Autoriteit Diergeneesmiddelen

Usage of antimicrobial drugs in horses 2012 – 2014

Results of a survey of veterinary practices in the Netherlands

January 2017




Preface

This is a copy of the SDa report *Usage of antimicrobial drugs in horses 2012 – 2014: Results of a survey of veterinary practices in the Netherlands*. The Netherlands Veterinary Medicines Authority (SDa) drew up this report following a request by the Dutch Ministry of Economic Affairs. The main objectives of the report were to quantify the amounts of antimicrobial drugs used in horses, to identify differences in prescription patterns between individual veterinary practices, and to specify the relative contribution of first-, second- and third-choice antimicrobial drugs to overall antimicrobial drug use in horses. To this end, usage data for the years 2012, 2013 and 2014 were collected through a survey of practices providing veterinary care for horses. A similar survey was conducted to shed light on the usage of antimicrobial drugs in companion animals from 2012 through 2014, also at the request of the Ministry of Economic Affairs.

SDa expert panel member Inge van Geijlswijk and veterinarian and Utrecht University teacher Mathijs Theelen (specialist in Equine Internal Medicine) conducted the study on behalf of the SDa expert panel, between November 2015 and August 2016. They were assisted in their activities by Anouk van Breukelen (a student at HAS University of Applied Sciences in Den Bosch). From the study design phase up to the finalization of this report, the enthusiastic input and constructive feedback of the consultative group members also proved to be invaluable.

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Summary

A total of 24 veterinary practices provided the SDa with their 2012, 2013 and 2014 procurement data (in the event of dedicated equine veterinary practices) or prescription data (in the event of mixed-animal veterinary practices). These data were used to estimate the amounts of antimicrobial drugs used in the horses registered with these practices.

Usage of antimicrobial drugs in horses turned out to be low. Over the 3-year study period it decreased by 24%, from 0.735 DDDA in 2012 to 0.562 DDDA in 2014. The 2014 figure indicates that on average, a horse in the Netherlands receives antimicrobial drugs for 5.6 days/10 years. In 2014, first-choice antimicrobial drugs were the main group of antimicrobial drugs used in horses, representing 85.1% of all antimicrobial drugs used. Second-choice antimicrobial drugs and third-choice antimicrobial drugs represented 12.5% and 2.5%, respectively. Between 2012 and 2014, usage of third-choice antimicrobial drugs dropped by 68%, from 0.040 DDDA to 0.013 DDDA. In 2014, 21% of participating practices had not used any third-choice antimicrobial drugs at all. Consequently, the relative contribution of third-choice antimicrobial drugs in horses was low.

Although all participating veterinary practices reported low usage levels, relatively big differences were seen between individual practices (their mean DDDA figures for the 2012-2014 period ranged from 0.168 to 1.190). The veterinary practices included in this study all had very distinct profiles, as they ranged from general veterinary practices exclusively providing primary care, to dedicated equine practices providing extensive in-patient treatment and intensive care (probably requiring slightly higher levels of antimicrobial drug use). This will have contributed to the inter-practice differences observed in the study.

The horse population in the Netherlands is estimated at 450,000 (according to 2014 data from Sectorraad Paarden, the foundation representing the Dutch horse sector). Based on this figure, usage of antimicrobial drugs in horses could have been responsible for up to 20.6% of the discrepancy observed between the overall amount of antimicrobial drugs sold in the Netherlands and the amount already accounted for (by the usage levels recorded in the monitored livestock sectors and by the fact that certain antimicrobial drugs are only authorized for use in particular species).

Overall usage as well as usage of third-choice antimicrobial drugs in horses is low. Based on these findings, the SDa expert panel feels it is not necessary to subject the Dutch horse sector to continuous monitoring. Similarly, it feels there is no obvious reason to start benchmarking veterinary practices with regard to the antimicrobial drugs prescribed for horses. To keep track of any future developments, a survey similar to the one described in this report could be conducted in 3 years' time.

Introduction

In the interest of public health, the Netherlands Veterinary Medicines Authority (SDa) promotes prudent usage of antimicrobial drugs in the Dutch livestock sector, with due regard for animal welfare. It strives for full transparency regarding the usage of antimicrobial drugs in agricultural livestock, and defines benchmark thresholds for livestock farmers as well as their veterinarians.

