

Activities and achievements in the reduction of antibiotics use and resistance in animals in Belgium in 2018



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Background

Antimicrobial resistance (AMR) is a global concern for the health of humans and animals, occupying scientists, policymakers and all stakeholders involved in human and veterinary medicine. If micro-organisms develop a resistance to antibiotics, it can become challenging, and in some cases extremely problematic, to tackle them.

The use of antibiotics is the most important cause of AMR. Reducing the use of antibiotics in veterinary medicine is a shared responsibility of the sectors and authorities involved. This is the impetus behind the drive for all parties involved in veterinary medicine in Belgium to share efforts to develop and implement appropriate actions.

Summary

This report summarises the main activities and achievements of various actors within veterinary medicine in 2018 with regard to reducing antibiotics use. In addition, this report contains statistics concerning national sales of antibiotics and their use at farm level, as well as the evolution of AMR in animals from 2011 to 2018.

2016 is considered to have been a turning point in Belgian veterinary medical policy given that three milestones were reached that year: the signing of the Antibiotics Covenant between the Federal Government and relevant organisations in the sector; the publication of a Royal Decree establishing both the conditions for use of critically important antibiotics and the registration of use for all antibiotics; and finally, the establishment of Sanitel-Med, the Federal Government database for these registrations.

In 2017, two of the three reduction goals proposed by AMCRA in the Vision 2020 plan, and which were later included in the Antibiotics Covenant, were achieved: 75% reduction in the use of the critically important antibiotics and a 50% reduction in the use of medicinal pre-mixtures containing antibiotics. **Further progress was to build on these results in 2018, as well as a considerable, further reduction in the sale of medicated feeds.** Furthermore, 2018 saw a sharp fall in the total sales of antibiotics: **compared to 2017 there was a total reduction of 12.8% (mg/kg), and compared to 2011, the reference year in the Antibiotics Covenant, there was a 35.4% reduction.** Moreover, since 2011, there has been a downward trend in AMR in food-producing animals in terms of prevalence of resistance to *Escherichia coli* (indicator bacteria). **This has strengthened the resolve of all partners to continue this course of action and their belief that the target of a 50% total reduction in antibiotics use in 2020 is achievable.**

Convenant between the Federal Government and all involved sector partners concerning the reduction of antibiotics use in the animal sector

The 'Convenant between the Federal Government and all the involved sector partners concerning the reduction of antibiotics use', which was signed on 30 June 2016, contains the following strategic objectives:

1. a 50% general reduction in the use of antibiotics by 2020;
2. a 50% reduction in use of critical antibiotics by 2020; and,
3. a 50% reduction in the use of medicated feed containing antibiotics by 2017.

The reference year for the reduction objectives is 2011. These objectives match AMCRA's reduction targets, as stated in its 'Vision 2020'.

The Convenant was signed by the Federal Government, represented by the ministers of Public Health and Agriculture, the pharmaceutical industry (pharma.be), agricultural organisations (ABS, Boerenbond and FWA), Compound Feed Industry (BFA), veterinary associations (UPV and VDV), animal welfare associations (ARSIA and DGZ), administrators of private quality systems (Belplume, Belpork, BVK, Codiplan, IPW IKM/QFL/QMK) and AMCRA.



The Antibiotics Convenant was signed on 30 June 2016 by representatives of the sector partners and by the ministers for Public Health and Agriculture Maggie De Block and Willy Borsus.

Achievements regarding commitments undertaken in the Antibiotics Covenant by sector-members and the government

The Federal Government, AMCRA and the involved sector partners have drawn up operational objectives within the Antibiotics Covenant. Furthermore, specific commitments are set out in Annex 4 to the Antibiotics Covenant.

For the Federal Government and each of the involved sector partners, this document reports several key achievements attained in 2018, the third year of the Antibiotics Covenant. For more information and an extensive description of all the results achieved, please refer to the respective organisations.

Federal Government

Monitoring of the anti-microbial resistance of the indicator bacteria and zoonoses

Based on the European decision 2013/652/EU, annual monitoring of antimicrobial resistance is performed (AMR) for commensal *E. coli* and for *Salmonella* and *Campylobacter* in pigs, poultry and calves/cows, as well as in the carcasses and meat of these animals.

