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ARCH-Vet

**Report on sales of antibiotics in veterinary medicine
and antibiotic resistance monitoring of livestock in Switzerland**

Summary

2014

1 Summary

1.1 Sale of antibiotics in veterinary medicine

The sales volume of antibiotics continued to decline in 2014. Overall, 49,250 kg of antibiotics were sold for veterinary medicine, which corresponds to a decrease of 8% compared with the previous year. This amounts to a decline of 32% (23 tonnes) since 2008. The decrease is due mainly to a fall in sales of medicated premixes.

The sales rankings of the various classes of antibiotic also remains unchanged: in first place are sulfonamides, followed by penicillins and tetracyclines. These three classes are often sold as medicated premixes, which account for about 60 % of the total volume (29 tonnes). The quantity of antibiotics approved only for pets comprises 2% of the total volume.

Of the highest-priority critically important antibiotic classes for human medicine (WHO 2011) the sales of third and fourth generation cephalosporins have increased slightly. Macrolids have shown a fall in the volume of sales since 2008. But the sales of long-acting, single-dose injection products show an upward trend. The sales of fluoroquinolones in the year under review were again slightly down on the previous year.

1.2 Antibiotic resistance in livestock

Various standardised tests have been carried out in Switzerland since 2006 as a part of a nationwide surveillance programme to assess the situation regarding antibiotic resistance in broilers, fattening pigs and cattle.

Continuous monitoring of the development of resistance in zoonotic pathogens and indicator bacteria in livestock is a basic requirement for gaining a better understanding of the risk of resistance spreading within animal populations and, via the food chain, to humans. Consequently, it is also a basis for evaluating measures to improve the situation.

To ensure that internationally comparable data can continue to be obtained, the monitoring was adapted to the new EU standards in 2014. In particular, tests on the various animal species will only be conducted alternately every two years in future. In addition, meat samples in the retail trade will also be taken from the animal species concerned and tested for the occurrence of resistant bacteria.

In 2014, healthy broilers were tested in the slaughterhouse and chicken meat from the retail trade was also sampled. In addition, nasal swabs from slaughter pigs were also tested for MRSA was in the previous year.

Table 1: Antibiotic resistance monitoring programme 2014

Type of sample	Number of samples	Bacteria tested	Number of resistance tests
Cloacal swab - broilers	493	<i>Campylobacter</i> spp.	174
Cloacal swab - broilers	205	<i>E. coli</i>	200
Cloacal swab - broilers	350	Enterococci	282
Cloacal swab - broilers	297	ESBL/AmpC prod. <i>E. coli</i>	124
Nasal swab - fattening pigs	298	MRSA	79
Meat samples - chicken	319	MRSA	22
Meat samples - chicken	319	ESBL/AmpC prod. <i>E. coli</i>	232
Meat samples - chicken	319	Carbapenemase prod. <i>E. coli</i>	0
Clinical material / all species	-	<i>S. Typhimurium</i>	18
Clinical material / all species	-	Monophasic <i>S. Typhimurium</i>	13
Clinical material / all species	-	<i>S. Enteritidis</i>	11

Zoonotic pathogens

In *Campylobacter jejuni* (*C. jejuni*) from broilers, resistance to ciprofloxacin has increased significantly since 2006, rising from 15% in 2006 to more than 46% in 2014. Resistance to erythromycin was observed only rarely in *C. jejuni* from broilers. In the reporting year, only one such isolate was found, which also showed resistance to ciprofloxacin. Fluoroquinolones, which include ciprofloxacin, and macrolides, which include erythromycin, are classed as highest-priority critically important antibiotics (WHO), because these substance groups represent the treatment of choice for serious forms of campylobacteriosis or salmonellosis in humans.

The occurrence of methicillin-resistant *S. aureus* (MRSA) in slaughter pigs in Switzerland has increased 2% to 26.5% since 2009. Results show in particular that a clonal MRSA line (CC398-t034) has spread widely in Switzerland's population of slaughter pigs. This MRSA type is also frequently found in livestock in other European countries and is a so-called livestock-associated MRSA. Although it is known that humans in close contact with animals are at higher risk of being MRSA carriers, such livestock-associated MRSA rarely causes infections in humans.

MRSA was detected in a total of 6.9% of chicken meat samples, although the occurrence in meat from domestic production was much lower, at 1%, than in meat from abroad (16%). Food today is not currently regarded as a source of MRSA transmission to humans, but a high incidence of multiresistant bacteria is nevertheless also not desirable here.

If salmonellae are isolated in biungulates or in poultry, they have to be sent for typing to the reference laboratory, where they undergo resistance testing. Since salmonellae rarely occur in Switzerland's animal population and the resistance rates are low, especially in *S. Enteritidis* and *S. Typhimurium*, the risk of resistant salmonellae being transmitted to humans through animal food from Swiss production is estimated to be very low.

Indicator bacteria

Resistance to ampicillin, ciprofloxacin, nalidixic acid, sulfamethoxazole and tetracycline has often been found in commensal *E. coli* isolates from broilers. While the resistance rates with respect to these antibiotics increased between 2006 and 2012, a marked decline has been seen since then.

Tests for the enterococcal species *E. faecalis* and *E. faecium* from broilers show that resistance to erythromycin and tetracycline are often found, although the resistance to these antibiotics in *E. faecalis* has significantly fallen in the last few years. No resistance was found to vancomycin or linezolid. In the case of *E. faecium*, however, high rates of resistance have been found with respect to quinupristin/dalfopristin, an antibiotic that is one of the few alternatives in human medicine for the treatment of infections with vancomycin-resistant enterococci.

In the reporting year, ESBL/AmpC-producing *E. coli* were detected in 41.8% of broiler flocks and in 73.3% of chicken meat samples selective detection methods. The increased prevalence in the broiler flocks could be due to a change in the laboratory method. The occurrence in chicken meat of foreign origin (85.6%) was significantly higher than the occurrence in meat from Swiss production (65.5%). No carbapenemase-producing *E. coli* were found.

Although the transmission of such bacteria to humans can be prevented by good kitchen hygiene and by making sure the meat is cooked through, multiresistant bacteria should not be present in food.

Conclusion

Resistance is found both in zoonotic pathogens and in indicator bacteria of health broilers in Switzerland, although the rates of resistance in indicator bacteria to several classes of antibiotic have shown a marked decrease in frequency over the last few years. An increased occurrence or unchanged high level of occurrence is especially seen in resistant bacteria such as MRSA or ESBL-producing *E. coli*, the frequency of which is influenced not only by the use of antibiotics alone, but also by other factors, such as animal movements, biosafety or slaughterhouse hygiene.

Further monitoring of resistance development and also research on the correlations and the spread of resistance in humans and animals are necessary in order to come up with better estimates of risk.

Coordinated measures are currently being developed in the National Strategy on Antibiotic Resistance (STAR) in partnership with all sectors involved with the aim of ensuring the effectiveness of antibiotics in preserving human and animal health in the long term.