Belgian Veterinary Surveillance of Antimicrobial Consumption

National consumption report

2010

Summary

This second BelVetSAC report, covers the results of the data collection surveillance of veterinary antimicrobial consumption in Belgium in the year 2010. Data consist of all veterinary antimicrobials sold to a veterinarian or pharmacist in Belgium and of antimicrobial premixes incorporated in medicated feed intended to be used in Belgium for the year 2010. It includes thus consumption data for farm animals as well as companion animals. The denominator for animal production was the biomass (in kg) calculated as the sum of the amount of beef, pork and poultry meat produced in 2010, plus the number of dairy cattle present in Belgium times 500 kg of metabolic weight per head.

The overall evolution in total tons of active substance (antimicrobial pharmaceuticals + antimicrobial premixes) shows a slight decrease of 1.6% from 2009 to 2010. The use of antimicrobial pharmaceuticals has decreased with 5.2%, however the use of antimicrobial premixes has increased with 16.3%. These evolutions are a confirmation of the trend already seen between 2008 and 2009. When looking at the antimicrobial use in function of the biomass a comparable evolution is observed with a decrease of antimicrobial pharmaceuticals of 9.0% and an increase of antimicrobial premixes of 11.6%, resulting in a total decrease of antimicrobials used per kg biomass present of 5.6%. The opposite evolution in use between pharmaceuticals and antimicrobial premixes is likely to be the result of a shift in use from on farm applied pharmaceuticals to in feed administered premixes.

The most applied antimicrobial classes are the sulphonamides and trimethoprim (89 tons, 29.7%) followed by the penicillines (80 tons, 26.7%) and the tetracyclines (74 tons, 24.7%).

These 2010 results confirm the trend already observed in 2009 of a decreasing use of pharmaceuticals and an increasing consumption of antimicrobial premixes resulting in an overall small decrease in the total amount of antimicrobials used in veterinary medicine. When looked at in the perspective of the amount of biomass produced a decrease of 5.6% is observed.

Although these data show a favorable evolution towards a decreased antimicrobial consumption they also show that the reduction is limited in comparison to several other European countries with comparable animal production systems. For many years the antimicrobial consumption per kg biomass in Belgium was lower than for The Netherlands whereas in 2010 for the first time a comparable level is obtained.

These results reemphasize the need for vigorous actions directed to all stakeholders, towards a reduced use of antimicrobials. For this purpose the recently established Knowledge Center on Antimicrobial Consumption and Resistance in Animals in Belgium (AMCRA) which has become fully operational from the first of January 2012, will propose recommendations and guidelines to guide the whole sector towards a rational reduction of the antimicrobial use in animals.

Samenvatting

Dit tweede BelVetSAC rapport omvat de resultaten van het gebruik van antimicrobiële middelen bij dieren in België in 2010. De gegevens omvatten alle antimicrobiële middelen die werden verkocht aan een apotheker of dierenarts in België (=antimicrobiële farmaceutica) evenals de antimicrobiële voormengsels die via gemedicineerd diervoeder worden toegediend. Het betreft dus data over het gebruik van antimicrobiële middelen bij zowel landbouwhuisdieren als gezelschapsdieren. Om het gebruik in verhouding tot het aantal aanwezige dieren te kunnen plaatsen wordt als noemer de biomassa berekend als de som van de geproduceerde kilogrammen varkens-, pluimvee- en rundveevlees in België in 2010 aangevuld met het aantal aanwezige melkkoeien vermenigvuldigd met hun metabool gewicht (500 kg/stuk).

De algemene evolutie, uitgedrukt in tonnen actieve substantie (antimicrobiële farmaceutica en antimicrobiële voormengsels) toont een lichte daling van 1.6% tussen 2009 en 2010. Het gebruik van de antimicrobiële farmaceutica is gedaald met 5.2% daar waar het gebruik van antimicrobiële voormengsels gestegen is met 16.3%. Deze evoluties zijn een bevestiging van de trend die reeds werd opgemerkt tussen 2008 en 2009. Als het gebruik van antimicrobiële middelen in functie van de biomassa wordt uitgezet, wordt een gelijkaardige evolutie waargenomen met een daling van het gebruik van antimicrobiële farmaceutica met 9.0% en een stijging van de antimicrobiële voormengsels met 11.6% wat resulteert in een daling van het totaal gebruik met 5.6% per kg biomassa. De tegengestelde evolutie in het gebruik van antimicrobiële farmaceutica en antimicrobiële voormengsels is vermoedelijk het gevolg van een verschuiving van het gebruik van antimicrobiële middelen toegediend door inmenging op het landbouwbedrijf naar de toediening via gemedicineerde diervoeders die reeds op het veevoederbedrijf met antimicrobiële voormengsels worden ingemengd.

De meest gebruikte klasse van antibiotica waren de sulfonamiden en trimethoprim (89 ton, 29.7%) gevolgd door de penicillines (80 ton, 26.7%) en de tetracyclines (74 ton, 24.7%).

Ondanks het feit dat deze data een gunstige evolutie naar een gereduceerd gebruik van antimicrobiële middelen tonen, dient opgemerkt te worden dat deze reductie minder snel verloopt dan in verschillende andere Europese landen met vergelijkbare types veehouderij. Zo was het gebruik van antimicrobiële middelen bij dieren in België (uitgerukt per kg biomassa) gedurende vele jaren lager dan in Nederland terwijl in 2010 beide landen op een ongeveer gelijk niveau zijn gekomen.

De resultaten herbevestigen de nood aan duidelijke acties naar alle betrokken sectoren om het gebruik van antimicrobiële middelen bij dieren verder te reduceren. Hiervoor zal het recent opgerichte kenniscentrum **A**nti**m**icrobial **C**onsumption and **R**esistance in **A**nimals in België (AMCRA), dat op 1 januari 2012 operationeel werd, adviezen en richtlijnen opstellen om verder te evolueren naar een rationele reductie van het gebruik van antimicrobiële middelen bij dieren.

Résumé

Ce deuxième rapport BelVetSAC traite des résultats de la surveillance de la collecte de données en matière de consommation d'antimicrobiens vétérinaires en Belgique durant l'année 2010. Les données se composent de tous les antimicrobiens vétérinaires vendus à un vétérinaire ou un pharmacien en Belgique et des prémélanges antimicrobiens incorporés dans des aliments médicamenteux destinés à être utilisés en Belgique en 2010. Elles comportent donc les données de consommation tant pour les animaux d'élevage que pour les animaux de compagnie. Le dénominateur pour la production animale était la biomasse (en kg) calculée comme somme de la quantité de viande bovine, de viande porcine et de volaille produite en 2010, ainsi que le nombre de vaches laitières présentes en Belgique multiplié par leur poids métabolique (500 kg/tête).

L'évolution globale de la quantité totale (tonnes) en substance active (médicaments antimicrobiens + prémélanges antimicrobiens) présente une légère diminution de 1,6% de 2009 à 2010. Cette évolution est une confirmation de la tendance déjà observée entre 2008 et 2009. Lorsque l'on observe la consommation antimicrobienne en fonction de la biomasse, on observe une évolution comparable avec une diminution des médicaments antimicrobiens de 9,0% et une augmentation des prémélanges antimicrobiens de 11,6%, ce qui a pour résultat une diminution totale des substances antimicrobiennes utilisés par kg de biomasse présente de 5,6%. L'évolution opposée au niveau de l'utilisation entre les médicaments antimicrobiens et les prémélanges antimicrobiens est probablement le résultat d'un glissement au niveau de l'utilisation des médicaments antimicrobiens utilisés dans l'élevage vers les prémélanges antimicrobiens administrés dans les aliments médicamenteux.

Les classes d'antimicrobiens les plus utilisées sont les sulfonamides et la triméthoprime (89 tonnes, 29,7%) suivies des pénicillines (80 tonnes, 26,7%) et des tétracyclines (74 tonnes, 24,7%).

Ces résultats de 2010 confirment la tendance déjà observée en 2009 d'une diminution de la consommation des médicaments antimicrobiens et d'une augmentation de la consommation des prémélanges antimicrobiens, ce qui entraîne une légère diminution globale de la quantité totale d'antimicrobiens utilisés en médecine vétérinaire. En ce qui concerne la quantité de biomasse produite, on observe une diminution de 5,6%.

Bien que ces données montrent une évolution favorable tendant vers une baisse de la consommation d'antimicrobiens, elles montrent également que la diminution est limitée par rapport à plusieurs autres pays européens qui ont des systèmes comparables de production animale. Pendant de nombreuses années, la consommation d'antimicrobiens par kg de biomasse en Belgique était inférieure à celle aux Pays-Bas, tandis qu'en 2010, un niveau comparable a été atteint pour la première fois.

