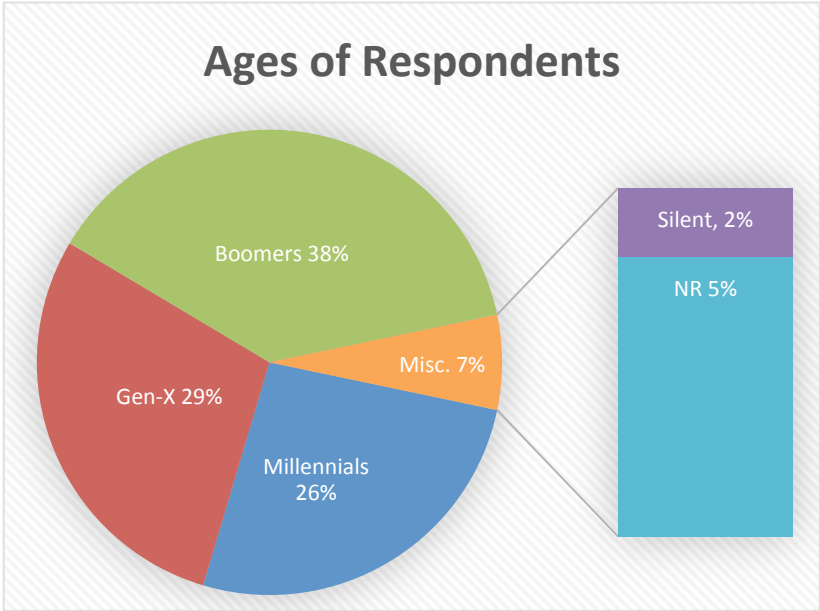

Figure 2

In addition to population data, shopping habits and meat preferences, respondents completed a 3-page questionnaire consisting of 22 questions. The first 17 questions required a numerical answer ranging from 1 to 5, the choices being as follows: 1 - *I strongly agree*, 2 - *I agree*, 3 - *I have no opinion*, 4 - *I disagree* and 5 - *I strongly disagree.* These 17 questions were followed by five additional questions requiring either a *yes* or *no* response. The responses for the first 17 questions were averaged and reported as a range between 1-5 in the table below along with the answers to the *yes* or *no* questions which were tabulated as averages with a range between 0-100% by assigning the dummy variables one to *yes* responses and zero to *no* responses.

TABLE 3 KEY *Questions 1-17: 1 - I strongly agree*, 2 - *I agree*, 3 - *I have no opinion*, 4 - *I disagree* and 5 - *I strongly disagree*

I love meat and eat it regularly.	2.3	Livestock deserves to be raised in as disease free an environment as possible.	1.3
I buy whatever meat is on sale.	3.6	When livestock becomes sick it should be treated with medicine.	2.1
The price of meat I buy for my family is important to me.	2.2	Antibiotics should be used to cure and prevent the spread of infection in a flock or herd.	2.2
I always look for sales on meat in the paper before shopping.	3.6	I would purchase ABF meat instead of the meat I currently purchase.	2.2
When I find meat on sale I buy extra and freeze it.	3.3	I would purchase ABF meat instead of the meat I currently purchase even if I had to pay more.	2.5
I don't pay attention to meat prices. Whatever I need at the time I purchase.	3.2	I would purchase ABF meat instead of the meat I currently purchase even if I had to pay twice as much.	3.3
When we eat out, we order meat dishes.	2.5	I have read/heard there are antibiotic residues in meat	71%
I order organic or "grass fed" beef.	3.3	I have read/heard that the FDA long ago banned the sale of meat, milk or dairy products containing antibiotic residues.	20%
I have heard livestock is routinely fed antibiotics in feed and drinking water and I'm OK with that.	3.7	I have read/heard there are super bugs that have become resistant to antibiotics due to their use in livestock.	46%
I have heard that livestock is raised in tight quarters and I'm OK with that.	3.9	I have read/heard that these super bugs can infect humans and pose a serious health risk.	47%
Livestock deserves to be treated humanely.	1.8	I have read/heard that these super bugs are species specific and there is no evidence that they can jump to humans and pose a serious health risk.	13%

Discussion and Conclusions

The 17 questions graded one to five dealt with meat buying and dining preferences (questions 1-8) and what the respondents understood or had *read or heard* about livestock rearing practices (questions 9-17). The first eight questions revealed agreement among the respondents that they *love to eat meat and eat it regularly,* (2.3) and that the price they pay is important to them, (2.2). Notwithstanding, there was a bias towards disagreement that they purchased meat on sale, (3.6) and bought extra to freeze for a future meal, (3.3). There was agreement that when they eat out, they order meat, (2.5) but a bias towards disagreement about ordering *grass-fed* beef, (3.3).

Respondents showed their strongest disagreement towards livestock being *routinely fed antibiotics,* (3.7) and that *livestock is often raised in tight quarters*, (3.9). They were in strong agreement that *livestock should be treated humanely*, (1.8) and in even stronger agreement *that livestock should be raised in as disease-free environment as possible,* (1.3). When livestock becomes sick there was agreement that medicine should be administered, (2.1) and specifically antibiotics when there is the risk of the *spread of infection in a flock or a herd*, (2.3).

There was agreement that respondents would purchase ABF meat instead of the meat they were currently purchasing, (2.2) even if they had to pay more for it (2.5) but not if they had to pay twice as much, (3.3).

Responses to the five *yes* or *no* questions were especially revealing. Seventy-one percent said they had *read or heard there are antibiotic residues in meat* while only 20% said they had *read or heard that the FDA had long ago banned the sale of meat, milk and dairy products containing antibiotic residues*. Forty-six percent said they had *read or heard* about antibiotic-resistant super bugs as a result of current livestock rearing practices using antibiotics and almost the same amount (47%) said they had

read or heard that these bugs can infect humans and pose a serious health risk. But only 13% said that they had *read or heard* that there is no evidence for this.

Our survey revealed that a large majority of consumers (71%) believe that their meat contains antibiotic residues and are willing to pay more for antibiotic-free meat despite the fact that all meat sold in the US is already antibiotic-free by law, whether labeled natural, organic or antibiotic free. Additionally, only 20% said they had heard that the FDA banned the sale of meat containing antibiotic residues. Fewer still (13%) said they knew there was no evidence to support the theory that antibiotic resistance in bacteria in livestock poses a threat to humans.

Rick DeLuca, President of Merck Animal Health recently spoke at the First European Animal Health Investment Forum held in London in February 2016 saying, "The lack of scientific data and pressure from consumers is being directly felt by farmers. Social media means small groups now have big voices and there is a lot of conjecture…There are consumer pressures on the antibiotics space and in animal welfare." Joachim Hasenmaier, member of Boehringer Ingelheim's corporate board for animal health also spoke, saying, "There is a clear stand on antibiotics – consumers and politicians have decided. If we don't convince consumers there are no residues in animal meat, meat consumption will decline," (Harvey, Lazell, 2016).

Consumers must be educated about the science behind the necessity for the judicious use of antimicrobials including antibiotics in the rearing of livestock for human consumption. They also need to be made aware of the industry safeguards which along with strict government oversight have been in place for decades, protecting them from antibiotic residues in the meat they currently purchase. This is largely the responsibility of the meat producers. They should be leading the way in assuring the US consumer that their meat is safe, healthy, and antibiotic-free despite the use of antibiotics in livestock rearing. Instead of playing on the unfounded fears of ill-informed consumers, meat producers, through a

variety of media, both traditional—a national marketing campaign perhaps—and social, should be at the forefront of this campaign, assuring consumers they have nothing to worry about.

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