



## Raising Awareness for Prudent Use of Antibiotics in Animals

Position paper of the global Alliance for the Prudent Use of Antibiotics (APUA)

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### The Ecological Impact of Antibiotic Use in Food Animals

Antibiotics are widely used in food animal production for various purposes including the therapeutic treatment of clinically sick animals, disease prophylaxis during periods of high risk of infection, and promotion of growth.<sup>1</sup> They are routinely placed in livestock feed and water to increase feed efficiency and prevent diseases that may otherwise result from the unsanitary and crowded conditions in which animals are raised. The administration of antibiotics in low doses over long periods of time is one of the strongest selective pressures leading to emergence of resistant bacteria. Under those conditions, antibiotic resistant bacteria emerge and rapidly proliferate, and can then transfer to humans through contact with food animals, food consumption, and contaminated water and soil.<sup>2</sup> Once resistant bacteria emerge in the environment, it is difficult to reverse the process. Resistance genes spread readily between bacteria of the same or different species<sup>3</sup>. Because many of the antibiotics used in food animal production are of the same classes as medically important antibiotics used in humans,<sup>4</sup> this leads to greater human vulnerability to antibiotic-resistant infectious diseases.

### The Need for Prudent Use of Antibiotics

Antibiotic use drives the emergence, spread and evolution of resistance genes. Because antibiotic-sensitive strains are suppressed or eliminated, resistant strains are amplified and made more available to recombinant events<sup>5</sup>. Both pathogenic and commensal bacteria can acquire resistance and propagate among groups of animals or fish, to local environments (barns), and to the wider environment (air, soil, water).<sup>1,4,6,7,8</sup> Food animals are a very large reservoir of non-typhoidal *Salmonella*, *Camphylobacter*, some strains of methicillin resistant *Staphylococcus aureus* (MRSA) for humans, and *E.coli* urinary tract and probably bloodstream infections of humans.<sup>3,9,10,11,12,13</sup> Millions of livestock are produced every year<sup>2</sup> and their manure contains millions of bacteria that can spread through the environment and the food chain<sup>4</sup>. After a half century of antibiotic use, antibiotic resistance genes have been spread to more than a quarter of the world's infectious bacterial species.<sup>14</sup> In addition, studies have shown that countries with higher rates of antibiotic use also have more antibiotic resistant bacteria.<sup>15</sup> Limiting the use of antibiotics to only circumstances that require them is one of the most important controls on the emergence and spread of resistance. It is a public

health imperative to eliminate misuse of antibiotics in human medicine and agriculture to prolong the lifespan of critically important antibiotics.

### **Defining Prudent Use**

Because animals far outnumber humans worldwide, the misuse and overuse of antibiotics in food animal production has a broad impact on the environment. The human health consequences of the dissemination of resistance genes from food animal production include increased numbers of infections, increased severity of illness, and increased likelihood of treatment failure.<sup>16</sup> The World Health Organization defines appropriate use as “the cost-effective use of antimicrobials which maximizes clinical therapeutic effect while minimizing both drug-related toxicity and the development of antimicrobial resistance.”<sup>17</sup> Any unnecessary use in human medicine should be minimized to reduce selective pressure in the environment. In the context of food animal production, prudent use means eliminating nontherapeutic uses, including growth promotion and feed efficiency. Another definition of prudent antibiotic use is: the right drug for the right condition for the right amount of time. Antibiotics should only be administered for treatment of diseased animals, with veterinary oversight.<sup>18</sup> Decisions about the amount of antibiotics being delivered, how they are delivered and how they are distributed need to be made judiciously to prevent unwanted consequences of antibiotic use.<sup>1</sup>

To minimize infection in food animal production and decrease the volume of antibiotics used, alternative infection prevention methods should be instituted wherever possible to improve animal health and eliminate or reduce the need for antibiotics for treatment or prophylaxis. Alternatives include: improved hygiene and health management on farms, use of probiotics or competitive exclusion products, and vaccination.<sup>18</sup> The introduction and use of vaccines in farmed salmon in Norway was successful in dramatically reducing the use of antibiotics in 2006.<sup>19,20</sup> Similar interventions should be made in all food animal farms.