Policy measures are being developed to achieve minimum, responsible and prudent use of antibiotics based on the information recorded in Sanitel-Med as well as the results of AMR monitoring performed by the FASFC for indicator bacteria and zoonoses in animals and foodstuffs.

2019-2020 Action items

In 2018, the various administrations developed a 2019-2020 joint action plan to support the sectors in reaching the reduction objectives.

Antibiotics usage – data collection & monitoring



On 27 February 2017 mandatory recording in the government's central database, Sanitel-Med, of antibiotics use by veterinarians was introduced for broiler and laying hens, veal calves and pigs. The FAMHP manages and finances the maintenance and the further development of the database, as well as the analysis by AMCRA's data analytics unit. In 2018 the first Sanitel-Med farm reports for the sectors involved were developed and the application was modified to make the reports available online. Based on the requirements of the new Veterinary Medicines Regulation (REG (EU) N° 2019/6), Sanitel-Med will be further modified to include the option of recording additional animal species in the future.

In 2018, general checks were carried out by the FASFC and the FAMHP on livestock farmers and veterinarians regarding compliance with the Royal Decree of 21 July 2016. Extra attention was paid on to both the correct recording and verification in Sanitel-Med, and compliance with the conditional use of critical resources. Additionally, FASFC and FAMHP cooperated on certain specific activities.

One health

In 2018 further steps were taken by the FPS Public Health, Safety of the Food Chain and Environment to create a national 'One Health' AMR action plan and management structure. To this end, there is a strong partnership between the various federal administrations involved (FPS, FAMHP, FASFC, Sciensano and RIZIV) and the Regions. The stakeholders will also be included in due course. Sciensano, the scientific institute concerned with both the animal and human aspects of AMR, is an important partner in the implementation of the 'One Health' concept.

Pharmaceutical industry

In 2018, pharma.be continued to build on previous educational and awareness activities. The e-formulary is still available free of charge to veterinarians for use in their everyday practice. Awareness raising among members of pharma.be and their employees also continued, including via the 'good use of antibiotics' e-learning module, which received an update in 2018. Finally, pharma.be remains an active partner within AMCRA and finances our members' data collection with respect to antibiotics use, as well as research into alternatives that can contribute to reducing the need for antibiotics.

Compound feeds industry

The compound feed industry keeps records of the production of medicated feed for livestock destined for the Belgian market and defines actions to encourage a reduction in their use. The reduction target set specifically for the compound feed sector (a 50% reduction in the use of antibiotics by the end of 2017) was broadly achieved at the end of 2017. **The use of medicated feeds containing antibiotics fell again in 2018, reaching a total reduction of 69.8% between 2011 and 2018.** This reduction is the result of very efficient sector initiatives (such as: the electronic prescription available only via the farm veterinarian; the collection of prescription data; and, the benchmarking of manufacturers in the same sector).



Agricultural organisations

Agricultural organisations have made financial contributions from the sanitary fund (contribution from livestock holders) to the development of a data collection system for pigs, poultry and dairy cattle, which will be managed by the sector. Moreover, they encourage the animal sectors, via consultation, to register with the AB Register or BIGAME data collection system as soon as possible to contribute to implementing detailed operational data collection for all food-producing animals. In the context of this data collection, the importance of data collection and analysis for the efficient use of antibiotics is explained to antibiotics users and suppliers through information campaigns. Self-regulatory initiatives are encouraged in consultation with product specification/label organisations.

The agricultural organisations also provide training for livestock farmers about the responsible use of antibiotics. Awareness is also raised through articles in trade publications for livestock farmers and via social media. Agricultural organisations contribute by disseminating vaccination recommendations to livestock farmers and veterinarians for the various animal sectors as well as participating in AMCRA working groups and in other organisations involved in antibiotics issues.

Veterinary organisations

In 2018 the UPV and VDV kept up their commitment by taking part in various AMCRA working groups. Veterinarians had previously taken an active role during the AMCRA working group “Benchmarking and Monitoring Antibiotics Usage in Animals – Part 2: Veterinarians”.