Five livestock sectors are already subject to monitoring, but in order to further promote transparency the SDa also wants to assess the amounts of antimicrobial drugs used in several other categories of animals. This report provides insight into the usage of antimicrobial drugs in horses. In a study similar to the one described in this report, the SDa also assessed usage of antimicrobial drugs in companion animals.

Background

Antimicrobial drug resistance is a growing concern in the Netherlands, both in human and veterinary medicine. To limit further spread of antimicrobial drug resistance, prudent usage of antimicrobial drugs is key. It is therefore crucial to be aware of the amounts of antimicrobial drugs used in various animals. Several years ago, at the request of the Ministry of Economic Affairs, the Ministry of Health, Welfare and Sport, the Dutch livestock sector and veterinarians, the SDa started monitoring antimicrobial drug usage levels in the four main livestock sectors in the Netherlands: the veal, cattle, pig and broiler farming sectors. This was the result of an agreement between the livestock sectors and the Dutch government. In the Netherlands, the great majority of antimicrobial drugs sold for veterinary use can be attributed to the four main livestock sectors. When comparing delivery records of the monitored livestock sectors with sales figures, approximately 9% of antimicrobial drugs sold (2014 figures) cannot be attributed to these four livestock sectors. Except for the 2% of antimicrobial drugs only authorized for use in companion animals, it is currently unclear in which categories of animals the remaining antimicrobial drugs were used. Assessment of the amounts of antimicrobial drugs used in animals not included in the monitored livestock sectors is necessary to help clarify the mass balance discrepancy between the number of kilograms of antimicrobial drugs sold and the reported number of kilograms of antimicrobial drugs administered in the monitored livestock sectors.

Objective

This study was performed to assess the use of antimicrobial drugs in horses in the Netherlands. Usage data were assessed per veterinary practice, not per prescribing veterinarian.

This report should answer the following questions:

- What are the amounts of antimicrobial drugs used in horses?
- To what extent do prescription patterns of individual veterinary practices vary with regard to the antimicrobial drugs prescribed for horses?
- What is the relative contribution of first-, second- and third-choice antimicrobial drugs to overall antimicrobial drug use in horses?
- To what extent does antimicrobial drug use in horses explain the mass balance discrepancy?

Materials and methods

Consultative group

A consultative group was established in order to optimize the level of support for the study and in order to facilitate early recognition of any study design limitations. The consultative group included six equine veterinarians from veterinary practices throughout the Netherlands (refer to Appendix 1 for the composition of the consultative group). The consultative group provided feedback on the study protocol, which resulted in several protocol amendments. During the study, the consultative group met a total of three times to discuss the study's progress and the results (on December 16, 2015, and on January 28 and April 21, 2016).

Selection of the veterinary practices

Following consultation with the consultative group, the SDa decided to first assess how many veterinary practices would be willing to participate in the survey. To this end a total of 50 practices providing equine veterinary care were contacted by telephone. Of the practices contacted, 48 claimed to be willing to participate. The other 2 practices did not want to participate due to privacy concerns. From the 48 practices willing to participate, 30 representative practices were initially selected for study participation: 25 dedicated equine veterinary practices and 5 mixed-animal veterinary practices with a large equine department.

On March 30, 2016, the SDa provided the financier with an interim report, entitled *Gebruik van antibiotica in de paardendierenartspraktijken in Nederland in de jaren 2012, 2013 en 2014* [Usage of antimicrobial drugs in equine veterinary practices in the Netherlands in 2012, 2013 and 2014]. The interim report was based on data from 15 veterinary practices. To make sure the final report would describe the use of antimicrobial drugs in horses in the Netherlands as accurately as possible, the SDa later decided to invite additional veterinary practices to participate in the survey, in order to reach the initially intended sample size of 25 practices. Veterinary practices that had initially agreed to participation but had not submitted any data were contacted again, by telephone as well as email. In the end 24 veterinary practices (19 dedicated equine practices and 5 mixed-animal practices) had provided all the required data, which were subsequently analyzed and included in the current report.

Data collection

The veterinary practices agreeing to participation during the initial telephone call were sent a follow-up email. In this email, the practices were requested to provide their antimicrobial drug procurement data and unique patient numbers for the years 2012, 2013 and 2014. Data protection legislation prevented the SDa from obtaining procurement data from distributors directly. This meant the veterinary practices had to request the data from their distributors themselves. To this end they could use a standard email written by the researchers. The patient numbers were retrieved from the practice management systems used by the veterinary practices, by means of a standardized query.

