

## OPTIMISING USE OF ANTIMICROBIALS FOR ANIMALS – SWEDISH EXPERIENCES

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The controversy concerning possible effects of the use of antimicrobials for use in food producing animals on the selection of resistant bacteria goes back to the 50s. In 1969, a British committee recommended restrictions in the use of antimicrobial growth promoters (AGPs) in order to mitigate the risk of resistance (Swann Committee 1969). Today, it is clear that emergence of antibiotic resistance in bacteria threatens our possibilities to successfully treat infectious diseases in humans and animals. Most experts and policy makers agree that to contain the problem, unnecessary use of antimicrobials must be curtailed (eg. SSC, 1999; WHO, 1997, FAO/OIE/WHO 2003).

In Sweden, the intensive debate from the 60s never ceased. In the beginning of the 80s, a broad discussion on use of antimicrobials and practices in animal production prompted the Swedish Farmers Union (LRF) to adopt a policy on use of antimicrobials, and to write to the Government and ask for a ban on growth promoting antimicrobials. In 1986, the use of antimicrobials for animals was restricted to veterinary purposes. This means that the use of antimicrobials for growth promotion was banned. All antimicrobials for animals are now classified as veterinary medicines and are only available on veterinary prescription.

The changes in 1986 had little or no impact on dairy, beef, calves, sheep or layers as these production sectors never or hardly used AGPs. More affected were the chicken and swine industry. Antimicrobials given at growth promoting doses prevent certain intestinal diseases. The ban was swiftly implemented, and some health disturbances had to be tackled. Other preventive strategies had to be found.

### Broiler production

Before 1986, almost all chicken feed contained both AGPs and a coccidiostat. The chicken producers identified the occurrence of clinical or subclinical necrotic enteritis as the main problem to tackle subsequent to the ban. It was agreed that a transition period would be necessary and that the veterinarians would prescribe virginiamycin as prophylaxis during this period. Field experience and more formal research confirmed the construction and climate of stables, hygiene, management and feed composition all contributed to the disease. Further, it was found that coccidiostats of the ionophore type also prevent necrotic enteritis (Elwinger *et al.* 1992).

Already in 1988, all prophylactic medications were abandoned. Strong emphasis was placed on improving animal environment, measures that could be foreseen to prevent other diseases as well. A special bonus was given for good animal management and care, which also led to improvements in the total level of quality of the production. The most important changes related to feed involved a reduction of protein content, a higher fibre content and supplementation with enzymes. Ionophores are used as coccidiostats for all conventionally reared chickens. Today, outbreaks of necrotic enteritis are rarely

seen. Prescription data show that during 1996-2000, less than 0.05% of the chickens were medicated for this disease.

Few other health problems are observed in Swedish broilers. A high level of biosecurity is applied to maintain a salmonella free status, and this also helps to control other infectious diseases. Through bioscreening measures, the production has remained free from mycoplasmosis and most other infectious diseases. Consequently, the overall use of veterinary antimicrobials in broiler production is very low (SVARM 2000)

### Pig production

Before 1986, practically all piglets were given antibacterial feed additives (olaquinox or carbadox), from weaning until delivery to the finishing units at the age of 10-12 weeks. Slaughter pigs were, to a lesser extent, given antibacterial feed additives (avoparcin or virginiamycin) until slaughter.

The most notable problems that were observed arose in weaner pigs. The Swedish Veterinary Association adopted a policy for prescription of medicated feed with particular emphasis on weaners. According to this policy, prescription of antimicrobials for mixing into feed or water should be coupled with a number of other measures such as a thorough herd investigation targeting etiology and predisposing factors, and written recommendations on changes in management, feed, hygiene *etc.* For a number of years, olaquinox was prescribed to problem herds. In the beginning of the 90s, this use was gradually replaced by zinc oxide. Zinc oxide is presently licensed for sale as a pharmaceutical subject to veterinary prescription and its use has declined by more than 90% since the mid 90s. Numerous measures have been, and are continuously, undertaken to optimise rearing and production systems and to employ available techniques (e.g. sectioning of buildings, age segregation, planned production). In the late 90s, a strategy for education of farmers and veterinarians, managed by the Swedish Animal Health Services, has been agreed and successfully implemented.

The ban also stimulated a development towards new rearing systems. Today, most of the pigs are reared in age-segregated systems aiming to minimise the spread of infectious diseases. The major indications for use of antimicrobials in pig production are enteric and respiratory problems. The former are mainly weaning diarrhoea and swine dysentery. Strategies for eradication of swine dysentery are applied in some problem herds. In 2002, the use of antimicrobials for medication of pigs via feed or water had decreased by 66% since 1988 (two years after the ban) and by 30% since the mid 90s (SVARM 2002).

### Use of antimicrobials – the overall figures

In Sweden, statistics on sales of antimicrobials for animals have been available since 1980 (for a review see SVARM 2000).

Before 1986, the average total usage for animals per year was 45 metric tons. Between 1988 and 1994, the sales were stably around 30 tons. From 1995, a steady decline in total sales has been recorded. In 2003, the figure was 16 tons, representing a decrease since 1980-84 by 64%. Today, few antimicrobials for administration to groups of animals via food or water are available. The proportion of the total sales of antimicrobials of drugs suitable for in-feed or water medication has declined steadily over the 90s and was in 2004 only 8% of that in 1980 (SVARM 2003), while use for medication of individual animals has remained relatively stable over two decades.

#### Prevalence of resistance among animal bacteria is low

Data from the Swedish Veterinary Antibiotic Resistance Monitoring programme (SVARM), indicate lower prevalence of resistance to AGPs, but also to most therapeutics, among bacteria from Swedish animals compared to materials collected and tested in similar ways in other European countries (SVARM 2003). Multiresistant *Salmonella* strains are rarely reported from food producing animals and the prevalence resistance to, for example, quinolones among *Campylobacter jejuni* from broilers is very low. The latter is reflected in a very low prevalence of resistance among *Campylobacter jejuni* isolated from humans infected domestically, in contrast to much higher prevalence in isolates from infections acquired abroad. Also, the occurrence of resistance to therapeutic antimicrobials among animal pathogens is lower than in many other countries.

#### Conclusions

To conclude, the ban of growth promoting antimicrobials in Sweden 1986 was initially associated with some health problems in piglets, and to a lesser extent in chickens. Most problems have today been solved. The Swedish experience shows that changes in production systems towards health-orientated systems are necessary in order to adjust to animal production without AGPs. Infectious diseases are controlled through biosecurity and control programmes, and efforts are continuously made to optimise management and feeding. Antimicrobials are used when needed, but crucial in the long-term strategy is to minimise the occurrence of diseases, thereby reducing the need for antimicrobials. Monitoring of resistance and use of antimicrobials are other important tools, providing guidance on the need for policy changes and other interventions. Taken together, the overall strategy appears to be effective in containing resistance to antimicrobials, and is also beneficial for animal health and animal welfare.

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