

Sales Of Antimicrobial Products
Used As Veterinary Medicines,
Growth Promoters And
Coccidiostats In The UK In 2000

SUMMARY

This paper reports on the sales of veterinary antimicrobial products in the UK in 2000. It shows that the decline in the sales of antimicrobials between 1998 and 1999 was reversed in 2000 although sales in 2000 remained well below the peak in 1996. The sales of antimicrobials used as growth promoters declined from 28 tonnes of the base active ingredient in 1999 to 24 tonnes in 2000. During 2000 an increase in sales of therapeutic antimicrobials for food animals was recorded from 383 tonnes to 437 tonnes. This increase was due to increases in the sales of tetracyclines (by 36 tonnes), trimethoprim/sulphonamides (by 12 tonnes) and macrolide based products (by 12 tonnes). Overall the antimicrobials sold for use in food and non-food animals increased by 9.5% (from 448 tonnes to 490 tonnes).

Sales in food animals accounted for 94% (461 tonnes) of the annual sales of 490 tonnes, but it is not possible to separate from this the food producing animals not entering the food chain because of, for example, the over thirty month scheme for cattle. Just under half (49%) of the total sales of antimicrobials for use in food animals is accounted for by tetracyclines whereas fluoroquinolones account for about 1 tonne as in previous years.

Ninety-five percent of the antimicrobials sold for use in food animals in 2000 were for therapeutic purposes, with growth promoters accounting for 5%. Approximately 56% of antimicrobial products in food animals are administered via feedstuffs most of which is used for pigs and poultry.

The increase in sales of therapeutic antimicrobials in 2000 occurred in pigs (by 7 tonnes), poultry (by 13 tonnes) and multi-species products (by 37 tonnes). This may well be attributed to the EU ban in 1999 on antimicrobial growth promoters and the presence of diseases such as Porcine Dermatitis and Nephritis Syndrome and Post-weaning Multi-system Wasting Syndrome (PDNS/PMWS) in the pig industry.

INTRODUCTION

Antimicrobial resistance is a serious problem in human medicine and this has led to increasing concerns about the use of antimicrobial products in human medicine, veterinary medicine, animal production, agriculture and horticulture. In the UK, the Government has made clear that it takes the problem of antimicrobial resistance very seriously and a comprehensive strategy has been developed to address the issue in order to maintain the effectiveness of antimicrobial products. A key element of this plan is the collection of information on the amounts of antimicrobial products used in veterinary medicine and animal production in the UK.

The Veterinary Medicines Directorate (VMD), an Executive Agency of the Department for Environment, Food and Rural Affairs (Defra) is responsible for the authorisation of veterinary medicines in the UK and in February 2001 published sales figures of antimicrobials authorised as veterinary medicinal products, growth promoters or coccidiostats for 1999. The sales data were provided by the veterinary pharmaceutical companies marketing these products in the UK. The figures are collated annually and this paper summarises the information provided for 2000.

A glossary of terms can be found at the end of this report that explains the scientific terms used in the report.

TOTAL SALES

Table 1 shows the amounts of therapeutic antimicrobials and antimicrobial growth promoters sold for use in food animals (including aquaculture) in 2000 expressed as tonnes of base active ingredients. The table also includes the total sales of therapeutic antimicrobials sold for use in non-food animals (horses, dogs, cats etc.) and the total amounts of antimicrobials sold for use in food animals and non-food animals during this period.

Table 1 : Sales of antimicrobial therapeutic products and growth promoters (tonnes active ingredient) 1998 – 2000 in food and non-food animals

| | 1998 | 1999 | 2000 | Annual increase/ decrease |
|--|------|------|-------|------------------------------|
| Therapeutic antimicrobials-food animals | 433 | 383 | 437** | 14% |
| Antimicrobial growth promoters | 89 | 28 | 24 | -14% |
| Total antimicrobials food animals | 522 | 411 | 461 | 12% |
| Therapeutic antimicrobials non-food animals* | 32 | 37 | 29 | -27% |
| Total antimicrobials-food animals and non-food animals | 554 | 448 | 490 | 9.5% |

* Horses, dogs and cats.