Ces résultats rappellent clairement la nécessité d'actions vigoureuses orientées vers les stakeholders et visant à obtenir une diminution de la consommation d'antimicrobiens. À cet effet, le Centre d'expertise sur la consommation d'antimicrobiens et la résistance à ceux-ci chez les animaux (AMCRA, Antimicrobial Consumption and Resistance in Animals), récemment établi en Belgique et entièrement opérationnel depuis le 1er janvier 2012, proposera des recommandations et des lignes directrices visant à orienter l'ensemble du secteur vers une réduction rationnelle de la consommation d'antimicrobiens chez les animaux.

Preface

Antimicrobials are valuable tools in the preservation of animal health and animal welfare, and must be cherished as they may save lives and prevent animal suffering. Nevertheless, antimicrobial consumption and its link to antimicrobial resistance in humans and animals has become a worldwide point of concern. The World Health Organization has indicated the follow up of antimicrobial resistance as one of the top priorities for the coming years. Antimicrobial consumption in animals selects for antimicrobial resistant bacteria in animals, leading to therapy failure in bacterial infections. Yet it might also jeopardize human health through either transfer of resistant bacteria or their resistance genes from animals to humans. The magnitude of this risk still needs to be quantified while increasing evidence of resistance transfer between ecosystems is found.

Given the risks both for animal and public health and since it is by far the leading driver for antimicrobial resistance, it is crucial to measure the level of antimicrobial consumption and antimicrobial resistance in animals. For comparison reasons with other countries, consumption data are plotted against the calculated biomass of animals. This second BelVetSAC report gives an overview of the consumption of antimicrobial in veterinary medicine in Belgium in 2010.

Contents

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Materials and Methods

Data collection

1. Antimicrobials for veterinary use

a. Antimicrobial pharmaceuticals

Sales data of all products in all pharmaceutical formulations registered on the Belgian market that contain antimicrobials were aggregated. These data were asked from the 24 wholesaler-distributors that are registered for supplying veterinarians and pharmacies in Belgium with veterinary medicines during the observation period. The distributors are obliged by law (article 12sexies, Law on medicines 25th March 1964; Articles 221 and 228 Royal Decree 14th December 2006 on medicines for human and veterinary use) to keep record of all sales and to deliver these records to the competent authority of the Belgian authority (Federal Agency for Medicines and Health Products) on demand. They were asked by letter dd. 14th October 2010 to upload the required data via a secured web-application (www.belvetsac.ugent.be). The required data consisted of all veterinary antimicrobials sold in the year 2010 to a veterinarian or pharmacist in Belgium. In Belgium, antimicrobial products are only available on prescription or by delivery from the veterinarian. Belgian veterinarians can both use antimicrobial products in their daily practice, or sell them to animal owners. Sales from one wholesaler-distributor to another were excluded from the input data to prevent double counting. A pre-filled list of antimicrobial containing specialties registered and marketed on the Belgian market was provided, together with its market authorization holder and national code (if available), formulation and package form. The wholesaler-distributor only needed to provide the number of packages sold for each product per year.

b. Antimicrobial premixes

As antimicrobial premixes can be purchased by feed mills directly from the producers or wholesalers (not necessarily through wholesaler-distributors) also data on medicated feed were to be collected. This was done by contacting all Belgian compound feed producers that are licensed to produce medicated feed (n=63). They received a list of registered and marketed antimicrobial containing premixes. The feed mills were asked by letter dd. 31th March 2011 to upload the required data, on legal basis of article 12sexies Law on medicines 25th March 1964; Article 221 and 228 Royal Decree 14th December 2006 on medicines for human and veterinary use. This data was also submitted via the secure web-application (www.belvetsac.ugent.be). Producers of medicated feed were asked to provide data on the use of antimicrobial containing premixes for the year 2010. Antimicrobial premixes can only be incorporated into medicated feed on prescription of a veterinarian.

Table 1 provides an overview of the groups of antimicrobial agents covered in the BelVetSAC data-collection system, together with the corresponding ATCvet codes. The ATCvet codes included in each antimicrobial class are listed in appendix A.

Table 1. groups of antimicrobial agents covered in the data collection and corresponding ATCvet codes.

Groups of antimicrobial agents	ATCvet codes
Antimicrobial agents for intestinal use	QA07AA; QA07AB
Antimicrobial agents for dermatological use	QD06A; QD06BA
Antimicrobial agents for intrauterine use	QG51AA; QG51AC; QG51AE; QG51AX QG51BA; QG51BC; QG51BE
Antimicrobial agents for systemic use	QJ01
Antimicrobial agents for intramammary use	QJ51
Antimicrobial agents for use in sensory organs	QS01AA; QS01AB QS02AA QS03AA
Antimicrobial agents for use as antiparasitic	QP51AG

2. Animal production

Animal production data to calculate the produced biomass were derived from the Eurostat website (http://epp.eurostat.ec.europa.eu/portal/page/portal/agriculture/data/main_tables).

From these animal production data, biomass (in kg) was calculated, according to Grave et al., (2010), as the sum of the amount of beef, pork and poultry meat produced that year in Belgium plus the number of dairy cattle present in Belgium times 500 kg of metabolic weight per head.

Data analysis

The total number of packages sold per product for all wholesalers was linked to a for that purpose developed database that contained all additional product information. This additional information consisted of:

- the different active antimicrobial substances the product contains per ml for liquids or mg for solids
- the weight per substance
- the number of units in one package
- for active substances expressed in International Units: the conversion factor to mg
- calculated from the above: the total amount of active substance (per active substance) in one package

- the ATC vet code for each (combination of) active substance(s) required for the ESVAC (European Surveillance of Veterinary Antimicrobial Consumption) reporting

Through this extra information, the number of packages sold can be converted to the amount of active substance used.

All sales data on antimicrobial feed premixes included in the data from wholesaler-distributors were excluded from the above data-source to prevent double counting. Data concerning antimicrobial premixes from medicated feed producers were added to the data on pharmaceuticals from wholesaler-distributors to account for total coverage of veterinary antimicrobial consumption in Belgium.

As in the 2007- 2009 report, yearly consumption figures were put versus biomass as a yearly adjusted denominator according to the methodology described by Grave et al. (2010). The animal species included were based upon the vast majority of the biomass present (estimated to be 92% of the total biomass present in Belgium). It should however be made clear that the calculation of the biomass does not contain other animal species such as horses, rabbits, small ruminants and companion animals (dogs, cats, …) (estimated to be 8% of the biomass present in Belgium), whereas the collected data on antimicrobial use also covers the use in these species. The biomass also includes animals slaughtered in Belgium but raised in other countries and it excludes animals raised in Belgium but slaughtered abroad.

The fact that many antimicrobial products are registered for use in different animal species and that there are currently no data available on the proportions of products used in the different species makes extrapolation up to animal species level unachievable at this moment. The Market Authorization Holders of the products do provide estimated proportions to be included in the product related pharmacovigilance periodic safety update reports, yet these estimates are not always at hand, and are often based on limited data. For these reasons it was not feasible to use these data for this report.

Data validation

To check for correctness and completeness the collected data were also compared to data collected by sector organizations. For the pharmaceutical industry data were provided by Pharma.be (www.pharma.be) and for the feed producing industry data were provided by BEMEFA (www.bemefa.be). In none of both datasets data were totally equal since slightly different data we asked for and not always all producers or wholesalers are member of the respective sector organizations. Trends and evolutions in the different dataset were compared and only if large discrepancies were observed data entry mistakes were further investigated and corrected, if needed.

Results

Response rate

All the 24 wholesaler-distributors, requested to deliver their sales data on veterinary antimicrobial products sold in 2010 responded. Of the 63 compound feed producers, licensed for the production of medicated feed, 62 responded of which 9 indicated not to have produced any medicated feed and 53 delivered the data on antimicrobial premixes incorporated in medicated feed to be used in Belgium. The one non-responding feed mill was of negligible importance in terms of its market share and therefore, data coverage is assumed to be over 99%.

Number of antimicrobial pharmaceuticals and premixes available on the Belgian market

Table 2 provides an overview of the number of antimicrobial pharmaceuticals and the number of antimicrobial premixes available on the Belgian market for the years 2007-2010 according to the commented compendium of the Belgian Centre for Pharmacotherapeutic Information 2007, 2008, 2009 and 2010 respectively (www.bcfi-vet.be).

Table 2. Armatorium of antimicrobial products on the Belgian market in 2007, 2008, 2009 and 2010

	2007	2008	2009[1]	2010
Number of antimicrobial pharmaceuticals on the market	270	276	283	292
Number of antimicrobial premixes on the market	16	18	20	21
Total number of antimicrobial products on the market	286	294	303	313

With exception of gamithromycin (since 2009), no new active substances were registered on the market in the reported years. Thus the observed increase in available products is largely due to the marketing of new formulations or new generic products based on existing active substances.