Various training courses were organised for veterinarians on the topic of ‘responsible antibiotics use’. Emphasis was placed on preventive veterinary medicine and the application of good biosafety across all animal sectors. The transition from curative to preventative veterinary medicine also requires veterinarians to fulfil a different role, functioning more as an adviser and trusted person for livestock farmers.



Administrators of private quality systems

The administrators of the private quality systems Belpork, Belplume, IKM/QFL and BVK committed to the collection of data and reporting analysis results on the use of antibiotics in animal production.

Given the expansion to poultry (in 2017) and dairy cattle (in 2018), the antibiotics data collection system for pig farms, the AB Register, established in the non-profit organisation Belpork, is located in a new non-profit organisation: the AB Register, with Belpork, Belplume and IKM/QFL as founding members.

In 2018 Belpork was mainly involved in the expansion and refinement of reporting. The frequency of individual reporting to the members was increased from biannually to quarterly, and the development of a more automated, ‘near real time’ (NRT) reporting tool was initiated. As data has already been collected for 4 years, the time has come to transition to interval benchmark limits. In order to promote the quality of the data further, so-called ‘error reporting’ will also be initiated. Finally, in 2018 Belpork also supported various projects around responsible use of antibiotics by making the data collected over the years (anonymously) available.

In 2018 Belplume mainly worked on improving the quality of the collected data. For this, awareness was raised among poultry farmers, veterinarians and hatcheries regarding providing data correctly.

Throughout 2018 various advisory councils were organised in connection with product specifications and antibiotics use in poultry. As a result, the content of the poultry report was fixed and included points for verification that inspectors were obligated to check for the AB Register. Cooperation with Sanitel-Med in October 2018 facilitated a combined report with some Sanitel-Med information being sent to all Belplume participants in November.

Product specifications from IKM and QFL included mandatory registration of antibiotics at dairy cattle farms as of 1 October 2018 (via the AB Register in Flanders and via BIGAME in Wallonia). In Flanders, IKM organised information sessions for bovine veterinarians. Additionally, communications to veterinarians and livestock farmers took place in the form of newsletters and articles in trade publications.

In March 2018 BVK made the first benchmark reports for 2017 available for the veal calf sector (per closed lot of veal calves; depending on the type of calves - (dairy, breeding, double-muscling, starters); depending on the month of slaughter). A follow-up report was drawn up. This report includes a report by the farm veterinarian on the discussion of the benchmark reports and recommendations for more efficient antibiotics use.

The CodiplanPLUS Rund product specification, which is a part of the Belbeef Standard, promotes the voluntary registration of antibiotics by the cattle farmer. Additionally, a sustainability monitor was launched, which contains a list of 45 sustainable initiatives, of which a few directly involve the influence on animal welfare, and indirectly also antibiotics use (including contracts with corporate consulting veterinarians, biosafety measures and purchasing policy).

Animal welfare organisations (DGZ & ARSIA)

The animal health organisations DGZ and ARSIA aim to strengthen the relationship between farm (consulting) veterinarians and livestock farmers by developing farm health plans. There is also active work around the education of livestock farmers and veterinarians, including by giving presentations and workshops to veterinarians. DGZ and ARSIA also play a central role performing susceptibility patterns on bacteria isolated from samples taken from clinically ill animals.



'*Altibiotique*' is a shared commitment by and among livestock farming sector representatives and veterinarians. They have joined with ARSIA to create this information and guidance tool for cattle farmers, for whom there is increasing worry regarding antimicrobial resistance in case of antibiotic treatments.

'Less, better, different' was the slogan for the '*Altibiotique*' plan: less use of antimicrobials; discussion about their use; and more work around prevention regarding cattle health. Since the beginning of '*Altibiotique*' almost 750 cattle farmers have taken part in one (or more) of the project's activities.



The BIGAME interface (information platform for the management of antibiotics and medications in livestock farming), developed by ARSIA together with Awé, now offers a completely new analysis to users regarding the use of antibiotics on the farm. This analysis will be dynamic and above all didactic. It will be available free of charge to livestock farmers and their named veterinarian, and is as such a unique reporting tool.

One of DGZ's top strategic objectives in 2018 was 'making animal health more prevention oriented'. DGZ wants to support livestock farmers making significant efforts in the area of biosafety with its Biosecurity Award. Working in a bio-safe way is an essential aspect for livestock farmers whose ambition is an economically viable farm with healthy animals and a minimum amount of medication use.



