Does antibiotic use in farmed animals pose a risk to human health?

No

Veterinary pharmacologist Stephen Page believes that antibiotic use in animals benefits human and animal health

While antibiotic use in livestock has the potential to cause harm to human health, the likelihood of harm arising from the use of antibiotics under current Australian practices is highly unlikely.

There is ample independent evidence supporting the long history of appropriate use of antibiotics in Australian livestock. For example, the past six annual reports of the National Residue Survey contain the results of tests for the presence of up to 38 antibacterial agents in the edible tissues of cattle, pigs, poultry and sheep.[1] Almost 400 000 assays were performed and compliance with Australian standards was at or above 99.99% for each of the four species tested.

Given the high morbidity and mortality associated with many of the diseases of livestock (eg, necrotic enteritis and coccidiosis in poultry, bovine respiratory disease and mastitis in cattle, and post-weaning diarrhoea and porcine respiratory disease in pigs), prevention of infectious diseases is of fundamental importance. Judicious use of antibiotics in integrated animal health plans has an important role to play in protecting the health and welfare of animals and in contributing to the safety and quality of the food that is produced. Only 39 antibacterial agents are approved and available for use in Australian livestock, six of which are from classes with no human medical use counterpart. As an example of contemporary patterns of use, a recent survey of the use of antimicrobial agents in the Australian pig industry found most use was for control of infections with *Lawsonia intracellularis, Mycoplasma hyopneumoniae* and *Escherichia coli* and relied on sulfonamides, tetracyclines and penicillins[2] — all drugs considered by the Expert Advisory Group on Antimicrobial Resistance to be of low importance to public health.[3]

What led the Australian Department of Health and Ageing to conclude that "Australia's food supply is one of the safest and cleanest in the world"[4]? In 2008, Food Science Australia was commissioned to survey the presence of bacteria with antimicrobial resistance in samples of raw whole poultry, beef mince and pork chops collected from shops in Melbourne, Sydney, Brisbane and Perth. Among the isolates of *Campylobacter jejuni, Salmonella* and *E. coli* that were collected, no fluoroquinolone or ceftiofur resistance was identified. No *Enterococcus faecium* was isolated and all *Enterococcus faecalis* isolates were susceptible to ampicillin, penicillin and vancomycin; only one of 300 *E. faecalis* isolates was resistant to gentamicin. In contrast, Denmark, despite being recognised as having one of the most regulated and conservative approaches to the use of antibiotics in livestock, noted significant antibiotic resistance in their most recent antimicrobial resistance monitoring report: fluoroquinolone-resistant *C. jejuni* in 17% of broiler meat samples; high-level gentamicin resistance in *E. faecalis* from pork samples; vancomycin-resistant *E. faecium* in 47% of isolates from broiler chickens; extended-spectrum β-lactamase producing *E. coli* (ceftriaxone resistant) in 27% of broiler cloacal swabs and 9% of broiler meat samples; fluoroquinolone-resistant *Salmonella enterica* subspecies *enterica* serovar Enteritidis in 8% of sporadic cases of human salmonellosis; multiresistant *Salmonella enterica* subspecies *enterica* serovar Typhimurium definitive type 104 (DT104) in 7% of isolates from pigs; and ceftiofur-resistant *E. coli* in 1% of domestic pork and broiler meat samples.[5]

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OzFoodNet (http://www.ozfoodnet.gov.au) was established by the Australian Government in 2000 to enhance surveillance of foodborne disease. It has published eight annual reports, which do not identify any cases of domestically acquired foodborne illness caused by infections with *Salmonella, Campylobacter* or Shiga toxin-producing *E. coli* complicated by antibiotic resistance of livestock origin. By contrast, a number of human cases of fluoroquinolone-resistant *Campylobacter* infection and *S.* Typhimurium DT104 infection have been described, but each originated from overseas (especially South-East Asia) or from imported food.

Since 2001, the Australian Salmonella Reference Centre has tested more than 18 000 *Salmonella* isolates from cattle, pigs, sheep, chickens (broilers and layers), raw meat and eggs. No fluoroquinolone-resistant isolates were found and only nine isolates (most of which were submitted before 2004) were phenotypically resistant to cefotaxime at 1 µg/mL.

Australians should be reassured that food safety is the highest priority in livestock production. The Australian Veterinary Association is currently updating a series of guidelines for responsible use of antibiotics, the poultry industry is supporting leading edge research to develop a vaccine to prevent necrotic enteritis, and the pig industry has spent over $7 million on projects to refine and replace the use antibiotics and has committed to halving antibiotic use by 2018.

Antibiotics used prudently and selectively can clearly benefit animal health and welfare, leading to overall human health benefits, not risks.

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Competing interests: I eat meat. I have lectured to veterinary students; have been an invited speaker at international meetings; and have provided consultation on antimicrobial use and resistance to the Australian Veterinary Association, the Australian Chicken Meat Federation, pharmaceutical companies (including MSD Animal Health and Phibro Animal Health), the Food and Agriculture Organization of the United Nations and the World Organisation for Animal Health.

Provenance: Commissioned; not externally peer reviewed.

1 Department of Agriculture, Fisheries and Forestry. National Residue Survey. http://www.daff.gov.au/agriculture-food/nrs (accessed Feb 2012).

2 Jordan D, Chin JJC, Fahy VA, et al. Antimicrobial use in the Australian pig industry: results of a national survey. *Aust Vet J* 2009; 87: 222-229.

3 Expert Advisory Group on Antimicrobial Resistance. EAGAR importance ratings and summary of antibiotic uses in humans in Australia. Canberra: National Health and Medical Research Council, 2006.

4 Department of Health and Ageing. Australia's food supply gets clean bill of health [press release]. 28 Feb 2003. http://www.health.gov.au/internet/main/publishing.nsf/Content/health-mediarel-yr2003-tw-tw03044.htm (accessed Mar 2012).

5 DANMAP 2010 — use of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from food animals, food and humans in Denmark. Copenhagen: Danish Integrated Antimicrobial Resistance Monitoring and Research Programme, 2011. http://www.danmap.org/Downloads/Reports.aspx (accessed Mar 2012). ❑