[1] Data on the number of antimicrobial pharmaceuticals and premixes on the market in 2007-2009 differ slightly from these reported in the first BelVetSac report (2007-2009). The data in the previous report were incomplete, but had no impact on the quantification of the amount of antimicrobials used.

Animal biomass produced in Belgium

The produced biomass was calculated based on the Eurostat data for the years 2007-2010 as described above (Table 3)

Table 3. Animal Biomass produced in Belgium between 2007 and 2010.

Anima l biomass	2007	2008	2009	2010
Meat (ton)				
Pork	1 063 277	1 056 169	1 082 036	1 123 769
Beef	272 863	216 547	255 017	263 142
Poultry	469 304	469 304	469 304	505 882
Total biomass from meat production	**1 805 444**	**1 742 020**	**1 806 357**	**1 892 793**
Dairy cattle				
Dairy cattle (number)	524 900	517 700	517 700	517 700
Dairy cattle metabolic weight (ton)	262 450	258 850	258 850	258 850
Total biomass (ton)	**2 067.894**	**2 000 870**	**2 065 207**	**2 151 643**

Figures in red are copied from the most adjacent year where figures were available.

An increase in biomass production of 4.2% is observed between 2009 and 2010. This rise is the result of an enlarged production in pork, beef and poultry. It might also be partially the result of a reduced export of living animals for slaughter in neighboring countries.

Total consumption of antimicrobial drugs for veterinary use in Belgium

The total consumption of antimicrobial drugs for veterinary use in Belgium is presented in Figure 1 in tons of active substance per given year. The total amount is subdivided into the part of antimicrobial pharmaceuticals and the part of antimicrobial compounds contained in antimicrobial premixes incorporated into medicated feed intended to be used in Belgium.

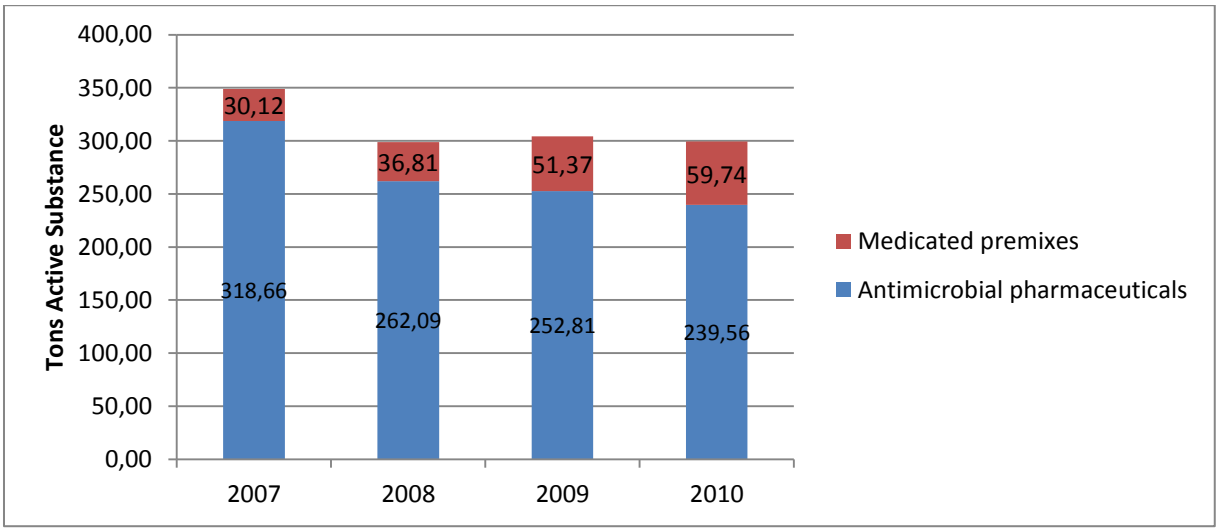

Figure 1. Total national consumption of antimicrobial compounds for veterinary use in Belgium for the years 2007, 2008, 2009 and 2010 (tons active substance)

Between 2009 and 2010, there is a small decrease of 1.6% in the total consumption of antimicrobials in veterinary medicine in Belgium. The use of antimicrobial pharmaceuticals decreased with 5.2% between 2009 and 2010, whereas the use of antimicrobial premixes increased with 16.3%. Figures 2 and 3 show these data separately for the antimicrobial pharmaceuticals and the antimicrobial premixes. When looking at the trend from 2007 onwards (start data collection) a decrease of 14.2% in total consumption is observed. Yet this decrease is largely realized between 2007 and 2008. Since 2008 the total consumption has somewhat stabilized.

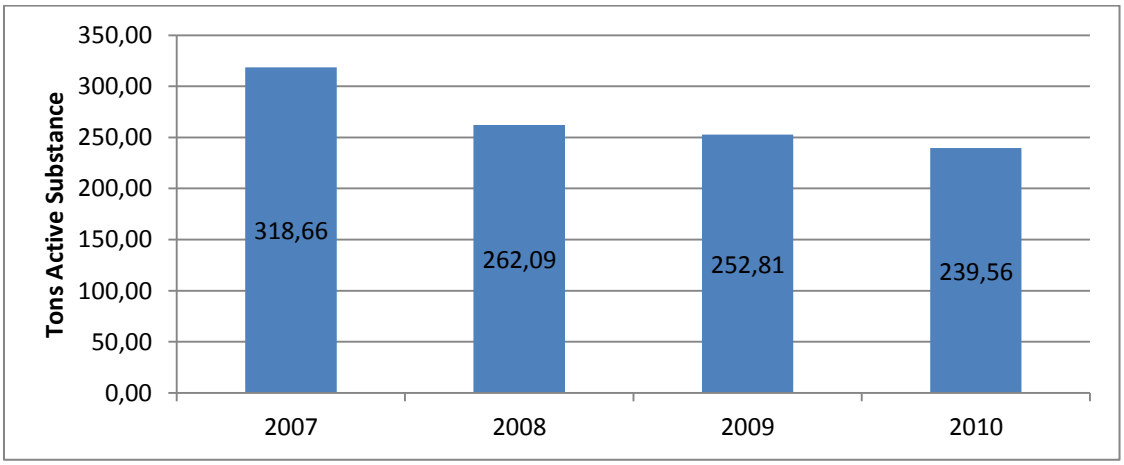

Figure 2. National consumption of antimicrobial pharmaceuticals for veterinary use in Belgium for the years 2007, 2008, 2009 and 2010 (tons active substance)

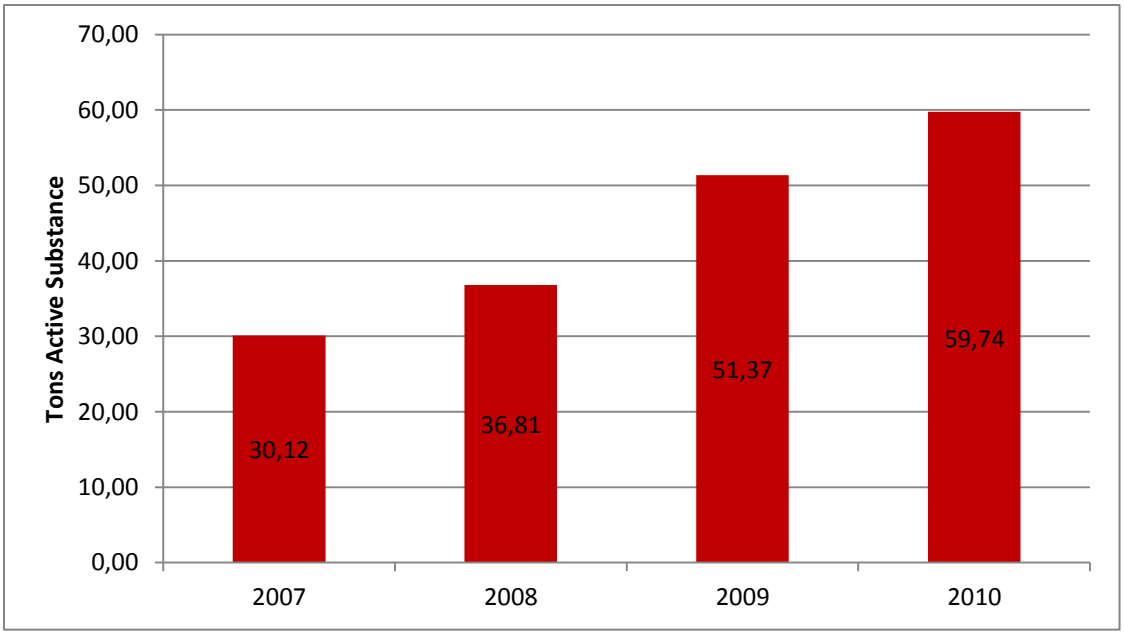

Figure 3. National consumption of antimicrobial premixes in Belgium for the years 2007, 2008, 2009 and 2010 (tons active substance)

Antimicrobial use versus biomass

The amount of antimicrobial compounds used in animals in Belgium was plotted against the amount of biomass produced. For 2010, this number was 139.0 mg/kg. This is a decrease of 5.6% in comparison to 2009. This decrease is larger than the decrease in absolute volume of consumed antimicrobials due to the increase of the produced biomass. Figure 4 presents these data, again subdivided into antimicrobial pharmaceuticals and antimicrobial premixes.

