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Guidelines for prudent use of antimicrobials and their implications on antibiotic usage in veterinary medicine

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Abstract

Antibiotics are still deemed necessary for the treatment and prevention of infectious diseases in farm animals intended for food production and to protect public health from food-borne diseases. All antibiotics used in veterinary medicine are the same or closely related to antibacterials used in human medicine or may induce cross-resistance. Consumption figures of antibiotics in the European Union (EU) indicate an about 10-fold higher number of treatment days in human medicine when compared to veterinary usage with tetracyclines being the most frequently used group. However, the conditions of antibiotic use in farm animals, mainly in swine and poultry by oral treatment of a large number of animals for prolonged periods of time and risk of underdosing might favour the selection of bacterial resistance. In order to reduce the use of antibiotics and thus to minimize the development of resistance in veterinary medicine, compulsory guidelines for prudent use of antibacterials in animals were published in Germany in December 2000. These guidelines describe the minimum requirements to be followed by veterinarians when administering antibiotics to animals. Key elements of the guidelines are the use of antibiotics on the basis of an exact (preferentially microbiological) diagnosis, choice of the most suitable antibacterial substance (antibacterial spectrum as narrow as possible, margin of safety as high as possible, good tissue penetration if necessary), restricted use of antibiotics with last resort character, adherence to the label instructions (no underdosing or prolongation of dosing interval). Any deviations from the guideline recommendations must be justified and recorded. Results of monitoring of antibiotic usage as medicated feeding stuffs in pig production in the German state Sachsen-Anhalt from October 2000 until March 2002 indicate a change of the prescribing attitude of veterinarians after implementation of the guidelines. The consumption of antibiotics continuously declined from 4255 kg before the guidelines to 1145 kg in the first quarter of 2002 resulting in a reduction of the treatment days per animal from 31.6 (third quarter 2000) to 13.6 days (first quarter 2002). Simultaneously the use of chlortetracycline decreased from initially 76% of the total amount of antibiotics prescribed to 14.7% at the end of the study, respectively. These results suggest an acceptance of the guidelines for prudent antibiotic use by veterinarians as an important tool to reduce the usage of antibiotics and the consecutive development of resistance.

Keywords: Antibiotics; Veterinary medicine; Farm animals; Consumption figures; Prudent use

Introduction

Antibiotics are widely used in veterinary medicine for therapeutic, metaphylactic, or prophylactic treatment of bacterial infections in farm animals intended for

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production of human food (meat, milk or eggs). The rationale for veterinary use of antibiotics is to protect animal welfare, to prevent epidemic spread of infectious animal diseases, to provide high efficiency of animal production, to prevent the transfer of zoonoses from animals to the human population, to warrant safety of food of animal origin and to prevent food-borne diseases (Ungemach, 2000). Antibiotics are vital drugs in veterinary medicine and cannot be replaced in the near future due to the lack of suitable alternatives, e.g. vaccines. The inherent risk of any use of antibiotics to select for bacterial resistance poses a relevant risk for public health by spreading of the resistance from farm animals to the human population via different patterns (Witte, 1998). Although, this risk is supposedly of minor importance when compared to resistance selection by antibiotic use in human medicine, some resistant zoonotic pathogens like *Salmonella, Campylobacter, Listeria* or *Escherichia coli* could be isolated in farm animals and food of animal origin, or when sporadically found in humans, they could be traced back to animal origin (Mølbak, 2004).

Usage of antibiotics in human and veterinary medicine

Data on the amounts of the antibiotics used in veterinary medicine are scarce in Germany and in EU member states with the only exception of Scandinavian countries. Estimates of sales volume of antibiotics in the EU and Switzerland were provided by the Fédération Européenne de la Santé Animale (Fedesa) for 1997 and 1999 (Table 1) (Fedesa, 1998, 2001). In 1997, in animals a total of 3494 tonne of active ingredients were used as therapeutics. A portion of 66% was tetracyclines while macrolides amounted to 12% and penicillins to 9%; the other antimicrobial groups together comprised 12%. In contrast to human medicine, newer potent antimicrobials such as third-generation cephalosporins and fluoroquinolones are still used to a very minor extent (<1%). Simultaneously, the estimated consumption of antibiotics in human medicine was 7659 tonne. In 1999, the usage in veterinary medicine increased by 408 tonne while in the meantime the non-therapeutic usage of antibiotics as growth promoters in farm animals declined by 51% to 786 tonne due to the ban of various antibacterial feed additives which finally will be phased out in 2006.

According to the EU usage figures of 1997, the European human population, and the number of food-producing animal species in the EU (cattle, sheep, goat, pig, poultry) doses of 342 and 54 mg antibiotic/kg body mass/year, respectively, were estimated revealing an approximately 6.3-fold higher use of antibiotics in humans when compared to animals (Table 1). The number of antimicrobial treatment days was several folds higher for humans than for

Table 1. Sales volume and dosage of antibacterial drugs in the European Union and Switzerland in human and veterinary medicine in the years 1997 and 1999

	Human		Animals (Farm animal)	
Antibiotics				
1999	8528[a]		3902[a] × 0.8[b]	
1997	7659[a]		3494[a] × 0.8[b]	
Population (1997)				
	Number[c] ($\times 10^6$)	Body weight (kg $\times 10^6$)	Number[c] ($\times 10^6$)	Body weight[c] (kg $\times 10^6$)
Men (60 kg)[d]	373	22 380		
Cattle/calves			56.7	17 130
Sheep/goats			71.1	2539
Pigs			190.5	20 398
Poultry (2 kg)[e]			5804	51 496
Dosage (mg/kg b.w.)	342		54	
Treatment days	34–68		2.7–5.4	
MDD[f] (mg/kg)	5–10		10–20	

[a]Data according to Fedesa (1998, 2001).
[b]80% farm animals/20% companion animals.
[c]Data (animal number and slaughter weight) according to Eurostat (1997).
[d]Mean body weight of 60 kg.
[e]Mean body weight at slaughter (1997).
[f]Mean daily doses of antibacterial groups used in human/veterinary medicine.