** Difference in total with Table 3 is result of rounding.

Total sales of therapeutic and growth promoting antimicrobials for food and non-food animals increased by 9.5% from 448 tonnes in 1999 to 490 tonnes in 2000. Antimicrobials sold for growth promotion in food animals fell by 14% in 2000 and the proportion of therapeutic antimicrobials used in food animals increased by 14% from 1999 to 2000. In contrast, the amounts of therapeutic products sold for use in non-food animals decreased by 27% from 37 tonnes to 29 tonnes.

The 14% increase in sales of therapeutic antimicrobials in food animals may be due to a number of factors including:

- The continued decline in sales of antimicrobial growth promoters because of the ban by the EU on June 30 1999 of those growth promoters that confer cross-resistance to antimicrobials used in human medicine. In Denmark, where a voluntary ban on the use of antimicrobial growth promoters by the farming organisations was completed by the end of 1999, a 30% rise in the use of therapeutic antimicrobials was seen (DANMAP 2000, Danish Veterinary Laboratories, <http://www.svs.dk>).

- New diseases in the pig industry such as PDNS/PMWS may well have increased antibiotic usage to combat secondary infections.

Table 2 : Sales of antimicrobial therapeutic products and growth promoters (tonnes active ingredient) 1993 – 2000 in food and non-food animals

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|--|------------|------------|------------|-------------|-------------|------------|-------------|-------------|
| Therapeutic antimicrobials – food animals | 392 | 445 | 486 | 533 | 495 | 433 | 383 | 437 |
| Annual increase/decrease | N/A | 14% | 9% | 10% | -7% | -13% | -12% | 14% |
| Antimicrobial growth promoters | 83 | 88 | 122 | 96 | 69 | 89 | 28 | 24 |
| Annual increase/decrease | N/A | 6% | 39% | -21% | -28% | 29% | -69% | -14% |
| Total antimicrobials - food animals | 475 | 533 | 608 | 629 | 564 | 522 | 411 | 461 |
| Annual increase/decrease | N/A | 12% | 14% | 3% | -10% | -7% | -21% | 12% |
| Therapeutic antimicrobials - non-food animals* | 20 | 24 | 32 | 30 | 32 | 32 | 37 | 29 |
| Annual increase/decrease | N/A | 20% | 33% | -6% | 7% | 0% | 16% | -27% |
| Total antimicrobials - food animals and non-food animals | 495 | 557 | 640 | 659 | 596 | 554 | 448 | 490 |
| Annual increase/decrease | N/A | 13% | 15% | 3% | -10% | -7% | -19% | 9.5% |

* Horses, dogs, cats etc.

Table 2 compares the sales of antimicrobials between 1993 and 2000. It shows that there was a significant rise in the total sales of antimicrobials from 1993-1996, followed by a fall in 1997, which has continued through to 1999 with an increase in 2000. The table also shows that by 2000, the sales of total antimicrobials in food animals have fallen below the levels sold in 1993, and to its second lowest level within the eight years for which data are available.

SALES BY ANTIMICROBIAL GROUP

Table 3 shows the sales of various groups of antimicrobials in food animals in 1998 to 2000. These groups were chosen for reporting, as they are the main groups of veterinary antimicrobials sold. Definitions of these groups can be found in the glossary at the end of the report. In 2000, tetracyclines, trimethoprim/sulphonamides and β -lactams (including penicillin) continued to account for most of the therapeutic antimicrobials sold for use in food animals. Together they contributed 85% with tetracyclines accounting for 52%, Trimethoprim/sulphonamides 22% and β -lactams 11%. Most of the tetracyclines were used in pigs and poultry in medicated feedingstuffs (MFS).

Table 3 : Sales of antimicrobial therapeutic products (tonnes active ingredient) 1998 – 2000 in food animals

| Therapeutic group | 1998 | 1999 | 2000 | Annual increase/decrease |
|----------------------------|------|------|-------|--------------------------|
| Tetracyclines | 233 | 192 | 228 | 19% |
| Trimethoprim/sulphonamides | 80 | 82 | 94 | 14% |
| β -lactams | 60 | 52 | 49 | -6% |
| Aminoglycosides | 24 | 20 | 12 | -40% |
| Macrolides | 24 | 29 | 41 | 41% |
| Fluoroquinolones | 1 | 1 | 1 | 0% |
| Others* | 11 | 7 | 11 | 57% |
| Total | 433 | 383 | 436** | 14% |

* Lincomycin, tiamulin, valnemulin, florfenicol, novobiocin, decoquinatate, diclazuril.

