Trends in veterinary antibiotic use in the Netherlands 2005-2011

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The MARAN website provides detailed data on the trends in antibiotic use per animal species. The information presented on the website is based on data from on-going surveillance systems on the sales and use of antimicrobial agents in animal husbandry in the Netherlands.

LEI project team

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Summary

During the period 2009-2011 the total sales of antibiotics dropped nearly 32%, from 495 tonnes in 2009 to 338 tonnes in 2011 (FIDIN, 2012). This far exceeds the policy objective for 2011 set by the Dutch government, i.e., a 20% reduction in antibiotic use compared with 2009. Survey data on antibiotic use per animal species indicate a decrease in all five livestock sectors examined in 2011.

Trends in total sales
In the period 2009-2011 the total sales of antibiotics, licensed for therapeutic use in animals in the Netherlands, decreased by nearly 32%, from 495 tonnes in 2009 to 338 tonnes in 2011 (FIDIN, 2012).

This means that the policy objective for 2011, a 20% reduction in 2011 compared with 2009, was more than reached. As compared with 2007, the year with the highest sales, the decrease until 2011 was 40%.

Trends in use per species

In 2011, all animal production sectors in the Netherlands showed a decrease in antibiotic use:

- sow/piglet farms: annual variation, decrease in 2010 and 2011;
- fattening pig farms: increase until 2008, decrease from 2009 to 2011;
- broiler farms: increase until 2009, decrease in 2010 and 2011;
- veal calf farms: decrease from 2007 to 2011;
- dairy farms: annual variation, decrease in 2011.

1 Introduction

Aim

The objective of this study is to obtain detailed insight into the trends in the exposure of farm animals to antibiotics. This is done by monitoring both overall sales data at the national level and use data per animal species. The results of the study can be used by the Ministry of Economic Affairs, Agriculture and Innovation for policy evaluation. In addition, the use data might play a role in explaining trends in resistance that have become apparent. Moreover, these data might be used to inform the European Commission.

Monitoring in the Netherlands

Monitoring of antibiotic use in the Netherlands is done in three ways. First, FIDIN, the federation of the Dutch veterinary pharmaceutical industry, annually reports the overall sales of antibiotics. Second, LEI, part of Wageningen UR, monitors the antibiotic use per animal species, on a stratified sample of farms. Third, the large animal production sectors recently implemented centralised registration systems, monitoring the use on all farms.

Monitoring in Europe

All EU member states are required to monitor antimicrobial resistance in food producing animals of public health concern (Zoonosis Directive 2003/99/EC). Within this context, monitoring of antibiotic use is equally important. Therefore the European Medicines Agency (EMA) is trying to establish national systems for the collection of data on sales of veterinary antimicrobial agents in Europe, in a standardized way (EMA, 2010). The presented sales data are also used for the national reporting to EMA.

2 Materials and methods

2.1 Analysis of trends in total sales

FIDIN reports the total amount of antibiotics (active ingredient in kilograms) sold in the Netherlands in 2011, at the level of pharmacotherapeutic groups. The data about use of active substances are based on sales data of members of FIDIN and are estimated to cover about 98% of all sales in the Netherlands. Actual consumption can differ from the amounts sold, as a result of stock piling and cross border use. The figures give information about the total sales for all animals, not per individual animal species.

The EMA collects harmonised data, primarily based on overall sales of veterinary antimicrobial agents. To ensure that the sales data provided by the EU member states are harmonised, an ESVAC Data Collection Protocol has been developed and a call for data has been sent to most EU member states[1]. To fully implement the ESVAC protocol FIDIN had to adjust the levels of active ingredients for several products, taking into account the salt and ester formulations and calculation factors of active ingredients expressed in international units. These corrections led to a reduction of the calculated total amount of active substance by approximately 4%. The sales figures of 2009, 2010 and 2011 were based on the ESVAC template, the figures of 1999 to 2008 were re-calculated and corrected accordingly.

To adjust for trends in the size of the animal population the sales of antibiotics were also expressed as grams of active ingredient per kilogram live animal weight (Figure 3.1). For this purpose the FIDIN sales data were related to the total live weight of the average number of animals present in the Dutch livestock farming sector (pigs, poultry, veal calves, other cattle and sheep). For this analysis the following average weights were used: veal calves 172 kg (i.e. the weighted average of white veal calf 164 kg and rosé veal calf 192 kg), other cattle 500 kg, turkeys 6 kg, other poultry 1 kg, fattening pigs 70 kg, sows 220 kg, piglets (< 20 kg) 10 kg, sheep 60 kg. This yields information about the trend in the sales of antibiotics in grams per kilogram of live animal weight present in the Netherlands over the years, thus taking yearly fluctuations in the size of the animal population into account.

The yearly average numbers of animals and its conversion into live weight are given in the Appendix, Table A.1 and A.2.

2.2 Analysis of trends in use per species

Daily doses (ADD)

The use of different active ingredients measured in kilograms is not directly comparable due to their differences in antimicrobial potency, pharmacokinetics[2], and, consequently, the dosage prescription. To provide insight into the true exposure of animals to antibiotics, the use should be determined per animal species and expressed in the number of Animal Daily Dose (ADD) per animal year (Jensen et al., 2004). The ADD is the defined average maintenance dose of a specified medicine per kg of a specified animal per day, applied for its main indication. This unit conforms to international developments in this field and developments in the human health sector. With the ADD approach the calculation and comparison of the total antibiotic use on different farms is possible, even when different active ingredients are involved.

[1] EC Directive 2001/82/EC and Regulation 726/2004 form a legal basis for national authorities to request the pharmaceutical industry to provide data on sales of antimicrobial agents. Member states are not yet obliged to provide data about the use of veterinary antibiotics to the EC.