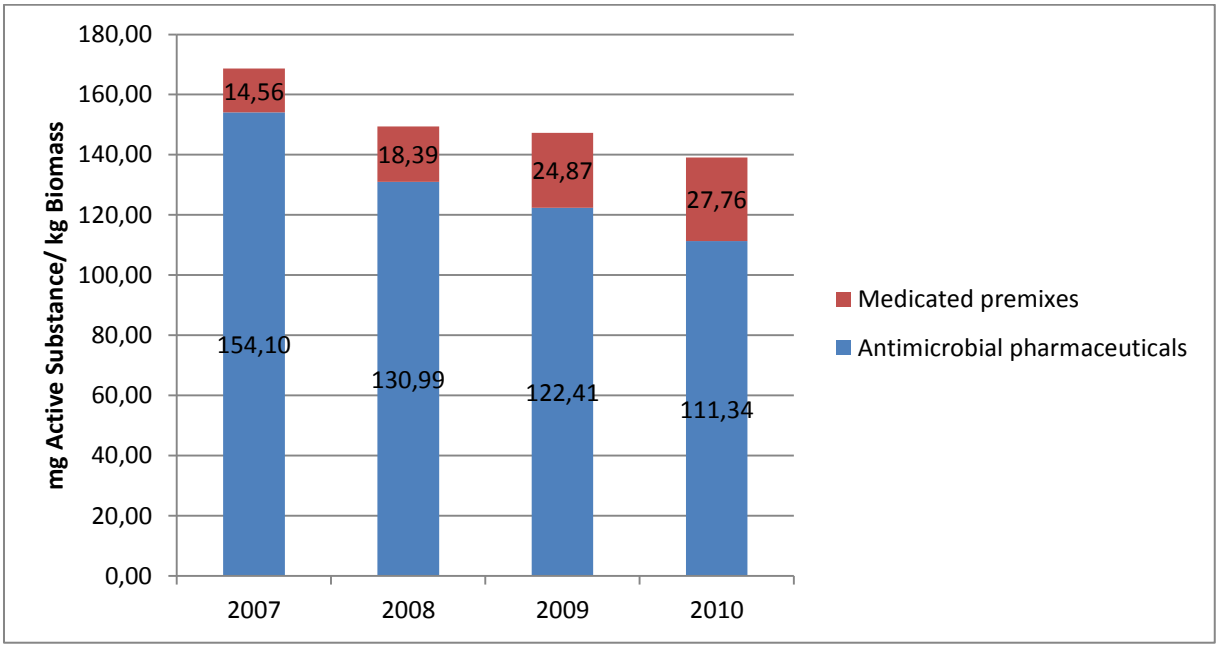

Figure 4. Total mg of active substance used per kg biomass for 2007, 2008, 2009 and 2010.

Overall, between 2007 and 2010 there is a decrease of 17.5% in the amount of antimicrobials sold per kg biomass.

Looking only at antimicrobial pharmaceuticals in function of the biomass produced, a decrease of 9.0% is observed between 2009 and 2010. From 2007 to 2010 this is a total decrease of 27.7%. Figures 5 and 6 show these data separately for the antimicrobial pharmaceuticals and the antimicrobial premixes .

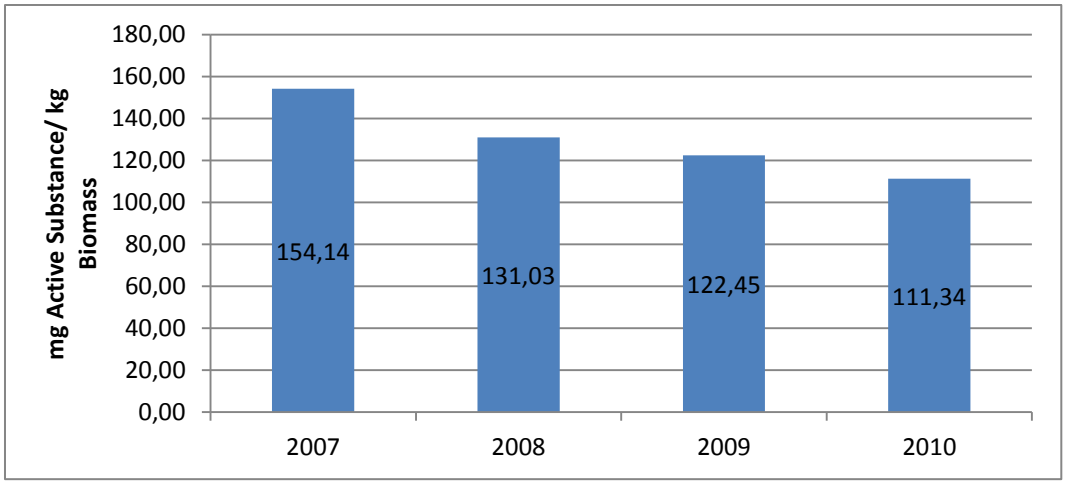

Figure 5. Mg active substance of antimicrobial pharmaceuticals used per kg biomass in Belgium for 2007, 2008, 2009 and 2010.

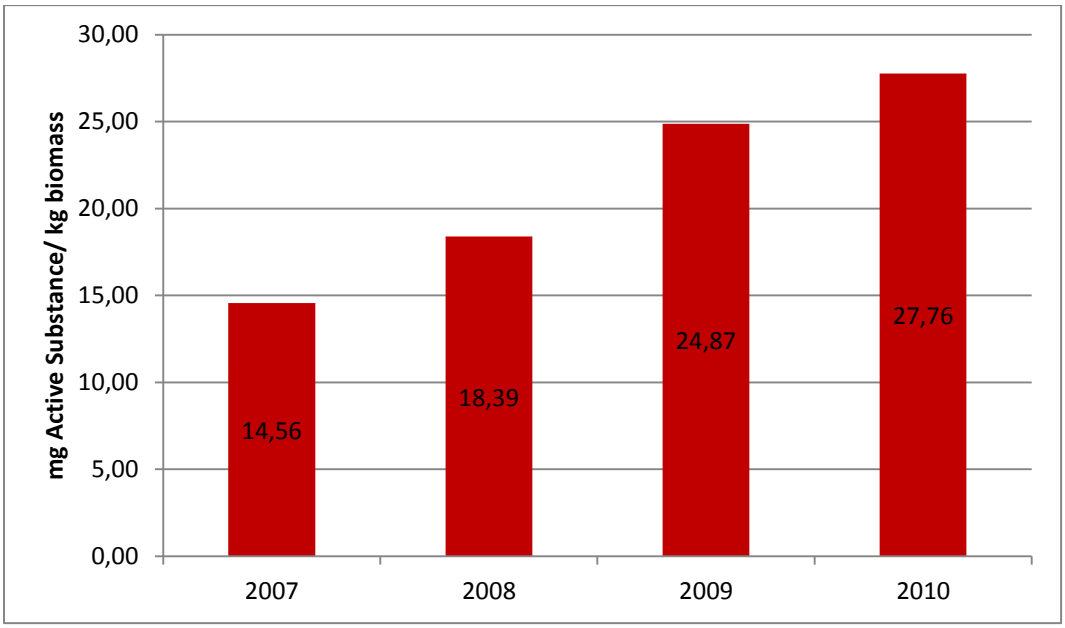

Figure 6. Mg active substance of antimicrobial premixes used per kg biomass in Belgium for 2007, 2008, 2009 and 2010.

Looking only at antimicrobial premixes in function of the biomass produced, an increase of 11.6% is observed between 2009 and 2010. From 2007 to 2010 this is a total increase of 90.6%.

Comparison of Belgium with The Netherlands for the last 4 years.

The results of Belgium, expressed in mg active compound per kg biomass were compared with The Netherlands, a country with a relatively comparable animal production structure, for the years 2007 - 2010.

Data from The Netherlands from 2007 - 2010 were obtained from the MARAN 2009 and 2010 report (www.lei.wur.nl), as well as the amount of biomass produced according to Eurostat database (epp.eurostat.ec.europa.eu), from which the amount used per kg biomass produced was calculated in the same way as done for Belgium.

Table 4. Mg active substance used per kg biomass produced in The Netherlands in the years 2007 – 2010.