DGZ worked on a number of different projects on the theme of 'behavioural change & the animal health business model'. DGZ was a co-applicant of the European ROADMAP project (Rethinking of Antimicrobial Decision-systems in the Management of Animal Production) and co-organiser of the VEE meeting entitled: Social Veterinary Epidemiology. 'How to induce behavioural changes in animal health management?'

AMCRA

AMCRA has done further work raising awareness and informing the involved parties. The *formulary for dogs and cats* was published as a convenient poster and distributed during fairs and conferences.

In cooperation with SAVAB-UPV and SAVAB-Flanders, AMCRA developed an informative brochure “Antibiotics: there is harm in trying!”. This brochure can be displayed in the waiting room and given to cat or dog owners.



Within a working group brought together for the purpose, AMCRA formulated recommendations on ‘the use of colistin in animal medicine’. Measures were listed which would see the use of such medications limited to a maximum of 1 mg/kg biomass.

The use of zinc oxide as a medication to treat gut oedema in piglets was investigated. There was a unanimous recommendation for its use to be phased out before the end of 2020.

AMCRA developed a generic ‘action plan’ for use across different species of animals in order to provide livestock farmers and their veterinarians with a tool to identify any (excessively) high antibiotics use at their farm, and to then draw up an ‘action plan’.



WWW.AMCRA.BE

AMCRA's data analytics unit, on behalf of FAMHP, carries out the analysis of the antibiotics use data collected in Sanitel-Med's data collection system. AMCRA is also pursuing a collaboration with the private labels who wish to offer additional services to users of the AB Register data collection system. The methodology for data analysis, benchmarking and reporting was published on the AMCRA website (<https://www.amcra.be/nl/analyse-antibioticagebruik/>).

In 2018 farm reports were produced for veal calves (1x), pigs (2x) and poultry farmers (1x), based on the data collected in Sanitel-Med. In addition, farm reports were drafted for pig farmers using the AB Register (3x). Preparatory analyses were also initiated to draw up farm reports for poultry and dairy farms using the AB Register.

Results concerning the use of antibiotics in animals in Belgium in 2018 and evolution since 2011.

Sales figures for antibiotics

The use of antibacterial agents in animals in Belgium is monitored annually in proportion to the amount of biomass produced annually. These results are published in the BelVet-SAC report (<http://www.belvetsac.ugent.be>). It concerns data on sales of antibacterial agents for use in agriculture as well as pets. These sales figures do not show use per animal species.

Total use

- **Expected reduction by the end of 2020: -50%**
- **Evolution between 2017-2018: - 12.8%**
- **Reduction achieved since 2011: 35.4%**

A further fall of 12.8% (mg substance/kg biomass) was reported in 2018, in comparison with 2017. This decrease stems from a reduction of 13.2% for pharmaceuticals and 9.2% for pre-mixes, together with an increase of 1.7% in biomass. The largest drop was observed for the combination of sulphonamide-trimethoprim (18.9%), tetracyclines (13.4%), aminosidines (12.4%) and macrolides (11.5%). The use of florfenicol rose again (by 6,1%). And the use of tiamulin also increased (by 109.5%).

In comparison with 2011 (the reference year), 2018 saw a **cumulative decline of 35.4%** in the total use reported.