[2] Differences in dosage are determined by differences in potency, differences in bioavailability and distribution throughout the body.

Expressing the use per animal year also enables comparisons of farms with different production and vacancy periods.

Furthermore, the ADD approach offers an opportunity to study the relationship with the occurrence and trends in antimicrobial resistance. With an ADD approach also a comparison of countries could be possible, when based on reliable use data per animal species. The often reported difference in "grams per kg biomass", as calculated from national total sales figures, is unsuitable for country comparison, because it mainly reflects differences in animal demographics and prescribing patterns.

Calculating number of daily dosages

The use of different active ingredients becomes comparable when the amount of active ingredient in each antibiotic preparation is measured as the number of daily dosages. The number of daily dosages per animal year was determined by calculating the total number of kilograms of animal that can be treated with each active ingredient[3]: the treatable weight. This was then divided by the total weight of the average present livestock on the farm, assuming that the average treatment is administered to animals with an average weight[4]. The following daily dosages box gives an example of the calculation of the number of ADD per animal year.

Example: Calculation of the number of daily dosage

For example, a farm with 150 fattening pigs with an average weight of 70.2 kg used 2 litres of antibiotic preparation X during the course of one year (X contains 40% = 400 mg/ml active ingredient a) and 20 kg of antibiotic preparation Y (Y contains 25% = 250 mg/g active ingredient b). Antibiotic preparation X: the defined daily dosage of active ingredient a is 10 mg per kg animal weight per day. Antibiotic preparation Y: the defined daily dosage of active ingredient b is 50 mg per kg animal weight per day.

Antibiotic X can be used to treat (2,000 * 400)/10 = 80,000 kg animal weight. Antibiotic Y can be used to treat (20,000 * 250)/50 = 100,000 kg animal weight. Consequently, the farm has used antibiotics for treatment of a total of 180,000 kg animal weight. The farm has an average of 150 fattening pigs per year, with a total weight of 10,530 kg. 180,000 kg were treated in that year, equivalent to 180,000/10,530 = 17.1 daily dosages. Consequently, an average fattening pig[5] on the farm in that year was administered a prescribed dosage of antibiotics on 17.1 days. In this example the farm uses 17.1 daily dosages per animal year of antibiotic preparation X plus Y.

Animal weights

The calculations in the sample survey are based on the average weight per animal during the animals' presence on the farm. The following average weights have been used: dairy cows 600 kg, veal calves 172 kg (i.e. the weighted average of white veal calf 164 kg and rosé veal calf 192 kg), broilers 1 kg, fattening pigs 70 kg, sows 220 kg, maiden gilts 107.5 kg, piglets (< 25 kg) 12.5 kg, breeding boars 350 kg (ASG, 2010). On dairy farms the number of daily dosages is based on the weight of the dairy cows only, because this category of the animals gets almost all of the antibiotics. On sow farms the size of the

[3] The use of antibiotics in spray containers is not included.

[4] The total weight is the average weight of the animals (in kg per animal) multiplied by the average number of animals present on the farm per year. Note that on dairy farms only the weight of the dairy cows has been taken into account.

[5] This refers to a pig on the farm throughout the year: however, there is no such pig. This is a method which can be used to provide for comparisons of farms with different vacancy rates. For example, a farm has 2 herds of animals a year, both of which comprise 200 animals that remain on the farm for 5.5 months. The farm is vacant during the first and last week of the year, and for 2 weeks between the two herds. The calculations for this farm are based on an average of 183 animals present on the farm. When a farm is vacant for six months and has a herd of 200 animals for six months then the calculations are based on an average of 100 animals on the farm.

'population at risk' is based on the weight of all present animals (including piglets, gilts, breeding boars). For an illustrative calculation of the number of daily dosages for young calves on dairy farms (from birth to weaning at 56 days of age) the average weight of 56.5 kg has been used.

2.3 Survey data and statistical analysis

Survey data

This study uses survey data from farms in the Farm Accountancy Data Network (FADN) and additional veal calves farmers. The FADN contains a stratified sample of around 1,500 agricultural and horticultural farms in the Netherlands (Vrolijk et al., 2009). Records are made of the economic data and technical key figures of these farms. Every year a number of farms are replaced by other farms to ensure that the database of the Data Network remains representative of Dutch livestock farming. On these farms all animal-medicine data and veterinary services are recorded. This provides information about the true exposure of farm animals to antibiotics, and gives insight into the underlying factors that could explain changes in antibiotic use. In cooperation with the veal calf sector the use in veal calves is monitored in an additional random sample. On the veal calf farms detailed data were collected on number of animals present and the amount of antibiotics used.

To ensure that the farms in the sample are representative of the whole population and to make the sampling as efficient as possible a disproportional stratified random sampling strategy is used (Vrolijk et al., 2009). A stratified sample implies that the population is divided into a number of homogeneous groups. Subsequently farms are selected from each of the groups. For strata with larger variation in the use of antibiotics, relatively more sample farms are selected. In the FADN sample the strata are based on both farm size and animal category. The additional sample of veal calf farms is additionally stratified for 'large integration' versus 'small integration or non-contracted farms'.

Data of 213 pig, broiler and dairy cattle farms in the FADN were used to estimate the antibiotic use in 2011. As from 2007 data from veal calf farms were collected, in an additional sample. See Table 2.1 for details. These data are available on the LEI website (www.lei.wur.nl) and the MARAN website (www.maran.wur.nl).