Year	Antimicrobial consumption (kg) [1]	Biomass produced (tons) [2]	mg active compound/ kg biomass
2007	590 000	3 141 488	188
2008	529 000	3 228 214	164
2009	518 000	3 239 767	160
2010	455 000	3 234 532	141

[1] MARAN report 2009 and 2010

[2] Eurostat (epp.eurostat.ec.europa.eu)

In Figure 7 the results of the Netherlands are compared to the results of Belgium for 2007-2010

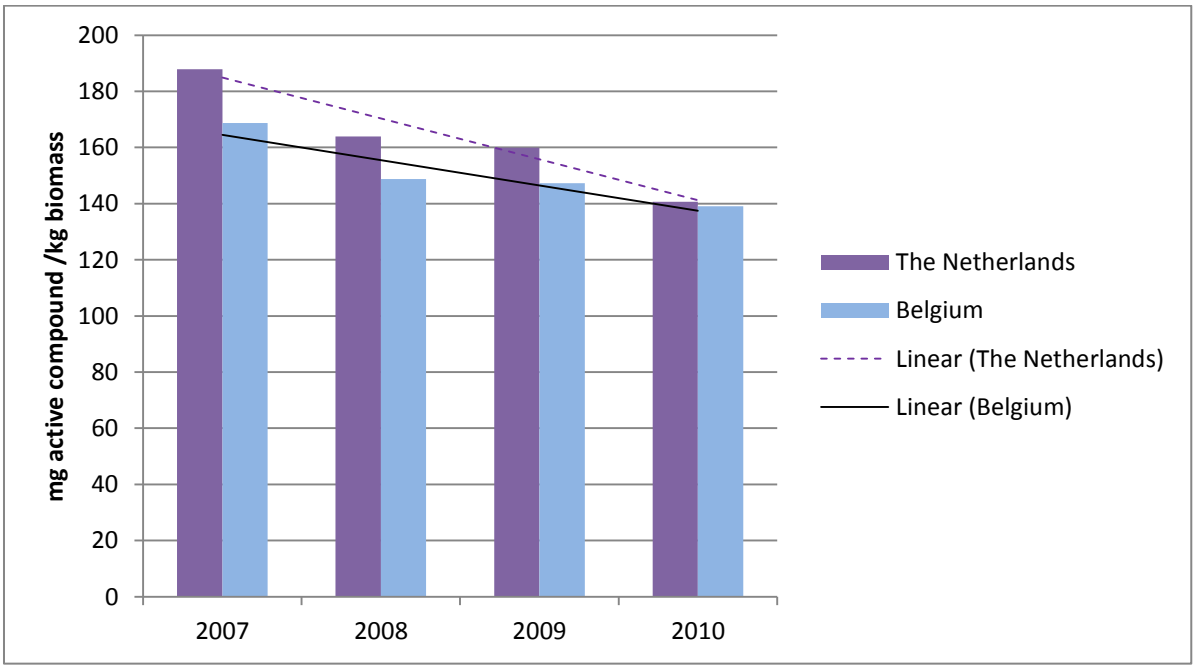

Figure 7. Comparison of mg active substance used per kg biomass produced between Belgium and The Netherlands for the years 2007 – 2010 (including trendlines).

In 2007, Belgium used 10.1% less antimicrobial active substance per kg biomass than The Netherlands, in 2008 this was 9.1%, in 2009 8.1%. Yet due to the remarkable decrease of antimicrobial use in The Netherlands in 2010 and the somewhat slower decrease in Belgium, the consumption per kg biomass is almost totally comparable in 2010 in Belgium and The Netherlands.

Antimicrobial use per class of antimicrobial compounds

1. Total consumption (antimicrobial pharmaceuticals and premixes)

In Figure 8 the total consumption of antimicrobials per class (ATC level 3 or 4) is presented. On average (2007 → 2010), 31.3% of the compounds used were sulphonamides and trimethoprim, 26.0% tetracyclines, 23.6% penicillines and 7.5% macrolides.

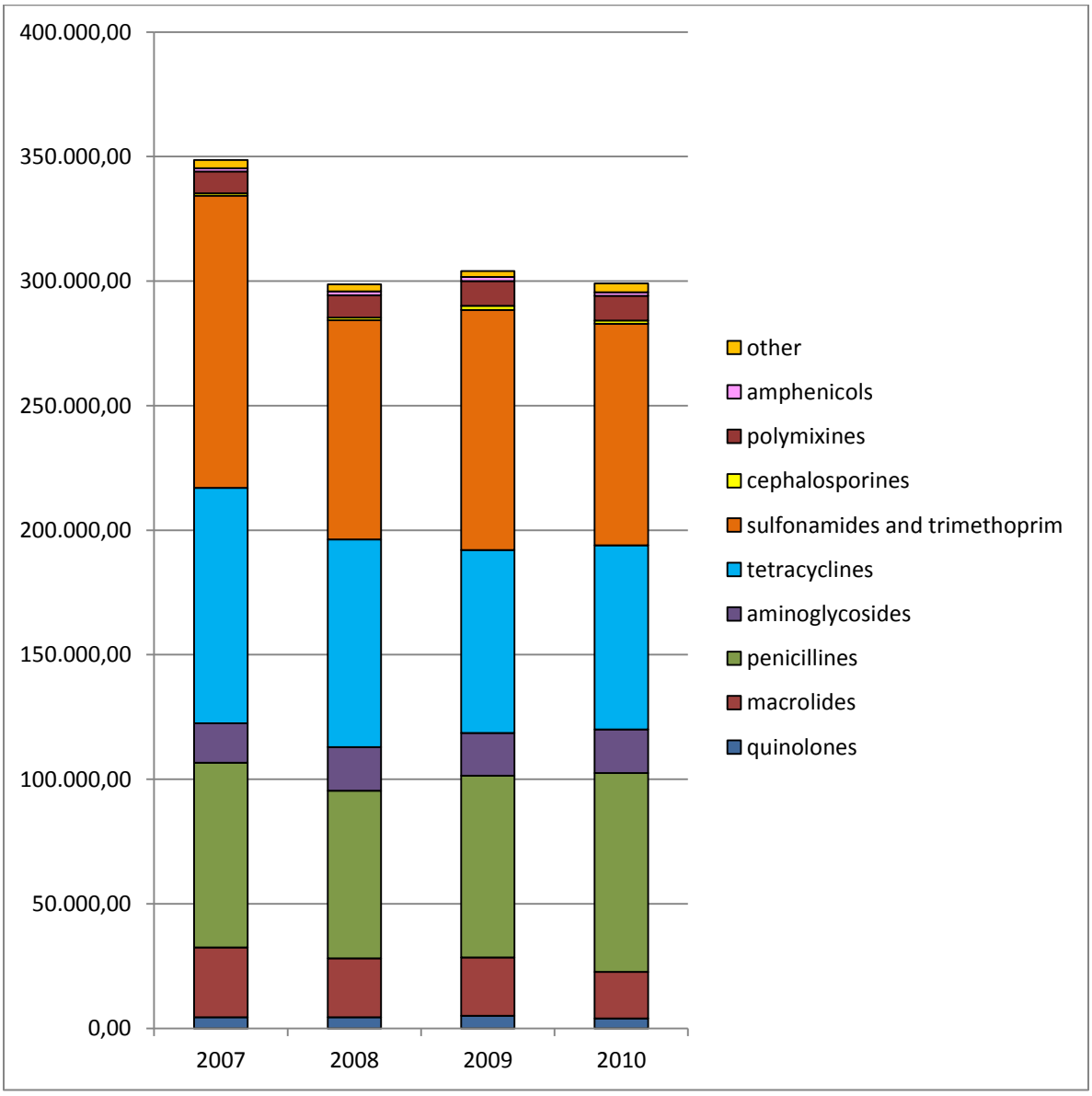

Figure 8. Total antimicrobial use per class of antimicrobials.

In 2010, the most used group of antimicrobials were the sulphonamides and trimethoprim with 29.7% (a decrease with 7.7% in comparison to 2009). The second most used group of antimicrobials was the penicillines with 26.7% of all used antimicrobials. This is an increase of 9.4% in comparison to 2009. The third most frequently used group of antimicrobials was the tetracyclines with 24.7% (an increase with 0.5% in comparison to 2009).

Table 5: Evolution in the antimicrobial consumption (kg) per antimicrobial class.

Class	2009	2010	evolution
aminoglycosides	16.984,3	17.382,2	2,3%
cephalosporins	1.667,6	1.368,9	-17,9%
fenicols	1.668,4	1.382,7	-17,1%
macrolides	23.527,2	18.787,1	-20,1%
other	2.388,3	3.646,7	52,7%
penicillines	73.232,1	80.082,5	9,4%
polymyxins	9.907,4	9.879,5	-0,3%
quinolones	5.021,9	3.978,1	-20,8%
Sulphonamides and trimethoprim	96.363,3	88.939,1	-7,7%
tetracyclines	73.496,7	73.838,2	0,5%
Totaal (kg)	**304.257,2**	**299.285,1**	**-1,6%**

2. Antimicrobial pharmaceuticals

In Figure 9 the consumption of antimicrobials per class (ATC level 3 or 4) is presented for the pharmaceuticals.