Data analysis

Procurement data (the number of packages supplied per calendar year, by EAN code) from dedicated equine veterinary practices were converted into the number of kilograms of horse treated, based on the authorized dosages for horses (in the absence of authorized dosages, dosages were based on the best available scientific evidence). In the event of mixed-animal practices that had not categorized their procurement data by species, the SDa used prescription data to estimate the amounts of antimicrobial drugs administered to horses. The resulting figures were subsequently converted into the number of kilograms of horse treated by these practices.

Some practices had recorded each patient's body weight in their practice management system, which meant the exact cumulative mass of all horses at risk could be calculated for the practices concerned. The other practices generally had not recorded their patients' exact body weight. The SDa therefore decided to determine the average equine body weight (for horses and ponies combined) based on the weights recorded by the former practices. The average equine body weight to be applied in this study was 522 kg. This weight was used in all calculations with patient record data, regardless of whether the patients concerned were horses or ponies. By using this uniform approach, the SDa estimated each practice's overall number at risk in terms of kilograms of horse as best as possible.

The SDa then calculated the theoretical number of days per year that an average horse registered with the practice concerned was treated with antimicrobial drugs (= Defined Daily Dose Animal, DDDA), based on the number of kilograms of horse actually treated and the number of kilograms of horse making up the veterinary practice's equine patient population (the number at risk) for the years 2012, 2013 and 2014. For reasons of consistency, total equine weight was based on the number of animals recorded throughout the 3-year period. This information was also used to determine the relative contribution of first-, second- and third-choice antimicrobial drugs, and to identify trends in antimicrobial drug use between 2012 and 2014. The SDa also wanted to assess how well the 2014 study results reflect the actual situation in the Netherlands in 2014. To this end, the number of packages of antimicrobial drugs only authorized for use in horses that had been used according to the study data were compared with the amounts of these antimicrobial drugs sold according to records of the Dutch Organization for Producers and Pharmaceutical Importers of Veterinary Medicine (FIDIN).

Five veterinary practices were not able to supply 2012 data, either because they had not yet been established in 2012 or because they had later switched to another practice management system. As a result, only their 2013 and 2014 data have been included in the study.

Procurement data of two mixed-animal veterinary practices did not allow exact quantification of the amounts used in horses, as some products had multi-species authorization. The SDa decided to estimate, in consultation with the veterinarians concerned, which proportion of the vials procured had been used to treat horses. This estimate was then used to determine the number of kilograms treated.

Definition:

The parameter **$DDDA_F$** represents the 'Defined Daily Dose Animal' based on the antimicrobial drug usage data of **a particular livestock farm**. The $DDDA_F$ is determined by first calculating the total number of kilograms treated at a particular livestock farm in a specific year, based on the amount of antimicrobial drugs obtained by the livestock farm in the year concerned, and then dividing this number by the average number of kilograms of animal present at the livestock farm concerned.

The DDDA for horses is calculated for **a particular veterinary practice**, and represented by the parameter **$DDDA_{DAP}$.**

The $DDDA_{DAP}$ is determined as follows:
$DDDA_{DAP}$ (for horses): first, the number of kilograms of horses treated by a particular veterinary practice in a specific year is calculated, based on the amount of antimicrobial drugs procured/delivered by the veterinary practice concerned, after which the number of kilograms is divided by the number of horses seen at least once by one of the practice's veterinarians over a 3-year period multiplied by the standardized average equine body weight.

Example: 1 $DDDA_{DAP}$ per year would mean that on average, each horse registered with the veterinary practice receives antimicrobial drug treatment for 1 day a year. In other words: on an average day, 1 in 365 horses registered with the veterinary practice receives antimicrobial drug treatment.

Statistical analysis

To assess whether the observed DDDA difference between the two types of veterinary practices was significant, the SDa performed an independent samples t-test. To assess whether the observed DDDA differences between the years 2012, 2013 and 2014 were significant, the SDa performed a paired samples t-test. The study data met the criteria for using these t-tests, as visual inspection of Q-Q plots had shown the data were normally distributed and a Levene's test had shown equality of variance. The statistical analyses were performed using the software package IBM SPSS Statistics 23.