Table 2.1	Number of sample farms taking part each year and the associated number of animals							
	Type of holding	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Number of animals	Sows/piglets	16,790	12,155	17,949	18,767	20,806	24,593	22,945
	Fattening pigs	54,788	55,970	119,922	156,098	159,104	153,887	145,418
	Broilers	2,367,623	2,315,882	2,197,716	2,508,103	2,530,313	2,244,706	2,245,689
	Veal calves	n.a.	n.a.	124,115	134,437	134,446	124,634	119,746
	Dairy cows	2,875	2,818	2,850	7,274	7,382	7,020	6,115
Number of farms	Sows/piglets	46	32	39	45	48	48	49
	Fattening pigs	40	31	49	77	72	64	61
	Broilers	29	28	29	29	28	25	26
	Veal calves	n.a.	n.a.	185	199	193	173	162
	Dairy cows	35	34	34	82	83	77	77
	Total	150	125	336	432	424	387	375

n.a. = no data available.

Statistical analysis

Data from the FADN-farms and the additional sample for veal calves are used to estimate the use in the whole population to obtain insight into the amount of and trends in antibiotic use on the national level. Antibiotic use per species on the national level is expressed as average number of daily dosages per average animal present on an average farm. Since the stratification is disproportional, the results have to be weighted to be representative. For each stratum the average daily dosages per animal year is determined. Then the weighted average for an animal category is calculated, based on the number of farms in the population in each stratum.

The aggregated use data are considered to be representative for the total exposure of Dutch food-producing animals to antibiotics. The 95% confidence intervals (CI) indicate that with 95% certainty, the average antibiotic use per animal on a national level, expressed in the number of daily dosages per animal year, will lie within the upper and lower limits given. The confidence interval also indicates the variation in antibiotic use amongst farms.

In this report the use data of all sample farms are used for statistical analysis on not only antibiotic use in each year, but also on the changes in antibiotic use over a period of two or more years. Comparing average uses of antibiotics between two years can be done in two ways: one using only farms that are in the sample for both years[6], the other using all farms in the sample in both years. The first method usually gives better results if the majority of the farms are in the sample for both periods. This usually is the case in two consecutive years. However, if the years of comparison are further apart, the number of sample farms available in both years will be more limited. In that case, testing for significant differences can better be done by using all farms in the sample to increase the statistical power of the comparison.[7]

[6] See Appendix 3 in Vrolijk et al. (2008) for more detail about the statistics.

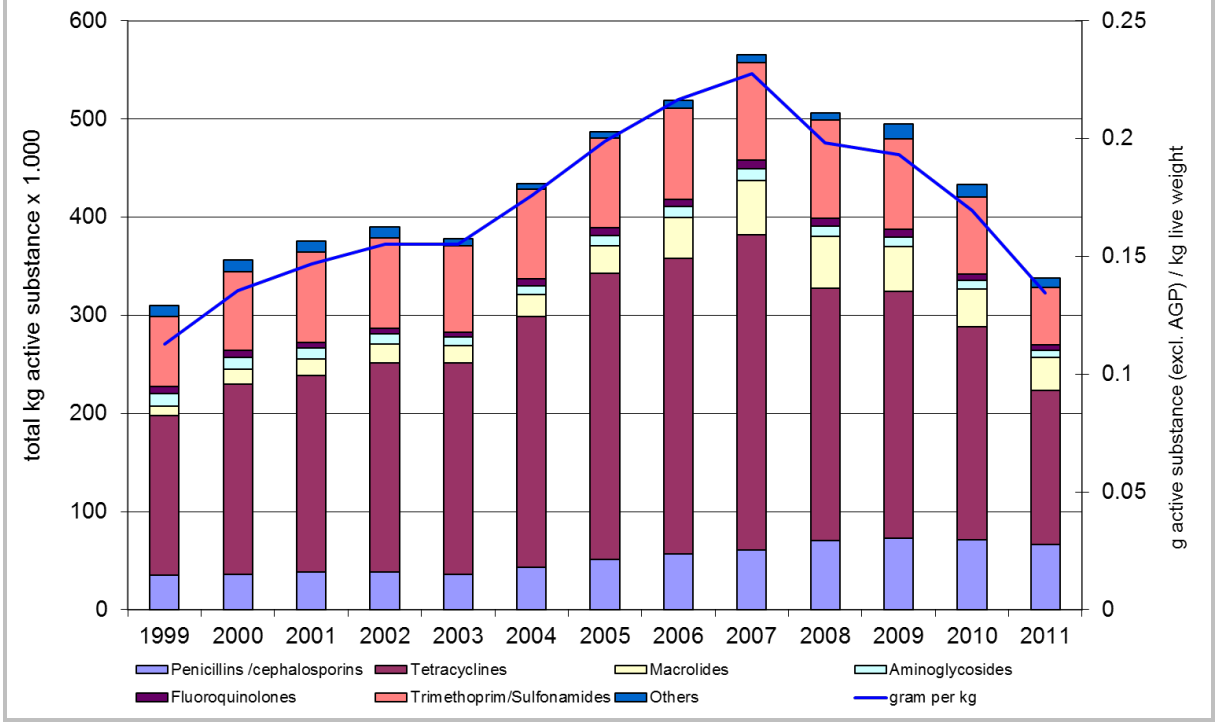
[7] If the difference between the two means is larger than twice the square root of the sum of both squares of the standard errors then there is a significant difference.

3 Trends in total sales

In the period 2009-2011 the total sales of antibiotics, licensed for therapeutic use in animals in the Netherlands, decreased by nearly 32%, from 495 tonnes in 2009 to 338 tonnes in 2011 (FIDIN, 2012). This means that the policy objective for 2011, a 20% reduction in 2011, compared with 2009, was more than reached. Compared with 2007, the year with the highest sales, the decrease up to 2011 was 40%.

Figure 3.1 shows the trend in the total sales (in bars). The trend is also expressed in grams of active substance per kg of live weight present (line), to adjust for possible fluctuations in the size of the animal population.

