



LOUISE M. SLAUGHTER  
CONGRESS OF THE UNITED STATES  
25TH DISTRICT, NEW YORK

October 24, 2013

Dr. John Holdren  
Director, Office of Science and Technology Policy  
Co-Chair, President's Council of Advisors  
on Science and Technology  
1600 Pennsylvania Avenue NW  
Washington, DC 20500

Dr. Eric Lander  
Broad Institute of MIT and Harvard  
Co-Chair, President's Council of Advisors  
on Science and Technology  
1600 Pennsylvania Avenue NW  
Washington, DC 20500

Dear Dr. Holdren and Dr. Lander:

I would like to encourage PCAST to investigate and report on the increasingly alarming problem of antibiotic resistance in the US. Informed and intelligent policy suggestions regarding the prudent use of antibiotics in agriculture and medicine are vital to preserving our precious cache of antibiotics. I also encourage PCAST to survey the data collection procedures used to examine our national use of antibiotics and make recommendations for improvement. We need detailed, local data collection in order to best identify any correlation in current agricultural antibiotic use with public health effects.

Antibiotic resistance is not a problem that is going away. There are rising numbers of bacteria resistant to multiple antibiotics, and the CDC has confirmed that there is strong scientific evidence connecting antibiotic resistant infections and the antibiotics used in agriculture.<sup>1</sup> The recent nationwide *Salmonella* outbreak sickening more than 300 individuals in 20 states and Puerto Rico is evidence of the severity of the problem, given that at least four of the seven strains were resistant to antibiotics, and affected individuals were hospitalized at twice the expected rate (42%).

While I support giving antibiotics to sick animals that need them, antibiotics are routinely distributed to animals without any indication that an animal is sick. Antibiotics are used to "prevent" diseases that arise from the filthy, crowded and stressful conditions in which food animals are raised. Considering that 80% of all antibiotics in this country are used in agriculture,<sup>2</sup> this practice needs to be comprehensively investigated and policy needs to be crafted to reduce this irresponsible use of a life-saving and fragile resource that is affecting public health.

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<sup>1</sup> "Threat Report 2013 | Antimicrobial Resistance | CDC."

<sup>2</sup> "Food and Drug Administration, 2010 Summary Report on Antimicrobials Sold or Distributed for Use in Food-Producing Animals, Center for Veterinary Medicine."

Bacteria readily develop antibiotic resistance in the presence of low, sub-therapeutic levels of the antibiotic,<sup>3</sup> precisely the conditions used on farms for animal growth promotion and disease prevention. Furthermore, genes conferring resistance to antibiotics can easily be transferred between bacterial species, leading to the spread of these resistance genes.<sup>4</sup> In fact, low levels of antibiotics are more likely to induce these transfers.<sup>5,6</sup> Antibiotic drugs from every important medical class are used in agriculture, and often at sub-therapeutic levels.<sup>7,8</sup> This dangerous practice creates a perfect storm of factors leading to antibiotic resistant bacteria directly within our food supply.

According to conservative CDC estimates, at least 2 million people get serious infections each year that are resistant to at least one antibiotic. Furthermore, 23,000 people die in hospitals every year from these antibiotic-resistant infections because we have no treatments for them.<sup>9</sup> These estimates do not include deaths from *C. diff* infections and deaths that occur outside of hospitals. We also bear an enormous economic burden for our misuse of these life-saving drugs. Estimates based on individual hospital assessments put the cost of treating antibiotic resistant infections near \$27,700 per patient, resulting in at least \$20 billion in direct healthcare costs and \$35 billion more in lost productivity each year.<sup>10</sup> Our misuse and overuse of antibiotics bear direct responsibility for these deaths and cost to society.

We must reduce the number of antibiotic resistant infections by eliminating unnecessary antibiotic use. Considering that the vast majority of antibiotics used in the US are used in agriculture, this is the first place that needs to be investigated. The CDC has reviewed and confirmed the mounting evidence connecting agricultural use of antibiotics to resistant infections seen in humans. Bacteria resistant to important medical antibiotics are routinely found in farm animals.<sup>11,12,13,14,15</sup> What we need now is a comprehensive study of the use of antibiotics in agriculture that will, first, quantify its impact on public health and, second, make a series of recommendations for limiting its impact. While it is also important

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<sup>3</sup> Gullberg et al., "Selection of Resistant Bacteria at Very Low Antibiotic Concentrations."

<sup>4</sup> O'Brien, "Emergence, Spread, and Environmental Effect of Antimicrobial Resistance."

<sup>5</sup> Allen et al., "Antibiotics in Feed Induce Prophages in Swine Fecal Microbiomes."

<sup>6</sup> Kohanski, DePristo, and Collins, "Sublethal Antibiotic Treatment Leads to Multidrug Resistance via Radical-induced Mutagenesis."

<sup>7</sup> Silbergeld, Graham, and Price, "Industrial Food Animal Production, Antimicrobial Resistance, and Human Health."

<sup>8</sup> Love et al., "Dose Imprecision and Resistance."

<sup>9</sup> "Threat Report 2013 | Antimicrobial Resistance | CDC."

<sup>10</sup> Roberts et al., "Hospital and Societal Costs of Antimicrobial-Resistant Infections in a Chicago Teaching Hospital."