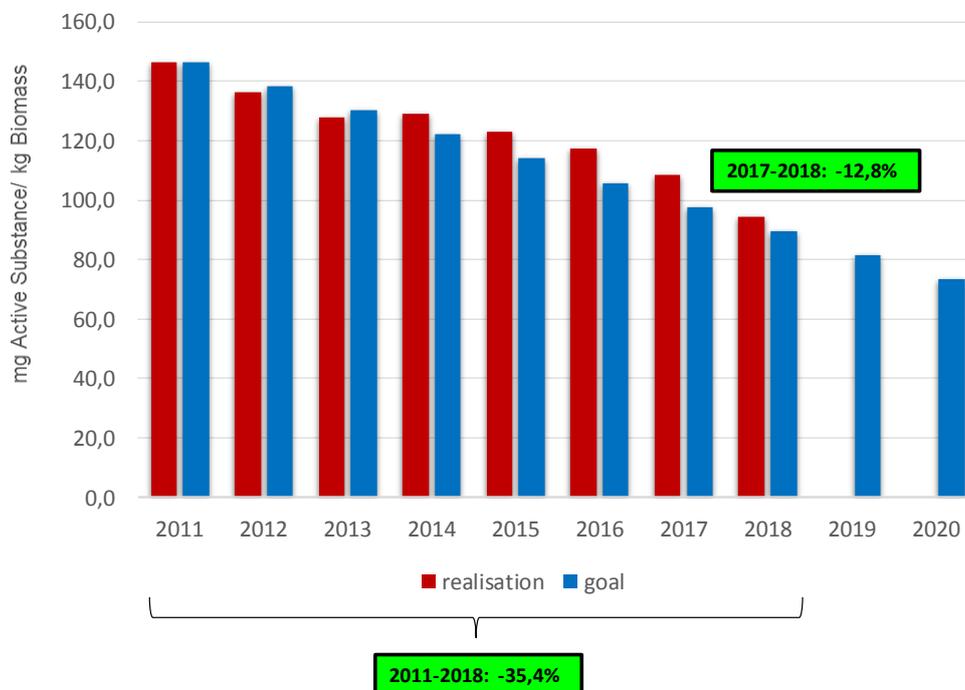


Figure 1 The annual reduction pathway envisioned by AMCRA for total antibiotics use between 2011 and 2020 (blue bars) and the reduction achieved between 2011 and 2018 (red bars).

Colistin and zinc oxide

The continued fall in the use of polymyxins (mainly colistin) in veterinary medicine over the last 6 years is a very good result. Colistin is listed by the WHO as a critically important antibiotic with the highest priority for public health. In 2018 a **cumulative decline of 64.4% in use** was reported, as compared with 2012, and a fall of 4.1% compared to 2017.

The use of zinc oxide as a medication to treat diarrhoea in weaned piglets has been permitted since October 2013. Whereas in 2018 there was a reduction in its use of 21.3% compared to 2017, there was a **progressive decrease of 55.4%** in comparison with 2015, the year with the highest use since initial authorisation (87.2 metric tons).

Critically important antibiotics

- **Expected reduction by the end of 2020: -75%**
- **Evolution between 2017-2018: +34.4%**
- **Reduction achieved since 2011: -79.1%**

With respect to AMCRA's second objective - a 75% reduction in the use of critically important antibiotics before 2020 (fluoroquinolones and 3rd and 4th generation cephalosporins) - 2018 saw a limited increase, in absolute terms, in the use of fluoroquinolones, which was entirely attributable to an increase in the use of flumequine. The use of 3rd and 4th generation cephalosporins, in contrast, continued to decline.

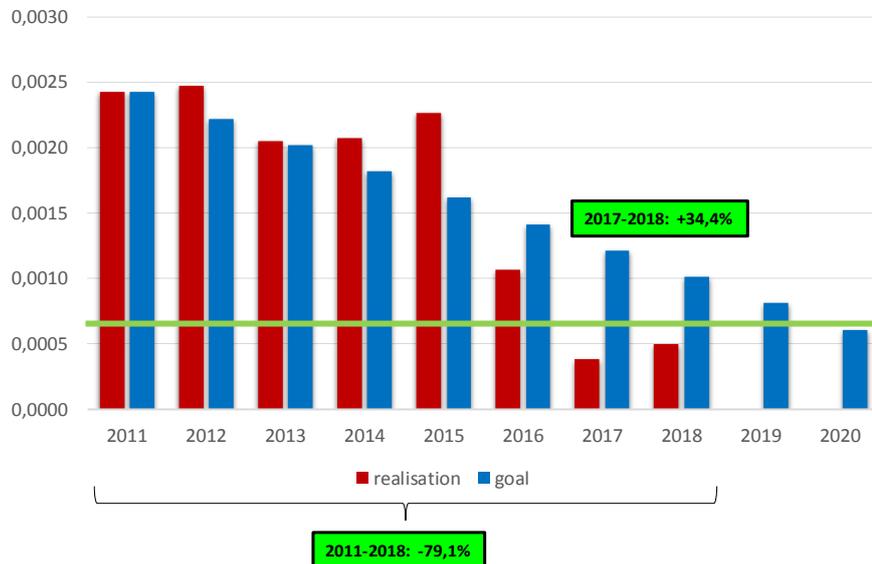


Figure 2 The annual reduction pathway envisioned by AMCRA for total antibiotics use between 2011 and 2020 (blue bars) and the reduction achieved between 2011 and 2018 (red bars).