Results

The study included 24 veterinary practices. In 2014, a total of 70,665 horses were registered with these practices. The SDa received data from 5 mixed-animal veterinary practices (practices providing veterinary care for horses, companion animals and agricultural livestock) and 19 dedicated equine veterinary practices (practices exclusively providing veterinary care for horses).

The mean DDDA for all participating practices combined turned out to be low throughout the observation period (2012-2014). It amounted to 0.735 (±0.442) in 2012, to 0.547 (±0.303) in 2013, and to 0.562 (±0.277) in 2014. The year-to-year differences did not reach statistical significance (p-value for the 2012-2013 difference: 0.09; p-value for the 2013-2014 difference: 0.82) (see Table 1).

The DDDA figures varied by veterinary practice and from year to year. Throughout the observation period, individual practices' overall DDDA figures ranged from 0.088 to 1.629 (an 18.5-fold difference). The mean DDDA figures per practice for the 3 years combined ranged from 0.168 to 1.190 (a 7.1-fold difference). The mean DDDA figures for the 5 mixed-animal practices combined were 0.557, 0.484 and 0.493 for the years 2012, 2013 and 2014, respectively. The mean DDDA figures for the 19 dedicated equine practices were slightly higher: 0.799, 0.564 and 0.580, respectively. These differences between the two types of practices did, however, not reach statistical significance (p-value for all 3 years combined: 0.44).

In 2014, overall usage of antimicrobial drugs in horses was 24% lower than the 2012 level. Throughout the observation period, use of first-, second- and third-choice antimicrobial drugs declined by 22%, 19% and 68%, respectively (see Table 1 and Table 2). The relative contribution of first-choice antimicrobial drugs increased slightly during the observation period (2012: 83%; 2013: 83%; 2014: 85%). In 2014, first-choice antimicrobial drugs accounted for 85.1% of all antimicrobial drugs used in horses, while second- and third-choice antimicrobial drugs accounted for 12.5% and 2.5%, respectively.

In 2014, 58% of veterinary practices recorded a decline in their DDDA figure for third-choice antimicrobial drugs compared to 2012 (defined as a ≥0.010 reduction in DDDA from 2012 to 2014). In 42% of veterinary practices, the DDDA figure for third-choice antimicrobial drugs remained virtually unchanged (defined as a <0.010 change in DDDA from 2012 to 2014). It should be noted, however, that these practices had a low DDDA level for third-choice antimicrobial drugs (of 0.000 up to 0.033) to begin with. None of the veterinary practices included in the study recorded an increase in their DDDA figure for third-choice antimicrobial drugs (defined as a ≥0.010 rise in DDDA from 2012 to 2014). In 2012, 5% of practices had not used any third-choice antimicrobial drugs at all. In 2013 and 2014, the proportion of practices that had not administered any third-choice antimicrobial drugs rose to 21%. One practice's usage of second-choice antimicrobial drugs consistently exceeded its usage of first-choice antimicrobial drugs in the year concerned. The practice in question was a large equine veterinary practice that primarily provided secondary veterinary care.

Table 1. Usage of antimicrobial drugs in horses in the Netherlands in 2012, 2013 and 2014 (in DDDA), by type of veterinary practice

Year	Group of antimicrobial drugs	All veterinary practices combined		Mixed-animal practices		Equine practices	
		Mean	SD	Mean	SD	Mean	SD
2012	**Overall antimicrobial drug use**	**0.735**	**0.442**	**0.557**	**0.401**	**0.799**	**0.436**
	First-choice ABs	0.609		0.463		0.661	
	Second-choice ABs	0.086		0.037		0.104	
	Third-choice ABs	0.040		0.057		0.034	
2013	**Overall antimicrobial drug use**	**0.547**	**0.303**	**0.484**	**0.369**	**0.564**	**0.293**
	First-choice ABs	0.456		0.426		0.464	
	Second-choice ABs	0.074		0.040		0.083	
	Third-choice ABs	0.017		0.017		0.017	
2014	**Overall antimicrobial drug use**	**0.562**	**0.277**	**0.493**	**0.428**	**0.580**	**0.235**
	First-choice ABs	0.478		0.422		0.492	
	Second-choice ABs	0.070		0.062		0.073	
	Third-choice ABs	0.013		0.008		0.015	