<sup>11</sup> Hammerum, "Enterococci of Animal Origin and Their Significance for Public Health."

<sup>12</sup> Jackson et al., "Prevalence, Species Distribution and Antimicrobial Resistance of Enterococci Isolated from US Dairy Cattle."

<sup>13</sup> Diarra et al., "Distribution of Antimicrobial Resistance and Virulence Genes in Enterococcus Spp. and Characterization of Isolates from Broiler Chickens."

<sup>14</sup> Rodriguez-Palacios, Koohmaraie, and LeJeune, "Prevalence, Enumeration, and Antimicrobial Agent Resistance of Clostridium Difficile in Cattle at Harvest in the United States."

<sup>15</sup> White et al., "The Isolation of Antibiotic-Resistant Salmonella from Retail Ground Meats."

to look for totally new classes of antibiotics that are safe and effective, if any newly discovered antibiotics are used in the same way we use our current reserves, with indiscriminate overuse in agricultural and human settings, we will simply find ourselves in the same position down the line, with bacteria resistant to the new drugs.

All over the world, including in the US, studies have revealed striking evidence of the link between antibiotic use in agriculture and drug resistant infections in humans.<sup>16,17,18</sup> We also see that resistance has increased over time.<sup>19</sup> In Denmark in the 1990s, there was concern over the increasing number of drug resistant infections in hospitals, many of which could be traced directly to pig farms. This prompted the Danish government, which exports 90% of its pork, to more heavily regulate the antibiotics used on animals raised for food consumption. These strategies have resulted in a 60% reduction in antibiotic use in agriculture. At the same time, this reduction had no effect on the overall production of beef or poultry; pork production actually increased by 50%.<sup>20</sup> Pork farmers who were concerned that losing “preventative” antibiotics would hurt their newborn pigs instead saw piglet mortality rate go down.<sup>21</sup> Most importantly, numerous scientific studies have shown a dramatic reduction in drug-resistant bacteria in food animals and in food when antibiotic use on farms is reduced.<sup>22</sup> The reduction in agricultural drug use can also lead to a corresponding reduction in resistant infections.<sup>23</sup> The Danish experience prompted a variety of regulations on antibiotics throughout the EU, including a phase-out of all non-therapeutic use of antibiotics by 2006. This success would not have been possible without timely, specific, and reliable data on how much antibiotic was used in each farm and its relationship to public health data collected from hospitals.<sup>24</sup>

In the US, even medically important antibiotics can be sold over the counter for use on farms. The average amount of antimicrobials consumed by food animals in the EU is estimated to be about 98 mg per kg of meat or poultry produced. In the US, estimates made from our limited data sources have the number around 300 mg per kg meat.<sup>25</sup> Despite the large amount of antibiotics used in the United

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<sup>16</sup> Vieira et al., “Association Between Antimicrobial Resistance in *Escherichia Coli* Isolates from Food Animals and Blood Stream Isolates from Humans in Europe.”

<sup>17</sup> Marshall and Levy, “Food Animals and Antimicrobials.”

<sup>18</sup> Cavaco, Hasman, and Aarestrup, “Zinc Resistance of *Staphylococcus Aureus* of Animal Origin Is Strongly Associated with Methicillin Resistance.”

<sup>19</sup> Nemati et al., “Antimicrobial Resistance of Old and Recent *Staphylococcus Aureus* Isolates from Poultry.”

<sup>20</sup> Aarestrup, “Sustainable Farming.”

<sup>21</sup> Aarestrup et al., “Changes in the Use of Antimicrobials and the Effects on Productivity of Swine Farms in Denmark.”

<sup>22</sup> Schlundt and Pedersen, *Data for Action - The Danish Approach to Surveillance of the Use of Antimicrobial Agents and the Occurrence of Antimicrobial Resistance in Bacteria from Food Animals, Food and Humans in Denmark.*

<sup>23</sup> Dutil et al., “Ceftiofur Resistance in *Salmonella Enterica* Serovar Heidelberg from Chicken Meat and Humans, Canada.”

<sup>24</sup> Aarestrup, “Sustainable Farming.”

<sup>25</sup> Ibid.

States, we have neither the reliability nor the specificity of data collection to begin to assess the impact of agricultural antibiotic use on public health.

On October 22, David E. Hoffman's Washington Post editorial, published just prior to the airing of a PBS Frontline episode entitled "Hunting the Nightmare Bacteria," called on President Obama to appoint someone to tackle antimicrobial resistance across all fronts, given that individuals in multiple agencies (CDC, NIH, FDA, USDA) have responsibility for the issue but there is little coordinated effort. Given the attention PCAST has paid to this issue with the recent September 12<sup>th</sup> meeting, I am hopeful that you will undertake a study that will encourage such an outcome.

I strongly urge PCAST to fully investigate the connection between antibiotic use in animal production and the levels of antibiotic resistant infections in the US. I also encourage a comprehensive look at the appropriateness of current data collection methods regarding antibiotic use in agriculture and the general availability of such data. I hope that PCAST will take up these important tasks and issue specific policy recommendations to combat this growing public health threat.

Sincerely,

A handwritten signature in blue ink that reads "Louise M. Slaughter". The signature is written in a cursive, flowing style.

Louise M. Slaughter  
Member of Congress