Figure 3.1 **Therapeutic antibiotic sales from 1999-2011** (FIDIN, 2012)



Discussion

The total sales volume amounted to 338 tonnes in 2011, which is below the level of the year 2000. However, at that time an additional 205 tonnes of antimicrobial growth promoters were used (see Table 3.1). Almost all classes of antibiotics showed a decrease.

Tetracyclines

The sales data show a decrease of tetracyclines from 251 tonnes in 2009 to 157 tonnes in 2011 (-37%). The sales of tetracyclines in 2011 mainly consisted of 102 tonnes of oxytetracycline (-41%, compared to 2009) and 54 tonnes of doxycycline (-31%). The true exposure to tetracyclines decreased by an estimated 35%, roughly assuming a constant livestock population and an average dosage of 30 mg per kg of animal for oxytetracycline and 10 mg per kg for doxycycline.

Fluoroquinolones

In 2011 the fluoroquinolones represented 1.52% of the total veterinary antibiotic sales in the Netherlands, of which 0.43% 'newer' fluoroquinolones (danofloxacin, difloxacin, enrofloxacin and marbofloxacin). In the periode 2009-2011 the sales of fluoroquinolones decreased substantially, by 34%. The sales of the newer fluoroquinolones showed a slight increase of 6%.

Cephalosporins

The cephalosporins represented 0.23% of the total sales, of which 0.17% third and fourth generation cephalosporins (cefoperazon, cefovecin, cefquinome, ceftiofur). In 2009-2011 the sales of third and fourth generation cephalosporins decreased by 37%.

Table 3.1 Antibiotic sales from 1999-2011 in tonnes

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Penicillins/cephalosporins	35	36	38	38	36	43	51	57	61	70	73	71	66
Tetracyclines	162	194	200	214	216	256	292	301	321	257	251	217	157
Macrolides	10	15	17	19	17	23	28	42	55	52	46	39	34
Aminoglycosides	13	12	11	10	9	9	11	11	12	11	10	9	7
Fluoroquinolones	7	7	6	6	5	7	8	7	9	8	8	7	5
Trimethoprim/Sulfona-mides	72	80	92	92	88	91	91	93	99	100	92	78	58
Others	11	12	11	11	7	6	6	8	8	7	15	13	10
Total therapeutic sales	310	356	376	390	378	434	487	519	565	506	495	433	338
Antimicrobial growth promoters (AGP)	250	205	180	140	120	80	40	0	0	0	0	0	0
Total sales including AGP	560	561	556	530	498	514	527	519	565	506	495	433	338
Gram per kg live weight	0.11	0.14	0.15	0.16	0.15	0.18	0.20	0.22	0.23	0.20	0.19	0.17	0.13

Source: FIDIN (2012).

4 Trends in use per species

The sample survey indicates a decrease in all livestock sectors in the Netherlands in 2011. The use data in Figure 4.1 are indexed, using 2009 as baseline year. The continuous line represents the estimated average use. The 95% confidence intervals are indicated by the dotted lines. The results are presented from 2005 to 2011, for veal calves as from 2007.

Figure 4.1 **Trends in antibiotic use 2005 - 2011**

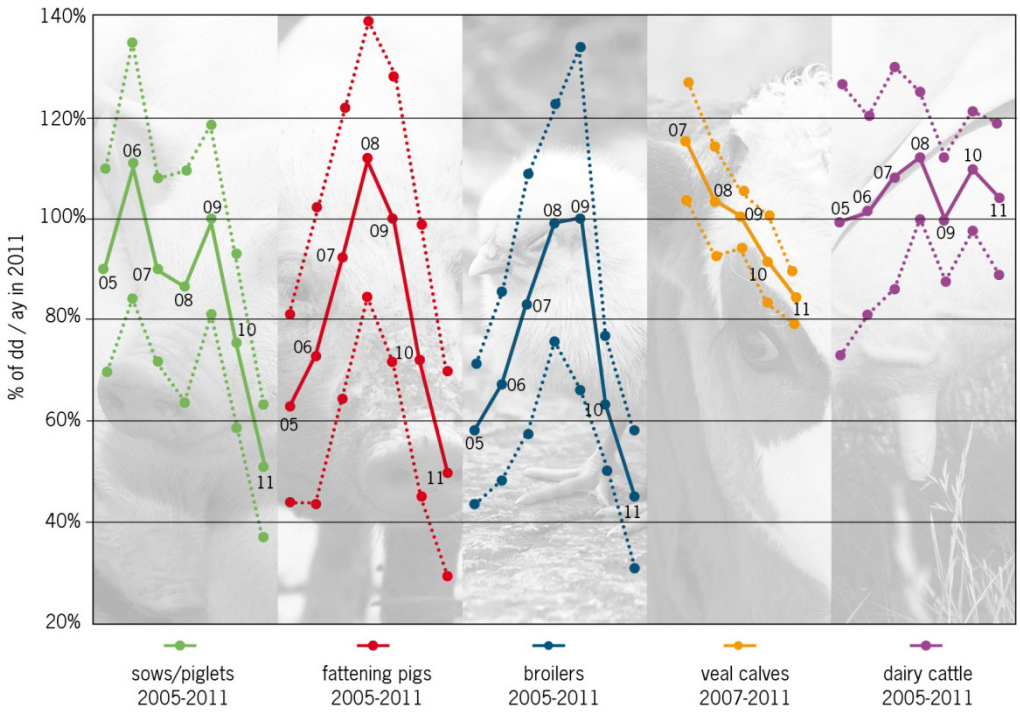


Figure 4.1 shows the tendencies in antibiotic use per animal species for the years 2005-2011, indicating a decrease in all livestock sectors in the Netherlands in 2011:

- sow/piglet farms: annual variation, decrease in 2010 and 2011;
- fattening pig farms: increase until 2008, decrease from 2009 to 2011;
- broiler farms: increase until 2009, decrease in 2010 and 2011;
- veal calf farms: decrease from 2007 to 2011;
- dairy farms: annual variation, decrease in 2011.

