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# **ARCH-Vet**

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

## **Summary**

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## SUMMARY

### Sales of antibiotics in veterinary medicine

A steady decrease in the volume of antibiotics sold has been apparent since 2009. In 2013, a total of 53,384 kg of antibiotics were sold for veterinary purposes. This represents a fall of 6.7 % on the year before. Compared with the peak year of 2008, the decline is as much as 26 % (or 18,920 kg).

In terms of quantity, sulfonamides once again accounted for the largest volume of sales in 2013, followed by penicillins and tetracyclines. As before, the proportion of medicated pre-mixes is just under two thirds of the total volume (approx. 33 tonnes). The proportion of active ingredients licensed only for pets is 1.5 % of the total volume.

The decline in cephalosporin use, first observed in 2011 since recording began, continued in 2013. However, the reduction is due primarily to a drop in sales figures for first-generation cephalosporins. Sales of third and fourth generation cephalosporins, on the other hand, rose slightly.

Macrolides too have seen a fall in sales volumes since 2008. However, there has been an increase in sales of long-acting, single-application injections.

Sales of fluoroquinolones rose by 15 % in 2013 compared with the year before.

### Antibiotic resistance in livestock

Since 2006, various standardised tests have been carried out in Switzerland 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.

### 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 41.3 % in 2013. Microbiological resistance to erythromycin was observed only rarely in *C. jejuni* from broilers. In the reporting year, only two such isolates were found (1.3 %); however, both were also microbiologically resistant to ciprofloxacin. Fluoroquinolones, which include ciprofloxacin, and macrolides, which include erythromycin, are classed as highest-priority critically important antibiotics (WHO / OIE / FAO), because these substance groups represent the treatment of choice for serious forms of campylobacteriosis or salmonellosis in humans.

In pigs, the rate of *Campylobacter coli* (*C. coli*) strains resistant to streptomycin is very high, at around 74.3 %. However, it was over 90 % in 2006 and has fallen significantly since then. High rates of resistance to tetracycline and ciprofloxacin have also been found; in the case of ciprofloxacin, a statistically significant upward trend has been discernable since 2006. Eight isolates (3 %) showed microbiological resistance to both ciprofloxacin and erythromycin.

**Table1:** Antibiotic resistance monitoring programme 2013

Type of sample	Number of samples	Bacteria tested	Number of resistance tests
Cloacal swab - broilers	448	<i>Campylobacter</i> spp.	168
Cloacal swab - broilers	201	<i>E. coli</i>	189
Cloacal swab - broilers	249	Enterococci	213
Cloacal swab - broilers	170	ESBL	47
Faecal swab - fattening pigs	348	<i>Campylobacter</i> spp.	266
Faecal swab - fattening pigs	200	<i>E. coli</i>	183
Faecal swab - fattening pigs	171	ESBL	16
Nasal swab - fattening pigs	351	MRSA	73
Faecal swab - veal calves	253	Enterococci	176
Faecal swab - veal calves	208	<i>E. coli</i>	176
Faecal swab - veal calves	181	ESBL	30
Nasal swab - veal calves	253	ESBL	10
Clinical material / all species	-	<i>Salmonella</i> spp.	85
Clinical material / all species	-	S. Typhimurium	48
Clinical material / all species	-	Monophasic S. Typhimurium	17
Clinical material / all species	-	S. Enteritidis	6

The occurrence of methicillin-resistant *Staphylococcus aureus* (MRSA) in Switzerland has remained constant compared with the previous year, at 20.8 %. Prevalence was much lower in 2009 and 2011, at 2 % and 5.6 % respectively. The results show that one clonal MRSA line in particular (CC398-t034) is spreading widely in Switzerland's population of slaughterhouse pigs. This MRSA type is also frequently found in the livestock of other European countries and is a "livestock-associated MRSA".

In veal calves, the prevalence of MRSA is still low (at 4 %) and has not risen significantly since 2010. In addition to type CC398-t011 MRSA, type CC398-t034 MRSA was found in veal calves for the first time in this reporting year. Its spread will be monitored over the coming years.

Overall, only a few *Salmonella* isolates were available from clinical material. Resistance was found especially in monophasic *S. Typhimurium* strains, which were consistently resistant to ampicillin, streptomycin, sulfamethoxazole and tetracycline.

### Indicator bacteria

In *Escherichia coli* (*E. coli*) isolates, medium to high rates of resistance to ampicillin, streptomycin, sulfamethoxazole, tetracycline and trimethoprim are found in all animal species. In *E. coli* isolates from broilers, microbiological resistance to ciprofloxacin and nalidixic acid was also observed frequently and, in veal calves, 14 % of *E. coli* isolates were microbiologically resistant to kanamycin. In pigs, the resistance situation has not changed significantly compared with previous years. In fattening calves, microbiological resistance to ampicillin, streptomycin, sulfamethoxazole and tetracycline has declined significantly since 2006.

Tests on the enterococcal species *E. faecalis* and *E. faecium* showed high rates of microbiological resistance in both broilers and veal calves. In recent years, rates of resistance to bacitracin, tetracycline and erythromycin in *E. faecalis* from broilers and to bacitracin in

*E. faecalis* from veal calves have declined significantly. As in 2010, a microbiologically vancomycin-resistant *E. faecalis* isolate from a veal calf was found in this reporting year.

The results of studies on ESBL/pAmpC-producing *E. coli* did not differ significantly from those in 2012. Using selective methods, ESBL/pAmpC-producing *E. coli* were found in 27.7 % of broiler flocks, in 9.4 % of fattening pigs and in 16.6 % of veal calves. Besides resistance to beta-lactam antibiotics, the isolates showed very high to extremely high rates of resistance to (fluoro)quinolones, sulfonamides, tetracycline and trimethoprim in all three species. The rates of resistance were likewise high to extremely high with regard to chloramphenicol, gentamicin and kanamycin in pigs and cattle. No resistance to carbapenem was found.

## **Conclusion**

Microbiological resistance is frequently found in Switzerland, both in zoonotic pathogens and in indicator bacteria of healthy livestock. MRSA has spread in Switzerland's pig population in recent years and microbiological resistance to certain important antibiotic groups is continuing to grow or remains unchanged at a high level.

Further monitoring of the development of resistance, and research into the connections between and spreading of resistance in humans and animals, is necessary in order to gain a better assessment of the risk. With the aim of ensuring the effectiveness of antibiotics in preserving human and animal health in the long term, coordinated measures are currently being developed in the National Strategy on Antibiotic Resistance (STAR) in partnership with all sectors involved.