### **Ensuring Prudent Use: Policy Recommendations**

A strong prudent antibiotics use policy at the national level is a necessary first step to minimize misuse of antibiotics in food animals. A national policy should require surveillance of antibiotic use and resistance on the farm and establishment of specific antibiotic use guidelines for each type of animal. In 2001, the Alliance for the Prudent Use of Antibiotics (APUA) convened a Scientific Advisory Group meeting as part of its Facts about Antimicrobials in Animals and the Impact on Resistance (FAAIR) project. After extensively reviewing the scientific evidence, key policy recommendations were suggested.<sup>18</sup> Similar recommendations were identified by the World Health Organization in its 2001 Global Strategy for Containment of Antimicrobial Resistance.<sup>17</sup> These experts all agree that the following prudent use principles should be part of national public health policy. Associated guidelines, surveillance and compliance regulations should be instituted to protect public health.

#### APUA Principles for Prudent Use of Antibiotics in Food Animals

- Antimicrobials should only be used in agriculture for treatment of diseased animals. Antimicrobial growth promoters and other non-therapeutic uses should be eliminated; AGP restrictions should not be compensated for by simply increasing use of prophylactic antimicrobials.<sup>17,18</sup>

- Antimicrobials should be administered to animals only when prescribed by a veterinarian. Professional societies of veterinarians should establish guidelines about recommended dosage, interval, and duration of antibiotic treatment. Economic incentives that promote the inappropriate prescription of antibiotics should be eliminated.<sup>17,18</sup>
- National-level quantitative data on antimicrobial use in agriculture should be made available to support risk assessment, interpretation of resistance trends, and assessment of the impact of policy changes on consumption. Pharmaceutical manufacturers should be required to report the quantities of antimicrobials produced, imported and sold. End-user surveys should be conducted to monitor use of antimicrobials in agriculture.<sup>18</sup>
- The ecology of antimicrobial resistance should be considered by regulatory agencies in assessing human health risk associated with antimicrobial use in agriculture. Regulatory agencies should work with research organizations to conduct risk assessment studies. When not enough data are available, regulators should follow the “precautionary principle.”<sup>18</sup>
- National surveillance programs for antimicrobial resistance should be improved and expanded to monitor antimicrobial usage in food animals. Programs should be linked to allow for joint analysis of human and animal data. They should include standardization of sampling, culture, identification, and susceptibility testing methods. Results should be published frequently.<sup>17,18</sup>
- Alternatives to antimicrobials, and new risk-assessment models should be instituted as well as research to improve understanding of the effects of antibiotic use.<sup>18</sup>
- Introduce pre-licensing safety evaluation of antimicrobials with consideration of potential resistance to human drugs.<sup>17</sup>
- Monitor resistance to identify emerging health problems and take timely corrective actions to protect human health.<sup>17</sup>

APUA also advises policymakers to separately categorize antibiotics from other drugs because they are “societal drugs.” Antibiotics not only affect the individual using them, but the larger community and the environment as well. A separate class would allow for implementation of incentives to industry for developing new antibiotics, post-marketing surveillance to curb resistance, and efforts by producers and consumers to preserve their efficacy.<sup>21</sup>

## Conclusion

Antibiotic resistant infections are increasing in healthcare settings and the community. Antibiotic overuse is the main driver. There is an urgent need for action on the issue of antibiotic resistance. The misuse and overuse of antibiotics in food animals is a major source of the problem. Improved surveillance and national regulation is needed to ensure that antibiotics are used prudently and are not routinely fed to animals for nontherapeutic purposes. Maintaining the status quo and continuing to misuse antibiotics as we have been doing will jeopardize our ability to effectively treat infectious diseases in the future. National authorities, veterinarians, physicians, and farmers all have a role in “preserving the power of antibiotics®.”

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