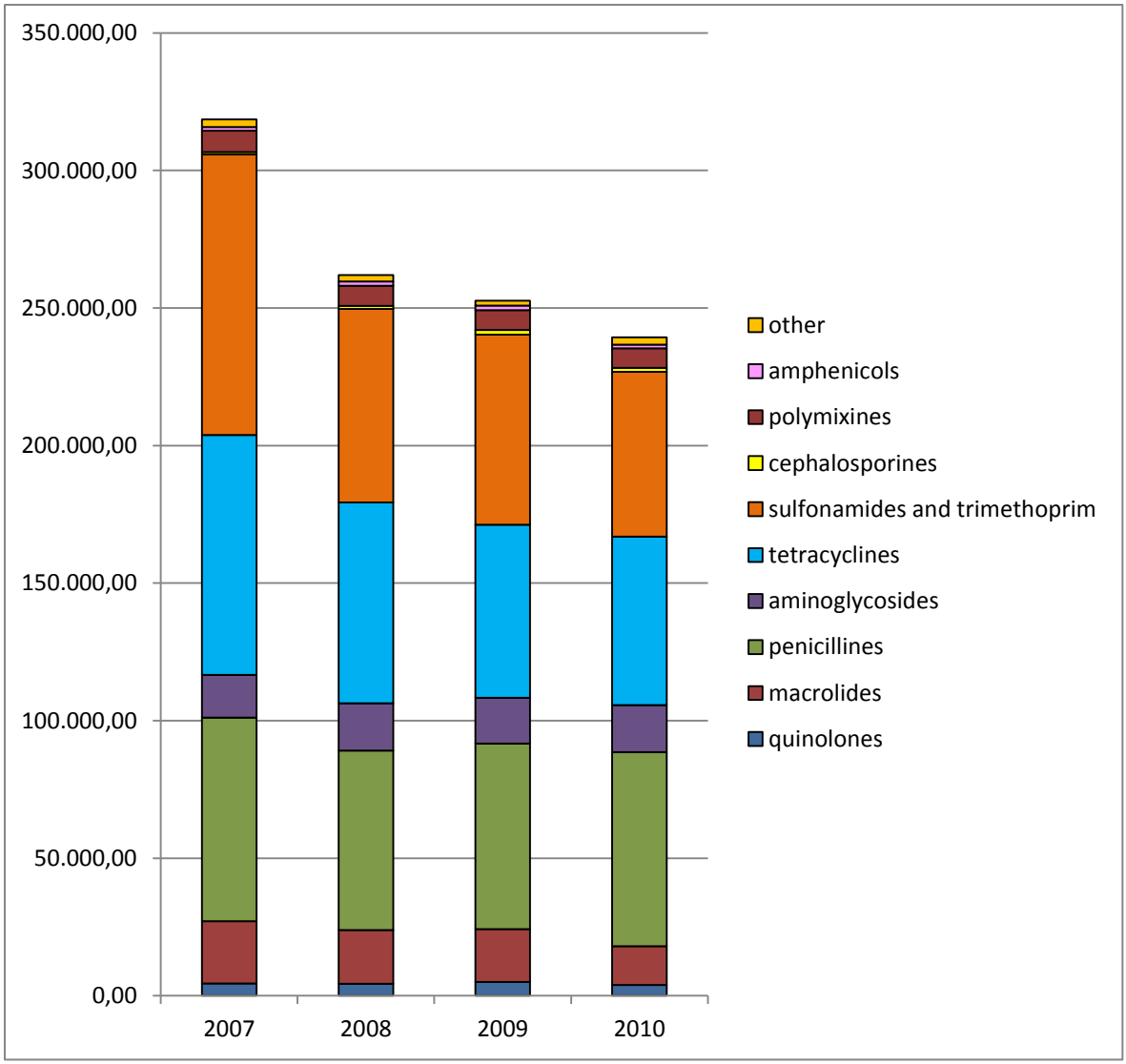

Figure 9. Use of antimicrobial pharmaceuticals per class of antimicrobials.

3. Antimicrobial premixes

In Figure 10 the consumption of antimicrobials per class (ATC level 3 or 4) is presented for the antimicrobial premixes.

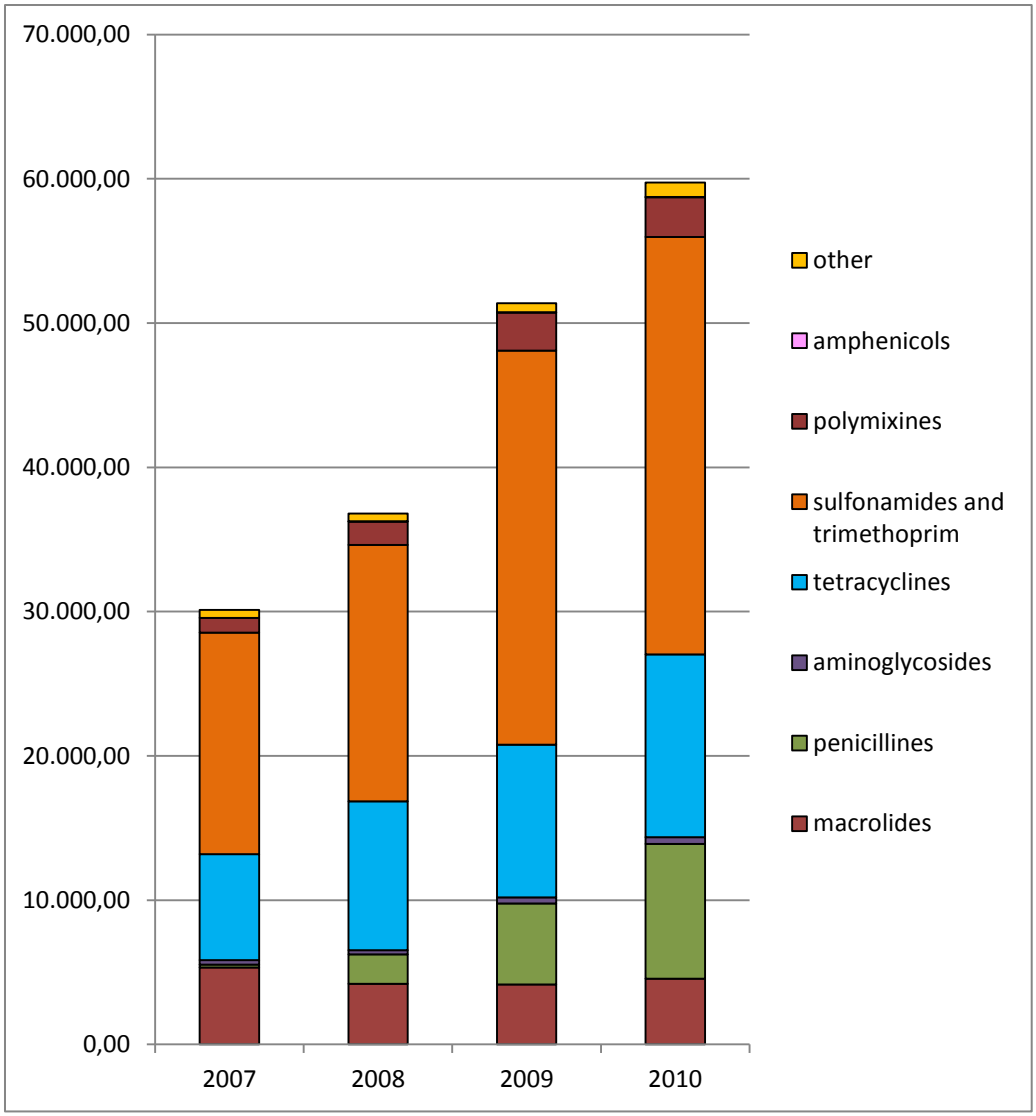

Figure 10. Use of antimicrobial premixes per class of antimicrobials.

The yearly increase in the use of antimicrobial premixes seems to be largely due to an increase in the use of tetracyclines, penicillines and sulphonamides and trimethoprim. Especially the use of amoxicillin (Table 6) has largely increased since 2007. In 2010, almost 48 times the amount of amoxicillin as medicated premix was used as in 2007.

Antimicrobial use per active substance

Table 6 gives the amounts used per individual active substance, grouped per class of antimicrobials.