DDDA = Defined Daily Dose Animal
SD = standard deviation
First-choice ABs: penicillins, tetracyclines, trimethoprim/sulfonamides
Second-choice ABs: aminoglycosides, macrolides/lincosamides, penicillins, polymyxins, combinations of multiple antimicrobial drugs
Third-choice ABs: 3rd- and 4th-generation cephalosporins, fluoroquinolones

Table 2. Usage of antimicrobial drugs in horses in the Netherlands in 2012, 2013 and 2014 (in DDDA), by group of antimicrobial drugs

Group of antimicrobial drugs	2012 Mean (all practices combined)	2013 Mean (all practices combined)	2014 Mean (all practices combined)
Overall antimicrobial drug use	**0.735**	**0.547**	**0.562**
First-choice antimicrobial drugs	**0.609**	**0.456**	**0.478**
Penicillins	0.093	0.097	0.116
Tetracyclines	0.009	0.016	0.016
Trimethoprim/sulfonamides	0.506	0.343	0.345
Other	<0.001	<0.001	<0.001
Second-choice antimicrobial drugs	**0.086**	**0.074**	**0.070**
Aminoglycosides	0.057	0.044	0.048
Combinations of multiple antimicrobial drugs	0.024	0.025	0.007
Macrolides/lincosamides	0.000	<0.001	0.002
Penicillins	0.005	0.005	0.014
Polymyxins	0.000	<0.001	<0.001
Third-choice antimicrobial drugs	**0.040**	**0.017**	**0.013**
3rd- and 4th-generation cephalosporins	0.039	0.015	0.012
Fluoroquinolones	0.001	0.001	0.001

DDDA = Defined Daily Dose Animal

Discussion

In absolute terms, antimicrobial drug usage levels in horses are low compared to usage levels in agricultural livestock and usage levels recorded in human medicine. Between 2012 and 2014, overall usage of antimicrobial drugs in horses declined by 24%. The steepest decline was recorded in usage of third-choice antimicrobial drugs (a 68% reduction between 2012 and 2014). This welcome development may be attributable to better education, more veterinarians participating in continuing education, and implementation of guidelines on the use of antimicrobial drugs in equine medicine.

Relatively big differences were seen between individual practices, although all practices reported low usage levels (their mean DDDA figures for the 2012-2014 period ranged from 0.168 to 1.190). The veterinary practices included in this study differed in their patient profiles, as they ranged from general veterinary practices exclusively providing primary care, to dedicated equine practices providing extensive in-patient treatment and intensive care. This will have contributed to the inter-practice differences observed in the study. The slightly higher usage levels found for dedicated equine practices may have been due to the fact that these practices in general provide more specialist care compared to mixed-animal veterinary practices. It should be noted, however, that the actual differences between the two types of practices were very small and not statistically significant. It should also be noted that DDDA figures for dedicated equine practices were calculated using procurement data, while DDDA figures for mixed-animal practices were calculated using prescription data. As a result, DDDA figures for mixed-animal practices have been adjusted for loss or disposal of unused antimicrobial drugs (i.e. spillage), while DDDA figures for equine practices have not. The inter-practice differences do, however, suggest that there is still some room for further harmonization of veterinary practices' application of protocols and further reductions in the amounts of antimicrobial drugs prescribed. The available data did not allow for assessment of individual veterinarians' prescription patterns.

When interpreting the study results, some limitations of the study should be taken into account. Due to privacy-related considerations, the researchers could not ascertain whether the supplied antimicrobial drug procurement data were correct and complete. In particular small amounts of special antimicrobial drugs that were not obtained through regular wholesalers (primarily antimicrobial drugs obtained from human pharmacies) may not have been included in the study data.

With regard to the exact number of patients registered with a particular veterinary practice, the SDa had to rely on the accuracy of the practice's patient records. Generally speaking, when practices record patient data, easy retrieval for epidemiological analysis is not their primary concern. Duplicate patient entries or multiple horses registered under the same patient number may have resulted in an incorrect number being used as the denominator in the SDa's calculations. Practices may have also deleted deceased patients from their active patient records, in which case deceased patients have not been included in the total number of patients registered with the practice concerned. These factors may have affected the study results, although the SDa cannot ascertain the extent to which they have affected the results, if at all. In line with its method for determining usage levels in the monitored livestock sectors

in the Netherlands, the SDa decided to base its calculations on a standardized animal weight. This may, however, have affected the accuracy of practice-specific data.