** Difference in total with Table 1 is result of rounding.

The table indicates that sales were up for all the major therapeutic groups during 2000 except β -lactams, aminoglycosides and fluoroquinolones. Reasons to account for this may include combating the consequences of new and emerging diseases within the UK food animal industry such as PDNS/PMWS and the EU ban on some growth promoting products in June 1999. It was noted that a voluntary ban on these products in Denmark similarly led to an increase in the sales of therapeutic antimicrobials (DANMAP 2000). The most significant percentage changes are in the sales of macrolides and others, which showed increases of 41% and 57% respectively, in 2000. The increase in the 'others' category may be the result of additional drug types being included in the group in the 2000 analysis.

Table 4 summarises the sales of coccidiostats reported to the VMD. It was noted in last year's report that it had not been possible to obtain the full data on sales of coccidiostats, which were expected to be higher than the 66 tonnes reported. With this in mind, the large increase (356%) in coccidiostat

sales between 1999 and 2000 probably reflects missing data in earlier years rather than increased sales in 2000. Coccidiostats are not related to any product used in human therapy. They are used exclusively in animals to prevent coccidiosis, particularly in poultry.

Table 4 : Sales of coccidiostats (tonnes active ingredient) in the UK 1993 - 2000

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|------------------------------|------|------|------|------|------|------|------|------|
| Coccidiostats | 114 | 139 | 124 | 113 | 121 | 103 | 66 | 235 |
| Annual Increase/ Decrease | N/A | 22% | -11% | -9% | 7% | -15% | -36% | 356% |

SALES BY ROUTE OF ADMINISTRATION

Table 5 lists the major types of formulation of antimicrobials sold in 1998 - 2000. Medicated feedstuffs made up 56% of the therapeutic antimicrobials, whilst water/oral medication and injectables contributed 36% and 6% respectively. Intramammary products and other therapeutic antimicrobial products contributed 1% and 0.28% respectively each. Compared to the 1999 sales figures, there was an overall 14% increase in sales, mainly from the sharp rise in the sales of water/oral administered products. In contrast sales of medicated feedstuffs decreased by 21% whilst injectables showed no change.

Table 5 : Sales of therapeutic antimicrobials (tonnes active ingredient) by route of administration in food animals 1998 – 2000

| Classification | 1998 | 1999 | 2000 | Annual increase/decrease |
|----------------------|------|-------|-------|--------------------------|
| Medicated feedstuffs | 362 | 307.5 | 244 | -21% |
| Injectable | 24 | 27 | 27 | 0% |
| Water/Oral | 38 | 40 | 158 | 395% |
| Intramammaries | 7 | 5.5 | 5.7 | 4% |
| Other * | 2 | 3 | 1.2 | -60% |
| Total | 433 | 384 | 436** | 14% |

* Includes aerosols, creams, ear and eye medications.

** Difference in total with Table 1 is result of rounding.

Intramammaries registered a 4% increase at a time when dairy cattle numbers were decreasing. Dry cow products rose from 3.2 tonnes active ingredient in 1999 to 3.9 tonnes in 2000. Lactating cow products fell from 2.3 tonnes in 1999 to 1.8 tonnes in 2000.

SALES BY FOOD ANIMAL SPECIES

Table 6 provides a breakdown of the sales of antimicrobials for use in different species of food animals. It is clear from this table that about 70% of antimicrobial products are authorised for use in more than one species.

Table 6 : Sales of therapeutic antimicrobials (tonnes active ingredient) by food animal species only 1993 – 2000

| Species | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|----------------------|------|------|------|------|------|------|------|------|
| Cattle | 10 | 12 | 14 | 11 | 9 | 11 | 11 | 10 |
| Sheep | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 0.3 |
| Pigs | 89 | 91 | 109 | 117 | 121 | 90 | 89 | 96 |
| Poultry | 10 | 16 | 17 | 20 | 17 | 14 | 11 | 24 |
| Fish (salmon, trout) | 10 | 7 | 7 | 7 | 9 | 5 | 4 | 2 |
| Multi-Species* | 273 | 319 | 339 | 378 | 339 | 313 | 267 | 304 |
| Totals** | 392 | 445 | 486 | 533 | 495 | 433 | 383 | 436 |

* A combination of two or more of the following species - cattle, pigs, sheep and poultry.