For pigs, broilers and veal calves the decrease in the period 2009-2011 was statistically significant.

In the following paragraphs the use of the different types of antibiotics per livestock species is addressed into detail.

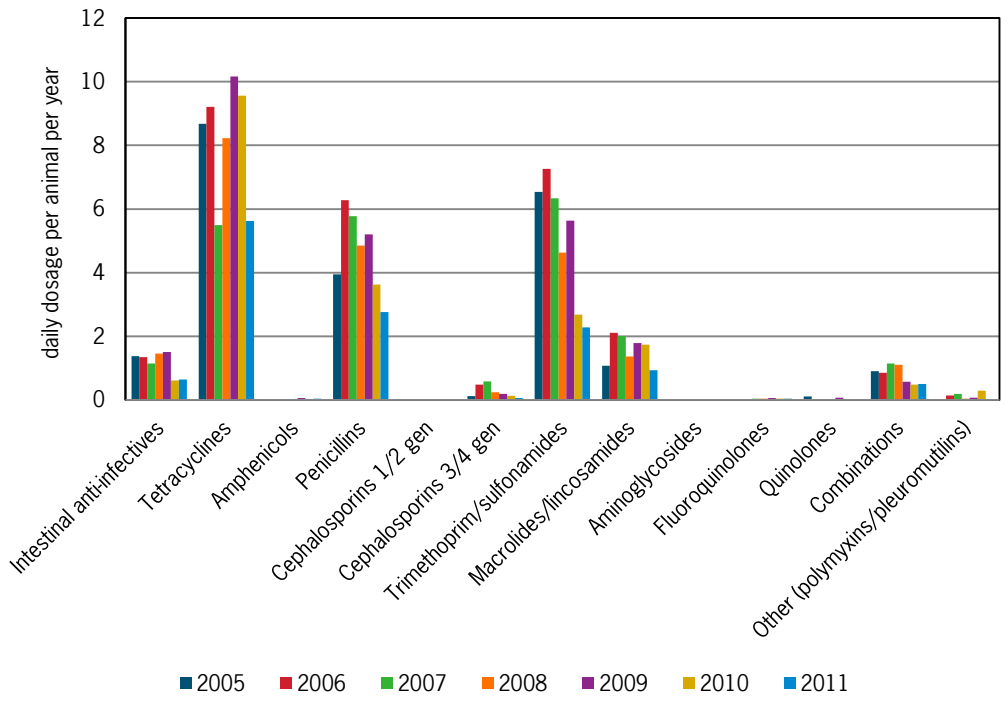
4.1 Pigs

Sows and piglets

In 2011, the average use in sows/piglets is estimated to be 13 daily dosages per year (95% Confidence Interval: 10-16 dd/ay). In 2009 the use was 25 daily dosages per year (95% CI: 21-30 dd/ay). The large confidence intervals are mainly caused by the large variation in use that exists between different farms. 79% of the antibiotics were orally administered, probably predominantly in piglets.

Figure 4.2 provides insight into the trends in the relative use of the various groups of antibiotics.

Figure 4.2 **Antibiotic use in sows/piglets in dd per sow per year in 2005-2011**



In 2011 44% of the total antibiotic use in sows/piglets consisted of tetracyclines, 21% of penicillins and another 18% of trimethoprim/sulfonamides. 0.5% of the total use consisted of 3rd and 4th generation cephalosporins and 0.3% consisted of fluoroquinolones, which are likely to have been administered to young piglets before weaning.

Discussion

Within the sample about 82% of the farms had a use level below the target value ('streefwaarde') for 2011 of the Animal Drug Authority (SDa, 2012), 10% between the target value and the signaling value ('signaleringswaarde'), 6% between the signaling value and the action value ('actiewaarde'), and 2% above the action value.

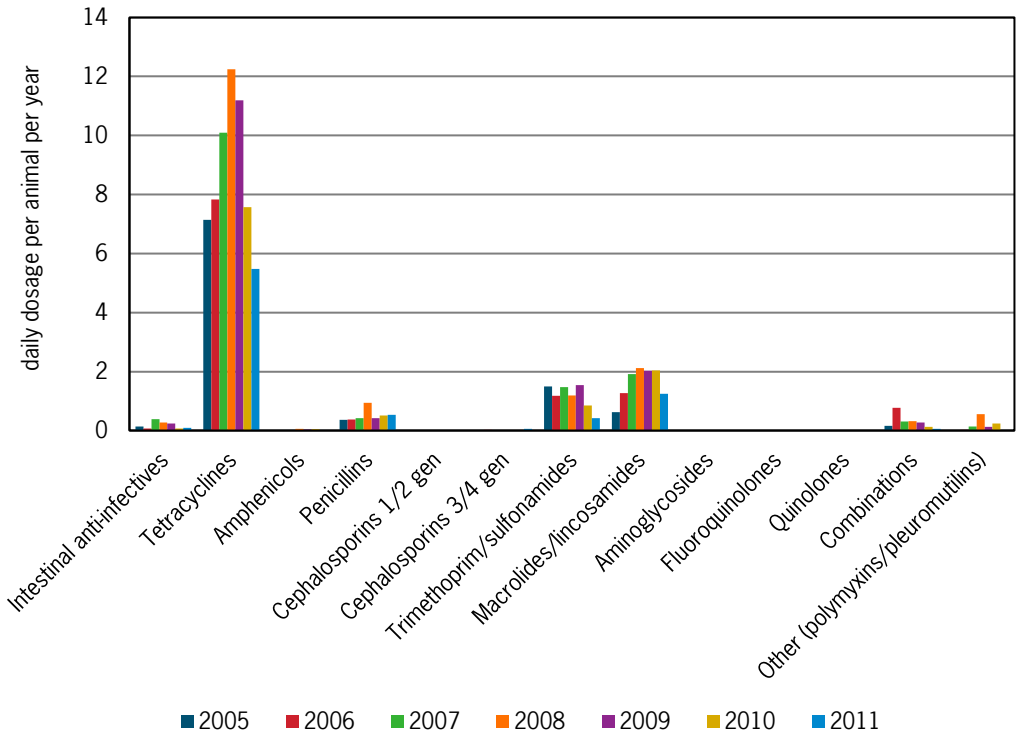
In 2011, the use in sows/piglets was 13 daily dosages per animal year. However, in practice most antibiotics are likely used for the treatment of the piglets, and only incidentally for the sows. If it is assumed that 100% of the antibiotics are administered to the piglets, with an average weight of 12.5 kg, this would mean that an average piglet is treated with antibiotics during 13 days in the period from birth to the age of 74 days (at delivering to the fattening farm, at 25 kg).