A **decrease of 79.1% was reported in comparison with 2011**. This result can in large part be attributed to the introduction of the Royal Decree of 21 July 2016, containing measures regarding the use of critically important antibiotics in food-producing animals, and to the efforts made in this regard by veterinarians. A significant reduction had already been achieved by 2016 (of 53%) even though the regulation only came into force in August of that year. Between 2016 and 2017 this reduction was confirmed with an additional decrease of 64.4%, resulting in a total reduction of 84% compared to

2011. Even though an increase has now been reported in the use of fluoroquinolones, the planned reduction of 75% is still achieved.

Medicated feed

- **Expected reduction by the end of 2017: -50%**
- **Evolution between 2017-2018: -9.2%**
- **Reduction achieved since 2011: -69.8%**

The 3^{de} AMCRA objective - a reduction of 50% by 2017 (which is also included in the Antibiotics Covenant) - had already been more than achieved last year and now, thanks to a further decrease of 9.2% between 2017 and 2018, has been exceeded by an even greater margin. **For this reason, a total reduction of 69.8% since 2011 can be reported.**

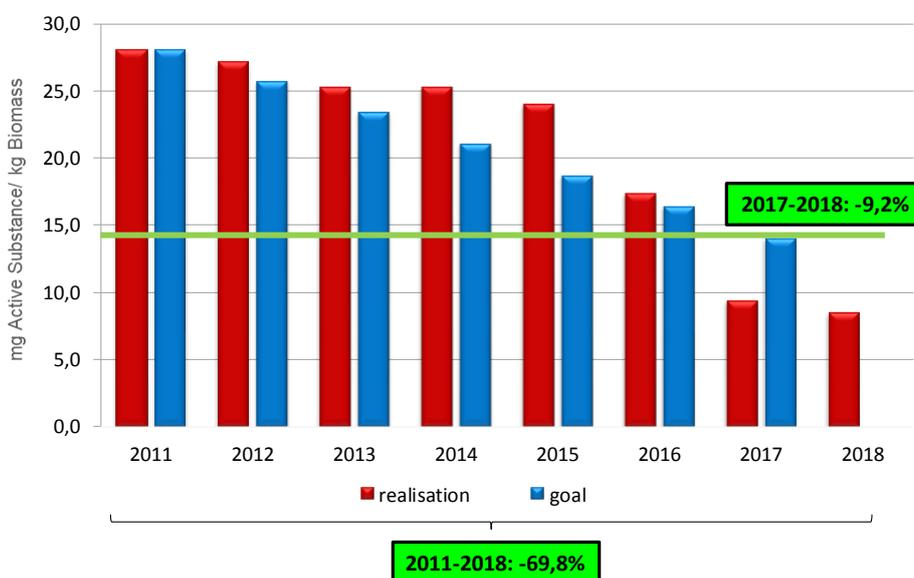


Figure 3 The annual reduction pathway envisioned by AMCRA for total antibiotics use between 2011 and 2020 (blue bars) and the reduction achieved between 2011 and 2018 (red bars).

Use according to the AMCRA colour code

Antibiotics with an orange colour code are used most often, in terms of mg/kg biomass used. This is chiefly the result of a greater number of classes of antibiotics colour coded orange than yellow. The use of yellow and orange antibiotics decreased between 2017 and 2018 by around 10%. As stated, the use of red antibiotics grew in 2018, but still amounts to a reduction of 79.1% compared to 2011.