** Does not include growth promoters, all of which are multi-species.

It is likely that most are used in pigs and poultry but it is currently impossible to determine the exact usage in different species. The VMD has commissioned an independent study on the use of antimicrobial products in food animals. A draft final report has been forwarded to the VMD and the findings of the report are being considered.

Table 6 shows that there was a further decline in 2000 in the sales of antimicrobials used in aquaculture at a time when fish (salmon and trout) production remained almost constant. In 1993, 55,000 tonnes of salmon and trout were produced and 10 tonnes of antimicrobials were sold. In 2000, 134,000 tonnes of salmon and trout were produced and 2 tonnes of antimicrobials sold. It has been suggested that the reduction in the sales of antimicrobials in aquaculture is due mainly to improved husbandry techniques and the use of increasingly effective vaccines.

ANTIMICROBIALS SALES AND LIVESTOCK REARED

Table 7 shows the live weights of animals slaughtered for food from 1993-2000 and the sales of therapeutic and growth promoting antimicrobials for food animals during the same period. The total live weight of livestock slaughtered for food increased between 1993 and 1995, which corresponds to the trend in sales of antimicrobials during this period. The total live weight of livestock slaughtered for food declined in 1996, mainly due to the sharp decline in cattle slaughtered for human consumption as a result of the BSE crisis but increased in the subsequent two years, before falling again in 1999 and 2000.

Table 7 : Live weight ('000 tonnes) of animals slaughtered for food use* (restated) against antimicrobials (tonnes active ingredient) sales 1993 – 2000

| Species | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|--------|--------|-------|-------|--------|--------|--------|--------|
| Poultry | 1,632 | 1,917 | 1,998 | 2,085 | 2,148 | 2,184 | 2,160 | 2,144 |
| Cattle | 1,768 | 1,901 | 2,022 | 1,462 | 1,444 | 1,451 | 1,407 | 1,465 |
| Pigs | 1,246 | 1,291 | 1,233 | 1,214 | 1,338 | 1,402 | 1,298 | 1,121 |
| Sheep | 963 | 697 | 724 | 686 | 638 | 698 | 717 | 711 |
| Fish (salmon and rainbow trout)** | 59 | 75 | 81 | 94 | 110 | 120 | 138 | 139 |
| Total ('000 tonnes) | 5,668 | 5,881 | 6,058 | 5,541 | 5,678 | 5,855 | 5,720 | 5,580 |
| Total antimicrobials (therapeutic and growth promoters) used in food animals (tonnes) | 475 | 533 | 608 | 629 | 564 | 522 | 411 | 461 |
| Live wt of animals slaughtered per tonne of antimicrobial active ingredient sold | 11,933 | 11,034 | 9,964 | 8,809 | 10,067 | 11,217 | 13,917 | 12,104 |

* Source Defra Statistics (Commodities and Food) Division.

** Source Scottish Executive and Centre for Environment, Fisheries and Aquaculture Science (CEFAS).

Total antimicrobial sales for food animals, reached a peak in 1996, fell in the subsequent three years and increased in 2000. Between 1998 and 1999 poultry recorded a drop in production, the first fall in a long-running upward trend and this has continued through into 2000. Between 1999 and 2000 cattle production increased by 4%, whereas pig and sheep decreased by 14% and 1% respectively. Fish registered an increase of just under 1% in production. The total live weight of animals slaughtered for food fell by 2.4% between 1999 and 2000 whilst total antimicrobial sales in food animals increased by 12%.

Many farm animals are reared to slaughter without the use of antimicrobials or growth promoters. However, if it were assumed that the antimicrobials sold for food animals were used only in animals slaughtered for food, 1 tonne of antimicrobial was used to produce 13,917 tonnes of live weight of animals slaughtered in 1999 and 12,104 tonnes in 2000.