Fattening pigs

In 2011, the average use in fattening pigs is estimated to be 8 daily dosages per year, of which 92% orally administered (95% Confidence Interval: 5-11 dd/ay). In 2009 the average use was 16 daily dosages per year (CI: 11-20 dd/ay).

Figure 4.3 provides insight into the trends in the relative use of the various groups of antibiotics.

Figure 4.3 **Antibiotic use in fattening pigs in dd per animal year in 2005-2011**



In 2011 69% of the total antibiotic use in fattening pigs originated from the administration of tetracyclines and 16% from macrolides/lincosamides. 0.8% of the total use consisted of 3rd and 4th generation cephalosporins. Fluoroquinolones were not applied.

Discussion

Within the sample about 71% of the farms had a use level below the target value ('streefwaarde') for 2011 of the Animal Drug Authority (SDa, 2012), 25% between the target value and the signaling value ('signaleringswaarde'), and 3% between the signaling value and the action value ('actiewaarde'). No sample farm was above the action value.

In 2011, the use in fattening pigs was 8 daily dosages per animal year. Assuming a production period of 117 days, 3 daily dosages (= 8 x (117/365) are administered to each fattening pig during its production period from 25 kg to slaughter weight. This fattening pig has also received antibiotics at the breeding farm (during 13 days), which brings the total exposure to antibiotics per fattening pig to approximately 16 days during its whole life from birth to slaughter at the age of 191 days.

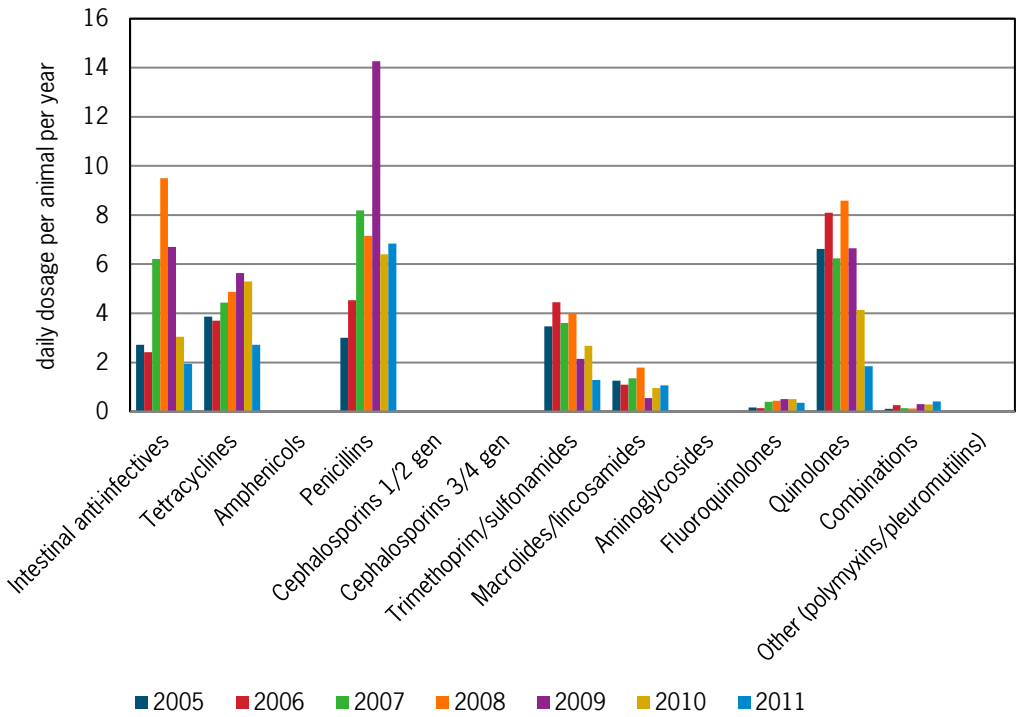
If it is assumed that the average treatment weight of fattening pigs will be 30% lower than their average live weight, since younger animals are more likely to receive antibiotics than older animals, the estimation of the total life time true exposure increases from 16 days to a total of 17 days. Compared to 2009 this is a decrease of nearly 50%.

4.2 Broilers

The average use in broilers is estimated to be 16 daily dosages per year in 2011, administered orally, mainly through the drinking water (95% Confidence Interval: 12-21 dd/ay). In 2009 the use was 37 daily dosages per year (CI: 24-49 dd/ay).

Figure 4.4 provides insight into the trends in the relative use of the various groups of antibiotics.

Figure 4.4 **Antibiotic use in broilers in dd per animal year in 2005-2011**



In 2011 administration of penicillines accounted for 41% of the total antibiotic use on broiler farms, tetracyclines for 17%, intestinal anti-infectives for 12% and quinolones for 11%. Fluoroquinolones use was 2.2% of the total use. The use of intestinal anti-infectives (e.g. orally administered neomycin, colistin) decreased from 7 dd/ay in 2009 to 2 dd/ay in 2011.