Table 6: Antimicrobial use per active substance

		Total (kg)				Antimicrobial pharmaceuticals (kg)				Medicated premixes (kg)			
Class	**Antimicrobial compound**	**2007**	**2008**	**2009**	**2010**	**2007**	**2008**	**2009**	**2010**	**2007**	**2008**	**2009**	**2010**
aminoglycosides	**Apramycine**	377,7	295,1	253,9	228,0	304,6	209,1	164,3	118,0	73,1	86,0	89,6	110,0
	dihydrostreptomycine	7.222,0	7.810,9	7.783,1	8.653,4	7.222,0	7.810,9	7.783,1	8.653,4	0,0	0,0	0,0	0,0
	Gentamicine	110,6	135,8	163,1	140,8	110,6	135,8	163,1	140,8	0,0	0,0	0,0	0,0
	Kanamycine	0,1	2,3	10,9	13,2	0,1	2,3	10,9	13,2	0,0	0,0	0,0	0,0
	Neomycine	1.430,9	1.377,2	1.299,5	1.071,1	1.430,9	1.377,2	1.299,5	1.071,1	0,0	0,0	0,0	0,0
	paromomycine	1.526,8	1.647,3	1.423,5	2.825,8	1.526,8	1.647,3	1.423,5	2.825,8	0,0	0,0	0,0	0,0
	spectinomycine	4.980,6	6.062,1	6.050,3	4.449,8	4.740,3	5.865,0	5.717,0	4.092,5	240,4	197,1	333,4	357,3
cephalosporins	**Cefalexine**	171,7	238,7	604,4	502,2	171,7	238,7	604,4	502,2	0,0	0,0	0,0	0,0
	Cefalonium	8,6	17,7	17,7	12,5	8,6	17,7	17,7	12,5	0,0	0,0	0,0	0,0
	Cefapirine	14,3	14,6	13,8	11,0	14,3	14,6	13,8	11,0	0,0	0,0	0,0	0,0
	Cefazoline	0,4	0,8	0,4	2,2	0,4	0,8	0,4	2,2	0,0	0,0	0,0	0,0
	Cefoperazon	4,5	7,6	6,4	6,5	4,5	7,6	6,4	6,5	0,0	0,0	0,0	0,0
	Cefovecin	5,3	6,8	8,1	8,9	5,3	6,8	8,1	8,9	0,0	0,0	0,0	0,0
	Cefquinome	132,9	144,4	151,2	146,7	132,9	144,4	151,2	146,7	0,0	0,0	0,0	0,0
	Ceftiofur	571,7	655,7	865,6	678,9	571,7	655,7	865,6	678,9	0,0	0,0	0,0	0,0
fenicols	**chlooramfenicol**	2,1	2,2	2,4	1,6	2,1	2,2	2,4	1,6	0,0	0,0	0,0	0,0
	Florfenicol	1.303,1	1.560,4	1.666,0	1.381,1	1.303,1	1.534,5	1.649,4	1.359,9	0,0	26,0	16,6	21,2
Macrolides*	**Clindamycine**	146,2	154,4	136,9	141,0	146,2	154,4	136,9	141,0	0,0	0,0	0,0	0,0
	erythromycine	49,9	50,0	53,9	0,0	49,9	50,0	53,9	0,0	0,0	0,0	0,0	0,0
	gamithromycine	0,0	0,0	25,8	32,3	0,0	0,0	25,8	32,3	0,0	0,0	0,0	0,0
	Lincomycine	6.109,2	6.011,1	6.084,4	4.838,0	5.411,6	5.581,3	5.529,5	4.339,7	697,6	429,8	554,9	498,3
	Pirlimycine	0,5	0,5	0,4	0,5	0,5	0,5	0,4	0,5	0,0	0,0	0,0	0,0
	Spiramycine	602,8	712,4	732,3	313,4	602,8	712,4	732,3	313,4	0,0	0,0	0,0	0,0
	Tilmicosine	6.147,9	4.968,2	4.873,7	5.534,2	3.209,0	2.438,9	2.615,8	3.216,3	2.938,9	2.529,3	2.257,8	2.317,9
	tulathromycine	51,1	53,4	66,0	56,8	51,1	53,4	66,0	56,8	0,0	0,0	0,0	0,0

	Tylosine	14.990,6	11.869,7	11.553,7	7.870,9	13.292,6	10.620,8	10.199,8	6.122,4	1.698,0	1.248,9	1.354,0	1.748,6
other	**Metronidazol**	68,3	70,2	71,8	67,6	68,3	70,2	71,8	67,6	0,0	0,0	0,0	0,0
	Rifaximin	5,5	7,8	10,5	14,4	5,5	7,8	10,5	14,4	0,0	0,0	0,0	0,0
	Tiamuline	2.684,8	2.396,3	2.041,1	3.316,0	2.571,3	2.218,1	1.648,5	2.524,4	113,5	178,1	392,6	791,6
	Valnemuline	432,8	352,9	233,6	212,3	0,0	0,0	0,0	0,0	432,8	352,9	233,6	212,3
	zink bacitracine	99,0	43,4	31,3	36,6	99,0	43,4	31,3	36,6	0,0	0,0	0,0	0,0
penicillines	**Amoxicilline**	64.345,2	56.577,5	62.384,6	66.496,7	64.150,3	54.538,6	56.785,1	57.164,0	194,8	2.038,8	5.599,5	9.332,7
	amoxicilline-clav	694,6	766,4	768,3	952,9	694,6	766,4	768,3	952,9	0,0	0,0	0,0	0,0
	Ampicilline	466,9	463,0	505,8	326,3	444,3	438,8	483,8	326,3	0,0	0,0	0,0	0,0
	Cloxacilline	494,0	528,1	573,2	542,8	433,9	463,4	514,5	542,8	0,0	0,0	0,0	0,0
	fenoxymethylpenicilline	68,3	212,2	157,3	99,1	68,3	212,2	157,3	99,1	0,0	0,0	0,0	0,0
	Nafcilline	23,3	23,4	33,3	1,9	23,3	23,4	33,3	1,9	0,0	0,0	0,0	0,0
	penethamaat	329,5	336,0	282,8	273,9	329,5	336,0	282,8	273,9	0,0	0,0	0,0	0,0
	procaïne benzylpenicilline	8.022,8	8.646,0	8.526,9	11.389,0	8.022,8	8.646,0	8.526,9	11.389,0	0,0	0,0	0,0	0,0
polymixins	**colistinesulfaat**	8.787,8	8.947,7	9.906,3	9.878,5	7.764,7	7.320,5	7.279,8	7.134,3	1.023,1	1.627,2	2.626,5	2.744,2
	polymyxine B sulfaat	0,7	1,2	1,1	1,0	0,7	1,2	1,1	1,0	0,0	0,0	0,0	0,0
quinolones	**Danofloxacine**	101,8	83,7	81,4	77,8	101,8	83,7	81,4	77,8	0,0	0,0	0,0	0,0
	Difloxacine	39,4	26,9	27,3	23,4	39,4	26,9	27,3	23,4	0,0	0,0	0,0	0,0
	Enrofloxacine	908,4	986,6	1.046,0	945,6	908,4	986,6	1.046,0	945,6	0,0	0,0	0,0	0,0
	Flumequine	3.239,0	3.070,5	3.633,0	2.682,9	3.239,0	3.070,5	3.633,0	2.682,9	0,0	0,0	0,0	0,0
	Ibafloxacine	3,2	4,0	3,6	1,1	3,2	4,0	3,6	1,1	0,0	0,0	0,0	0,0
	marbofloxacine	196,4	231,9	230,5	247,3	196,4	231,9	230,5	247,3	0,0	0,0	0,0	0,0
	Orbifloxacine	0,7	0,6	0,1	0,0	0,7	0,6	0,1	0,0	0,0	0,0	0,0	0,0
sulphonamides	**sulfachloorpyridazine natrium**	1.802,7	1.717,2	1.700,7	2.437,8	1.802,7	1.717,2	1.700,7	2.437,8	0,0	0,0	0,0	0,0
	Sulfadiazine	80.721,5	67.606,5	71.502,3	70.313,7	67.928,5	52.797,4	48.741,0	46.197,1	12.792,9	14.809,2	22.761,4	24.116,6
	sulfadimethoxine natrium	411,6	407,5	460,2	478,2	411,6	407,5	460,2	478,2	0,0	0,0	0,0	0,0
	sulfadimidine natrium	1.161,6	829,5	747,4	465,9	1.161,6	829,5	747,4	465,9	0,0	0,0	0,0	0,0
	Sulfadoxine	254,3	251,5	229,9	283,3	254,3	251,5	229,9	283,3	0,0	0,0	0,0	0,0

	sulfamethoxazol	79,0	105,7	129,6	83,4	79,0	105,7	129,6	83,4	0,0	0,0	0,0	0,0
	Sulfanilamide	16.070,3	2.940,1	6.598,0	0,0	16.070,3	2.940,1	6.598,0	0,0	0,0	0,0	0,0	0,0
	Trimethoprim	16.838,2	14.196,1	14.995,2	14.876,9	14.279,6	11.234,3	10.442,9	10.053,5	2.558,6	2.961,8	4.552,3	4.823,3
tetracyclines	**chloortetracycline**	940,6	1.053,6	2.210,6	2.288,4	940,6	884,4	825,7	884,3	0,0	169,3	1.384,9	1.404,1
	Doxycycline	64.705,7	55.769,3	54.719,0	57.216,0	64.694,7	50.749,9	46.312,6	47.826,6	11,1	5.019,4	8.406,4	9.389,4
	oxytetracycline	28.895,8	26.537,7	16.567,1	14.333,9	21.554,0	21.405,3	15.760,4	12.465,1	7.341,8	5.132,4	806,7	1.868,7
total (kg)		**348.855,1**	**298.990,2**	**304.257,2**	**299.285,1**	**318.655,8**	**262.094,9**	**252.806,2**	**239.549,0**	**30.116,6**	**36.806,4**	**51.370,3**	**59.736,1**