The figures for live weight of animals slaughtered are only those animals fed and slaughtered within the UK, i.e. no account has been taken for those live animals exported. Furthermore, the live weight slaughter figures do not include animals slaughtered via the over 30-months scheme (OTMS) or selective culls throughout (e.g. swine fever infected animals), i.e. animals not slaughtered for human consumption. Therefore, many of the food chain animals reared using antibiotics do not finally make the human food chain. The fate of these animals varies and it is not the remit of this report to record this. If this were taken into account, the amount of antimicrobials used to produce one tonnes of animals for human consumption would decrease.

ANNEX 1: GLOSSARY OF TERMS

| | |
|---------------------------------|---|
| Aminoglycosides | A closely related group of bactericidal antibiotics derived from bacteria of the order Actinomycetales. Polycationic compounds that contain an aminocyclitol with cyclic amino-sugars attached by glycoside linkages. Sulphate salts are generally used. They have broadly similar toxicological features. |
| Antibiotic | A substance produced by or derived from a micro-organism, which selectively destroys or inhibits the growth of other micro-organisms. |
| Antimicrobial | A compound which, at low concentrations, exerts an action against micro-organisms and exhibits selective toxicity towards them. The term includes any substance of natural, synthetic or semi-synthetic origin which is used to kill, or inhibit the growth of, micro-organisms (bacteria, fungi, protozoa and viruses). Antimicrobials include antibiotics, disinfectants, preservatives and other substances. |
| Antimicrobial Resistance | The ability of a micro-organism to withstand an antimicrobial. |
| β-Lactams | Semi-synthetic antibiotics derived from cephalosporin C, a natural antibiotic produced by the mould <i>Cephalosporium acremonium</i> . Bactericidal products that act by inhibiting synthesis of the bacterial cell wall. |
| Coccidiostat | Products used for the control of coccidiosis, a protozoal causing diarrhoea and dysentery. |
| Fluoroquinolones | A sub-group of the quinolone compounds, having the addition of a fluorine atom and the 7-piperazinyl group. Broad-spectrum antibiotics with properties more suited to the treatment of systemic infections. |
| Food Animals | Animals produced for food: cattle, sheep, pigs, chickens, turkeys, duck, geese, game, deer, salmon, and trout. |
| Growth Promoter | Substances, which, when given in animal feed, increase feed conversion efficiency or result in, better daily liveweight gain, or both. |
| Injectable Product | A therapeutic product which is administered to animals via injection. |
| Intramammary Product | A product which is administered into the breast or udder. |

| | |
|-------------------------------|--|
| Macrolides | A large group of antibiotics mainly derived from <i>Streptomyces</i> spp. Weak bases that are only slightly soluble in water. They have low toxicity and similar antimicrobial activity with cross-resistance between individual members of the group. Thought to act by interfering with bacterial protein synthesis. |
| Medicated Feedingstuff | Any substance, not being a medicinal product, which is for use wholly or mainly by being fed to animals for a medicinal purpose, or for purposes that include that purpose without further processing as defined in the Medicines Regulations 1992. |
| None Food Animals | Animals not reared for food. These are mainly companion animals including, dogs, cats, horses, small mammals, rabbits, birds. |
| Sulphonamides | A group of bacteriostatic compounds that interfere with folic acid synthesis of susceptible organisms. They all have similar antimicrobial activity but different pharmaco-kinetic properties. |
| Tetracyclines | A group of antibiotics derived from <i>Streptomyces</i> spp. They are usually bacteriostatic at concentrations achieved in the body, and act by interfering with protein synthesis in susceptible organisms. All have a broad spectrum of activity. |
| Therapeutic Products | A prescription only medicine (POM) used to treat a disease condition in an animal. |
| Trimethoprim | Compounds with a similar action to sulphonamides, acting by interfering with folic acid synthesis, but at a different stage in the metabolic pathway. Display a similar spectrum of activity to, and are often used in combination with, sulphonamides. |
| VMD | Veterinary Medicines Directorate, an executive Agency of the Department for Environment, Food and Rural Affairs (Defra). |
| Water / Oral Product | Therapeutic product that is administered to animals via the oral route. Includes, tablets, boluses, capsules, dissolvable powders and sachets, solutions, etc. |