Discussion

Within the sample about 85% of the farms had a use level below the target value ('streefwaarde') for 2011 of the Animal Drug Authority (SDa, 2012), 11% between the target value and the signaling value ('signaleringswaarde'), and 4% between the signaling value and the action value ('actiewaarde'). No farm in the sample had a use level above the action value.

In 2011, the use was 16 daily dosages per animal year. This means that an individual broiler is treated with antibiotics during 2 days (= 16 x 42/365) in the 42 days from day one to slaughter.

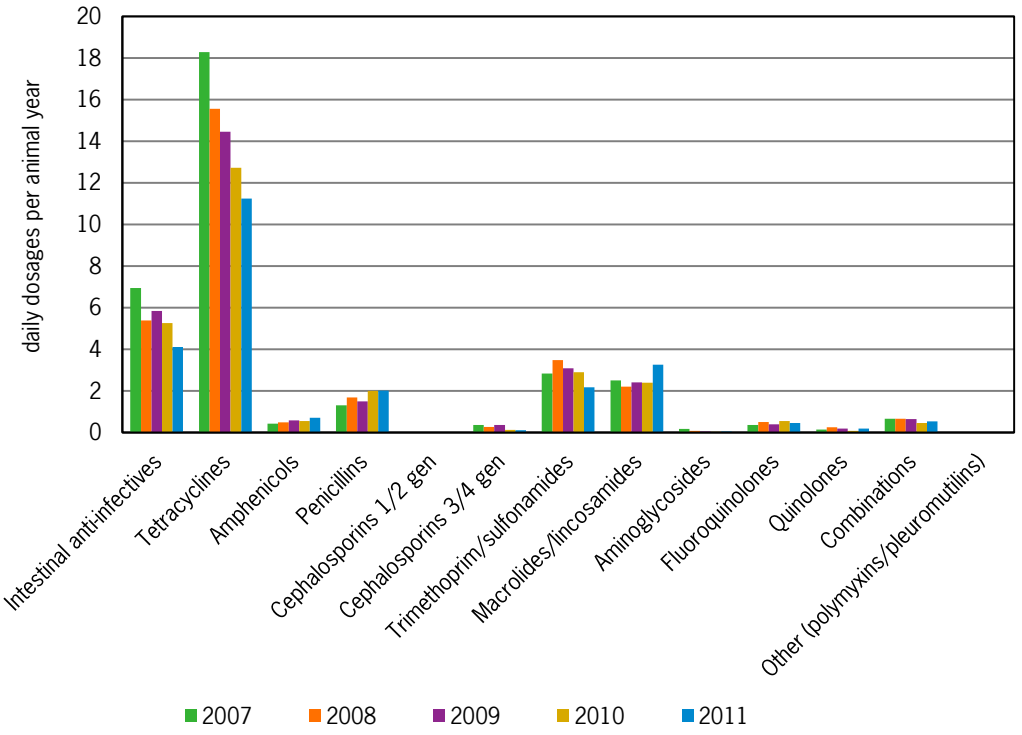
Data on the time of prescription reveal that the average weight on which broilers receive treatment equals the average live weight of 1.0 kg. Therefore the calculated exposure of approximately 2 days per broiler can be considered as an adequate estimation of the true exposure (i.e. 1 to 2 treatment days per broiler, considering the 95% confidence interval).

4.3 Veal calves

In 2011, the average use in veal calves is estimated to be 25 daily dosages per animal year, of which 90% was orally administered (95% Confidence Interval: 23-26 dd/ay). In 2009 the average use was 30 daily dosages per animal year (CI: 28-31 dd/ay). The total reduction in 2011 is 27%, as compared to the start of the monitoring in 2007. In 2007 the average use was 34 daily dosages per animal year.

Figure 4.5 provides insight into the trends in the relative use of the various groups of antibiotics.

Figure 4.5 **Antibiotic use in veal calves in dd per animal year in 2007-2011**



In 2011 45% of the total antibiotic use on the veal calf farms originated from the administration of tetracyclines, 17% from intestinal anti-infectives (e.g. neomycin, colistin) and 9% from

trimethoprim/sulfonamides. Fluoroquinolones and 3rd and 4th generation cephalosporin use were respectively 2.0% and 0.5% of the total use.

Discussion

Within the sample 48% of the farms had a use level below the target value ('streefwaarde') for 2011 of the Animal Drug Authority (SDa, 2012), 46% between the target value and the signaling value ('signaleringswaarde'), and 6% between the signaling value and the action value ('actiewaarde'). One farm had a use level above the action value.

The overall use further decreased, mainly as a result of less traditional antibiotic therapy with tetracyclines. In 2011, 25 daily dosages of antibiotics were administered per animal year. This means that the individual average veal calf was treated with antibiotics during 15 days (= 25 x 222/365) in the period from birth to the average slaughter age of 222 days (white and rosé).