According to research studies and the equine formulary published by the Royal Dutch Society for Veterinary Medicine (KNMvD) in June 2016, there are certain antimicrobial drugs for which the dosages generally used by veterinarians do not correspond to the authorized dosages. In this SDa study, veterinarians were assumed to have used the authorized dosages, if available for the product concerned. In the event of antimicrobial drugs not authorized for use in horses (off-label use), veterinarians were assumed to have used the dosages established in relevant scientific literature. As experience shows that several key antimicrobial drugs are generally used in dosages exceeding the authorized dosages, the DDDA figure reported for the antimicrobial drugs concerned presumably overestimates the number of treatment days. This means the actual number of treatment days for an average horse in the Netherlands is probably even lower than the number of treatment days identified in this report. Table 3 lists the antimicrobial drugs known to be generally used in dosages that do not correspond to the authorized dosages.

Table 3. Antimicrobial drugs that according to research studies are generally used in dosages exceeding the authorized dosages

Antimicrobial drug	Authorized dosage	Generally used dosage	References
Ampicillin for injection	30 mg/kg/day	Adult horses: 45 mg/kg/day Foals: 80 mg/kg/day	1-6
Procaine benzylpenicillin for injection	15 mg/kg/day	20 mg/kg/day	1,4,7-11
Cefquinome for injection	1-2 mg/kg/day (depending on the indication)	1-4 mg/kg/day (depending on the indication)	12,13
Trimethoprim/sulfadoxine for injection	2.4/12 mg/kg/day	10/50 mg/kg/day	1,14-18
Trimethoprim/sulfadiazine for oral administration	5/25 mg/kg/day	10/50 mg/kg/day	1,14-18

The study included 24 veterinary practices. In 2014, a total of 70,665 horses were registered with these practices. According to official Statistics Netherlands records[1], in 2014 the Netherlands had a horse population of 126,586. Based on this figure, the usage levels identified in the SDa study would pertain to 55.8% of the national horse population. However, according to several other sources the Netherlands had a substantially bigger horse population in 2014. Data from Sectorraad Paarden[2], for instance, suggest a national population of 450,000 horses. Based on this figure, the SDa study would only cover 15.7% of

[1] http://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=80780ned&D1=453-459,495-501&D2=0,13&D3=0,7,13-14&VW=T. Accessed 09/01/2016
[2] http://www.sectorraadpaarden.nl/uploads/brochure-nederland-paardenland-definitief.pdf. Accessed 09/01/2016

the horse population. Data from the World Horse Welfare organization[3], on the other hand, suggest the study covers 24.1% of a national population of 293,500 horses. The SDa decided to compare its 2014 figures for two veterinary prescription drugs only authorized for use in horses (trimethoprim/sulfadiazine oral pastes) with the 2014 sales figures recorded for these two products. This comparison showed that usage reported by the participating veterinary practices accounted for just 13.45% of the amounts sold. Extrapolation of these data suggests the percentage of horses covered by this study is likely to be closer to 15.7% than 55.8%.

For 2014, this study identified a mean DDDA of 0.562. This finding means that on average, a horse in the Netherlands receives 5.62 days of antimicrobial drug treatment once every 10 years. In contrast, Dutch citizens on average receive almost 5 days of antimicrobial drug treatment a year (usage in primary care and hospital settings combined). When comparing these figures, it is important to consider the differences in the (average) weights treated and any other factors that may have contributed to the difference between human and equine usage levels. Usage levels reported for the monitored livestock sectors also substantially exceed equine usage levels. When comparing the amounts of antimicrobial drugs used in horses with the amounts used in monitored livestock sectors, livestock that is housed and treated individually is best suited for such comparison. The SDa therefore decided to compare usage in horses to usage in dairy cattle and suckler cows. The usage level recorded for dairy cattle and suckler cows amounted to 2.3 DDDA.

The overall mass of antimicrobial drugs procured/sold according to the 2014 survey data was determined and extrapolated to the national horse population. Assuming the horses included in the SDa study represented 15.7% of the national population (based on the Sectorraad Paarden estimate), the total amount of antimicrobial drugs administered to horses in the Netherlands would amount to 2,600 kg. Assuming the number of horses included represented 55.8% of the national population (based on Statistics Netherlands records), the total amount of antimicrobial drugs administered would amount to 774 kg. As already mentioned, considering the amount of trimethoprim/sulfadiazine oral pastes used in the study population in relation to the national sales figure for these products, it seems more likely that the study population represented just 15.7% of the national population. This means the 2,600 kg figure is the most plausible estimate.