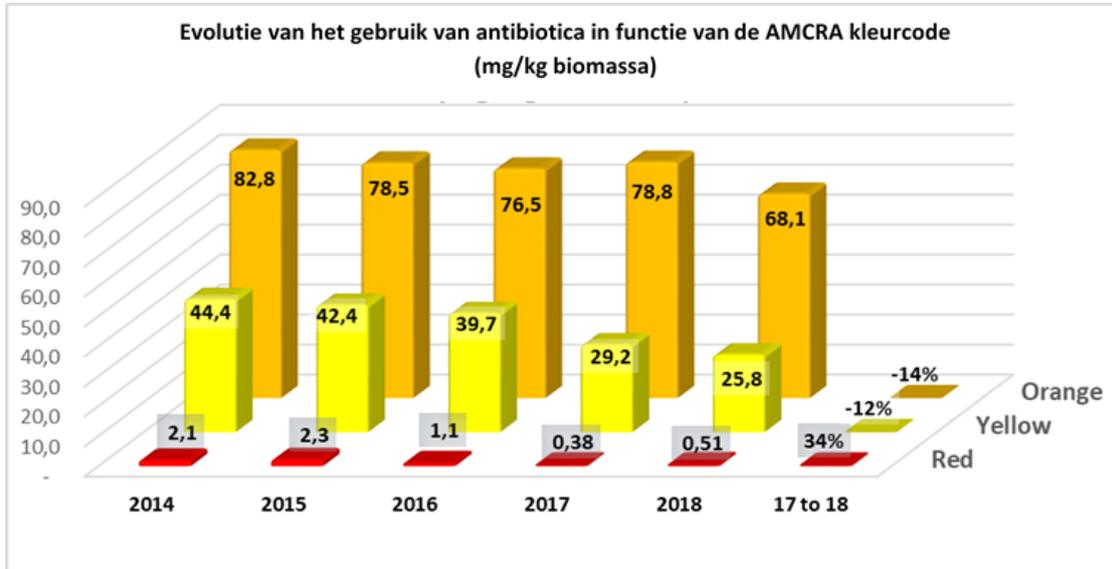


Figure 4 The share products used in animals in Belgium with a yellow, orange or red colour code between 2014 and 2018, and the evolution in percentage between 2017 and 2018.

Figures for antibiotics use in pigs, chickens and veal calves

For the first time, species-specific antibiotics use information can be shown, thanks to the mandatory reporting in Sanitel-Med of all requirements, administrations and provisions of antibiotics by veterinarians at livestock farms with pigs, poultry (broiler chickens and laying hens) and veal calves in Belgium (R.D. of 02/07/2017 amending the R.D. of 21/07/2016).

Sanitel-Med 2018 versus BelVet-SAC 2018

The information collected in Sanitel-Med covers 78% of the total amount of active substances sold in Belgium in 2018, according to BelVet-SAC data (77% of sales of 'pharmaceuticals'; 92% of sales of feeds made with antibiotic medications). This discrepancy between sales and use figures is to a large extent explained by the fact that registration of dairy and beef cattle, small ruminants, horses, turkeys, rabbits and other (pet) animals in Sanitel-Med is not currently mandatory.

Usage per animal category in Sanitel-Med

Antibiotics use is expressed in the number of days that an animal receives an antibiotic treatment out of 100 days present at the holding. This number is referred to as the **BD₁₀₀** (number of treatment days in **100**) and is calculated per animal category: 'nursing piglet', 'weaned piglet', 'fattening pig', 'sow', 'broiler', 'laying hen' and 'veal calf' (Figure 5). With an average BD₁₀₀ of **28.54**, the use of antibiotics in 2018 was highest in veal calves. This means that 50% of the veal calf holdings administer antibiotics fewer than 28.5 out of 100 days, but also that 50% of the holdings administer treatments on a greater number of days. 'Weaned piglet' is the animal category with the second highest average BD₁₀₀, of **16.57**. The box plot, which shows the spread of antibiotics use across the various holdings, shows greater variation in weaned piglets than in veal calves. Where the 'basic use' in veal calves is higher, the heaviest users have higher rates of use in weaned piglets than in veal calves. Broilers are in third place with an average BD₁₀₀ of **5.35**.