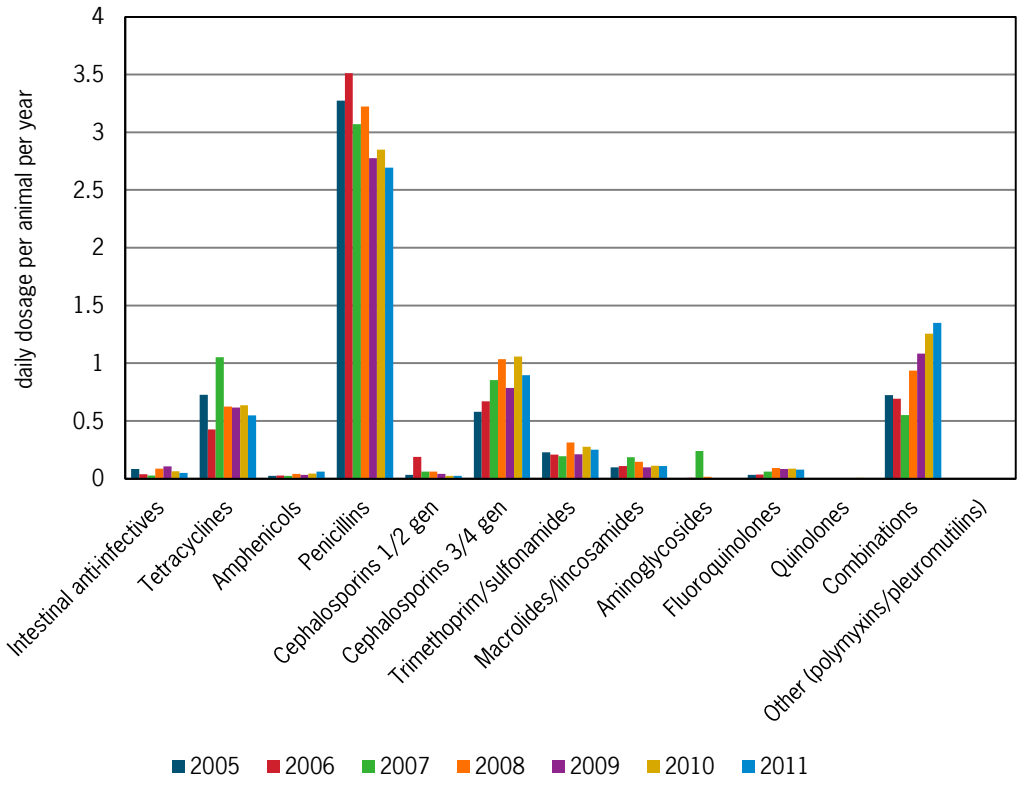
If it is assumed that the average treatment weight of veal calves is about 50% lower than the average live weight, since younger animals are more likely to receive antibiotics than older animals, the estimation of the total life time true exposure increases from 15 days to a total of 30 days.

4.4 Dairy cows

The average use in dairy cows is estimated to be 6.1 daily dosages per year in 2011, including the use in young stock (95% Confidence Interval: 5.2-7.0 dd/ay). In 2009 the use was 5.8 daily dosages per year (CI: 5.1-6.5 dd/ay).

Figure 4.6 provides insight into the trends in the relative use of the various groups of antibiotics.

Figure 4.6 **Antibiotic use in dairy cattle in dd per animal year in 2005-2011**



In 2011 44% of the total antibiotic use on dairy farms originated from the administration of penicillins and 22% from combinations, which were mainly applications for intramammary treatment. Also 15% third/fourth generation cephalosporins were used. Use of fluoroquinolones in dairy cattle is 1.3%.

Discussion

Within the sample about 34% of the farms had a use level below the target value ('streefwaarde') for 2011 of the Animal Drug Authority (SDa, 2012), 48% between the target value and the signaling value ('signaleringswaarde'), 10% between the signaling value and the action value ('actiewaarde'), and 8% above the action value.

In 2011 6.1 daily dosages of antibiotics were administered per animal year, of which 0.2 for oral use. If it is assumed that the oral use is only applied in young calves, an average calf is exposed to antibiotics during 7 days of the 56 day weaning period. Note that part of the antibiotics that are registered for oral treatment may have been used off-label in footbaths for disinfection of cattle feet instead of for treating sick calves.

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Appendix

Table A.1 Trends in livestock in the Netherlands in number of animals (thousands)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Piglets (less than 20 kg)	4,791	4,935	4,422	4,225	3,896	4,300	4,170	4,470	4,680	4,555	4,809	4,649	4,797
Sows	1,320	1,272	1,161	1,140	1,052	1,125	1,100	1,050	1,060	1,025	1,100	1,098	1,106
Fattening pigs (of at least 50 kg)	7,028	6,615	5,931	5,789	5,818	5,715	5,730	5,700	5,970	6,155	6,199	6,459	6,200
Turkeys	1,523	1,523	1,523	1,451	1,112	1,238	1,250	1,200	1,232	1,222	1,336	1,336	1,167
Other poultry	48,642	48,642	48,642	48,714	43,168	44,427	45,800	45,475	45,068	46,976	48,885	48,885	48,715
Veal calves	800	756	676	692	748	775	813	824	860	913	886	921	919
Cattle (excl. veal calves)	3,297	3,134	3,166	3,088	2,986	2,984	2,933	2,849	2,960	3,083	3,112	3,039	2,993
Sheep	1,152	1,250	1,250	1,300	1,476	1,700	1,725	1,755	1,715	1,545	1,091	1,211	1,113

Sources: Eurostat (pigs, cattle, sheep, laying hens before 2008), FAO (other poultry), CBS (laying hens 2008-2011); FAO Poultry figures 2011 were not yet available; poultry numbers 2010 were used

Table A.2 Trends in livestock in the Netherlands in live weight (in 1,000 tonnes)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Pigs	831	793	716	699	679	692	686	676	699	703	725	741	726
Turkeys	9	9	9	9	7	7	8	7	7	7	8	8	7
Other poultry	49	49	49	49	43	44	46	45	45	47	49	49	49
Veal calves	138	130	117	119	129	134	140	142	148	157	153	159	158
Cattle (excl. veal calves)	1,649	1,567	1,583	1,544	1,493	1,492	1,467	1,425	1,480	1,542	1,556	1,520	1,497
Sheep	69	75	75	78	89	102	104	105	103	93	65	73	67
Total	2,745	2,623	2,548	2,498	2,439	2,471	2,449	2,400	2,483	2,549	2,556	2,549	2,504

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