*Marcrolides inclusive lincosamides

Discussion

In the context of the increasing awareness of antimicrobial resistance development, comparable data and evolutions on antimicrobial consumption are of utmost importance. This second BelVetSac report describes the antimicrobial use in animals in Belgium in 2010. It is the follow up of the first BelVetSac report with the first complete data on the antimicrobial use of animals in Belgium between 2007 and 2009.

As in the first report the data were collected at the level of the wholesaler-distributors for the antimicrobial pharmaceuticals and at the level of the compound feed producers for the antimicrobial premixes. This level both warrants the most complete data and is the closest possible level to the end-user that is practically achievable at this moment. Wholesaler-distributors were asked to provide only data on sales to veterinarians or pharmacists, no sales to other wholesaler-distributors, by which double counting could be avoided. Feed premixes do not necessarily follow the chain through wholesaler-distributors, but compound feed producers can purchase the premixes directly at the level of the producers or pharmaceutical wholesaler. To cover both, data were collected at the level of the compound feed producers. To improve data quality and correctness all data were also validated against data collected by the sector organizations.

Although the collected data are valuable and show essential overall consumption trends, it is important to realize that the data are also very crude and some sources of bias in the data may be present. First of all it would be useful to have data where antimicrobial consumption can be attributed to the different animal species. This would allow to monitor trends per species. Equally it would be better to have data on the amount of treatments attributed to an animal during its live span rather than the amount of kg of a given compound consumed since the number of treatments is much more relevant in relation to the development of antimicrobial resistance than the total amount of antimicrobials consumed. In the current system we can neither be absolutely sure that all products sold in Belgium by the wholesaler-distributors were also used in Belgium. The possibility exists that veterinarians living near the country borders also use medicines bought in Belgium to treat animals abroad. Given the large pressure (e.g. awareness campaigns, legislative measures, …) on reduced antimicrobial use in the neighboring countries (e.g. The Netherlands) it could be speculated that this phenomenon may become increasingly important. On the other hand antimicrobial supplemented feed produced in a neighboring country may also be consumed in Belgium.

Developing a data collection system which meets with these requirements and excludes the possible sources of bias is one of the primary aims of the newly created (per January 2012) knowledge center on **a**nti**m**icrobial **c**onsumption and **r**esistance in **a**nimals in Belgium (AMCRA).

This report shows a decrease of 1.6% in the total consumption of antimicrobials in veterinary medicine between 2009 and 2010. When relating this progress to the evolution in the total biomass produced in 2010 there is a decrease of 5.6%. More precisely, the use of antimicrobial pharmaceuticals has decreased with 5.2% (9.0% relative to the biomass) whereas the use of antimicrobial premixes has increased with 16.3% (11.6% relative to the biomass). Therefore the decrease of the total consumption is entirely due to the decrease of antimicrobial pharmaceuticals. In 2010 the most applied antimicrobial classes were sulphonamides and trimethoprim (89 tons, 29.7%) followed by the penicillines (80 tons, 26.7%) and the tetracyclines (74 tons, 24.7 %).

The observed decrease in total amount of antimicrobials and the increase in the use of antimicrobial premixes is a confirmation of the trend already observed and described in the previous report. Antimicrobial premixes are used almost exclusively in pig production (>95%). As a result this increase is largely contributable to one production branch. Whether the reduction in pharmaceuticals has also occurred predominantly in pig production cannot be determined based upon the available data since the method of data collection does not allow to differentiate between animal species. However, a sort of trade off in pig production between pharmaceuticals and antimicrobial premixes is likely and therefore the observed opposite evolutions of pharmaceuticals and premixes are probably only a shift from the use of on farm mixed pharmaceuticals to antimicrobial premixes mixed in the medicated feed by the compound feed producers. This trend towards an increased use of antimicrobial premixes is likely related to the stop of the use of the on-truck mixing device (since 2008) for the supplementation of feed with medicines (pharmaceuticals) on farm at the moment of filling into the silo. Also the use of top dressing has been forbidden (since 2009) in pig producers working in accordance to the successful “Certus” quality label (www.certus.be) for pork. This has largely been replaced by the use of medicated premixes in feed produced in the feed mill. It might also be related to the increased availability of different registered antimicrobial premixes as shown in table 2. Finally, the use of antimicrobial premixes is perceived as very convenient for farmers and consequentially there are few restrains to withdraw farmers or veterinarians from the use of these products for (preventive) mass medication.

Between 2007 (start of the data collection) and 2010 an overall reduction of antimicrobial consumption of 14.2% (17.5% in relation to the biomass) is seen. This is a favorable evolution which is likely the result of the increasing awareness on risk related to the use of antimicrobial in veterinary medicine. Yet when comparing data of Belgium with these of The Netherlands, with comparable animal production, the reduction in antimicrobial use in The Netherlands is going much faster in the last years in comparison to Belgium. As a result, Belgium remains one of the (reporting) European countries with a high consumption of antimicrobials in comparison to the biomass produced. Since the publication of the first BelVetSac report Belgium has also become fully engaged in the European coordinated ESVAC data collection system. Therefore, it is anticipated that in the next EMA-ESVAC report also

data of Belgium will be included which will allow a comparison of Belgium to other European countries. We encourage strongly that all EU member states collect this kind of data and reports openly on them.

Although a favorable general trend is observed, these results reemphasize the need of actions directed to all stakeholders, towards a reduced use of antimicrobials. For this purpose the recently established AMCRA will propose recommendations and guidelines to guide the whole sector towards a rational reduction of the antimicrobial use. The results of these actions will however only become apparent in 2012 at the earliest since the AMCRA only became fully operational from the first of January 2012.

Conclusion

This report shows a limited decrease of the use of antimicrobials in animals in Belgium since 2009. Yet, given the increased understanding of the risks related to antimicrobial use in animals, it is of utmost importance that this favorable trend is continued and enforced and thus a further rational reduction can be achieved.

Acknowledgements

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Appendix

Appendix A. ATCvet codes included in the different classes of antimicrobials

Class of antimicrobials	ATCvet codes included
aminoglycosides	QJ01FF01
	QJ01GB03; QJ01GB90
	QS01AA11
	QD06AX04
	QS02AA14; QS02AA57
	QG51AA04
	QA07AA06
	QJ51RG01
	QJ51CE59
	QJ01XX04
other	QJ01XX10
	QJ01XQ01; QJ01XQ02
	QJ51XX01
	QJ01RA04
cephalosporins	QJ01DB01
	QJ01DD90; QJ01DD91
	QJ51DB01; QJ51DB04; QJ51DB90
	QJ01DE90
	QJ51DE90
	QG51AX02
	QJ51DD12
	QJ51RD01
amphenicols	QJ01BA90
	QS01AA01
macrolides	QJ01FA02; QJ01FA90; QJ01FA92; QJ01FA91; QJ01FA94; QJ01FA95
	QJ01FF02; QJ01FF52
	QJ51RF03
	QJ51FF90
penicillines	QJ01CA01; QJ01CA04; QJ01CA51
	QJ51RC26
	QJ01CR02
	QJ51CF02
	QJ01CE02; QJ01CE09; QJ01CE30; QJ01CE90
	QJ51CA51
polymixins	QJ01XB01
	QA07AA10
	QS02AA11
pyrimidins	QJ01EW10; QJ01EW13
	QJ01EA01

quinolones	QJ01MA90; QJ01MA92; QJ01MA93; QJ01MA94; QJ01MA95; QJ01MA96
	QJ01MB07
sulphonamides and trimethoprim	QJ01EW09; QJ01EW11; QJ01EW12
	QJ01EQ03
tetracyclines	QJ01AA02; QJ01AA03; QJ01AA06
	QD06AA02; QD06AA03