In 2014, there was a 16,957 kg mass balance discrepancy between the number of kilograms of antimicrobial drugs sold and the recorded number of kilograms of antimicrobial drugs administered in the monitored livestock sectors. Depending on whether the number of horses recorded by Statistics Netherlands or the number of horses estimated by Sectorraad Paarden is used, the horse population in the Netherlands could have been responsible for 774 kg (6.1%) up to 2,600 kg (20.6%) of this 16,957 kg discrepancy, respectively.

Analysis of the amount of third-choice antimicrobial drugs used (assuming the study population represented 15.7% of the national horse population) suggested overall usage of third-choice antimicrobial drugs in horses amounted to 6 kg. Usage in horses would therefore

[3] http://www.worldhorsewelfare.org/Removing-the-Blinkers. Accessed 09/01/2016

account for 1.4% of the 429 kg of third-choice antimicrobial drugs sold in 2014. Usage of third-choice antimicrobial drugs in the monitored livestock sectors amounted to 170 kg, and an additional amount of 23 kg of third-choice antimicrobial drugs concerned products only authorized for use in companion animals. This means that as yet, 230 kg cannot be attributed to a particular category of animals.

The initial reason for performing this study was a desire to account for sold antimicrobial drugs that could not be attributed to usage in the monitored livestock sectors. Due to the substantial discrepancy between the horse population according to official Statistics Netherlands records (126,586) and the horse population estimated by Sectorraad Paarden (450,000), the SDa has not been able to conclusively determine the amounts of antimicrobial drugs used in the national horse population. It did, however, find out that up to 20.6% of the mass of antimicrobial drugs formerly unaccounted for (antimicrobial drugs only authorized for use in companion animals excluded) can potentially be attributed to usage in horses.

Conclusion

Compared to antimicrobial drug usage levels in agricultural livestock and usage levels recorded in human medicine, usage in horses is low. Over the 3-year study period (2012-2014) overall usage of antimicrobial drugs in horses, and usage of second- and third-choice antimicrobial drugs in particular, declined.

The horse population in the Netherlands is estimated at 450,000 (according to 2014 data from Sectorraad Paarden). Based on this figure, usage of antimicrobial drugs in horses could have been responsible for up to 20.6% of the discrepancy observed between the overall amount of antimicrobial drugs sold in the Netherlands and the amount already accounted for (by the usage levels recorded in the monitored livestock sectors and by the fact that certain antimicrobial drugs are only authorized for use in particular species). This shows that the mass balance discrepancy between the number of kilograms of antimicrobial drugs sold and the recorded number of kilograms of antimicrobial drugs administered in the monitored livestock sectors can only to some extent be explained by antimicrobial drugs used in horses. The 2014 DDDA figure of 0.013 shows that third-choice antimicrobial drugs were only used incidentally in horses. The corresponding mass of these third-choice antimicrobial drugs could amount to up to 6 kg (with 3rd- and 4th-generation cephalosporins accounting for approximately 4 kg, and fluoroquinolones accounting for approximately 2 kg).

Overall usage as well as usage of third-choice antimicrobial drugs in horses is low. Based on these findings, the SDa expert panel feels it is not necessary to subject the Dutch horse sector to continuous monitoring. Similarly, it feels there is no obvious reason to start benchmarking veterinary practices with regard to the antimicrobial drugs prescribed for horses. To keep track of any future developments, a survey similar to the one described in this report could be conducted in 3 years' time. The SDa expert panel recommends a 3-year interval based on its experiences during this study. A 3-year interval would provide a suitable level of continuity for the monitoring process. Such a relatively short monitoring interval would also facilitate the data collection process. After all, a shorter interval means that throughout the monitoring period, fewer changes will be implemented in the participating veterinary practices and their practice management systems.

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Appendix 1 – Composition of the consultative group

The consultative group established for the survey regarding usage of antimicrobial drugs in horses had the following members:

Julius Peters	Equinoord
Floor Bernard	Paardenpraktijk Utrecht
Hanneke Panhuijzen	Dierenartsenpraktijk Bodegraven
Hans Peeters	DAP Kromme Rijnstreek
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SDa/1149/2017