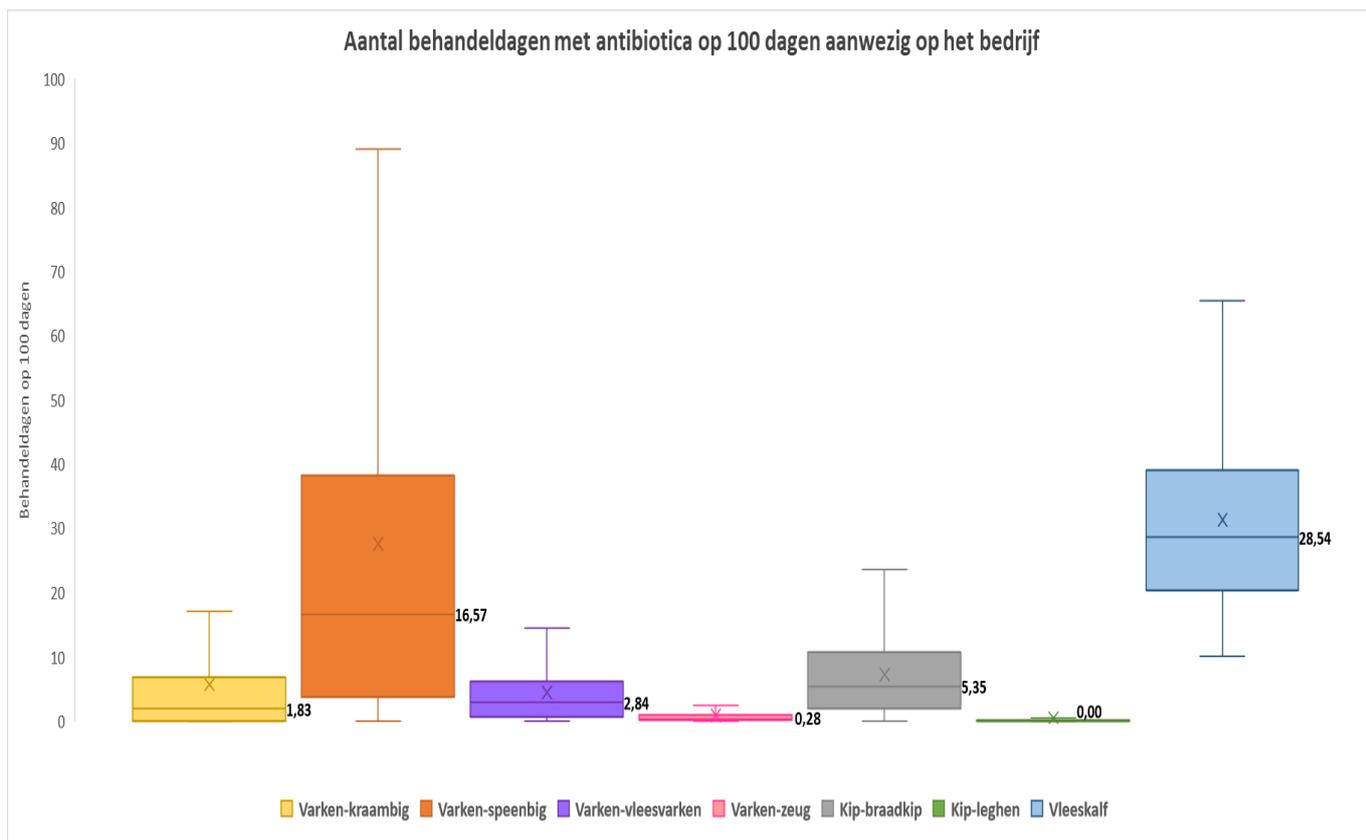


Figure 5 For each category of animals, the spread of the antibiotic use is shown across the holdings for those animal categories. The darker line in the box and the number beside the box are the median: 50% of holdings use less, 50% use more. For laying hens, 70% of holdings use no antibiotics.

Antibiotic resistance in indicator bacteria *Escherichia coli* originating from livestock farms

Evolution of antibiotic resistance in *Escherichia coli* to critically important antibiotics between 2011 and 2018

Background

Antibiotic resistance in bacteria originating from food-producing animals has been monitored **annually** since 2011. This monitoring is organised by the Federal Agency for the Safety of the Food Chain (FASFC). The objective is **to monitor the resistance of *Escherichia coli* (*E. coli*)** in clinically healthy animals to antibiotics from specific classes of antibiotics that are **of importance for animal and human health**. For this reason, *E. coli*, an indicator bacterium, is isolated in fattening pigs, broilers, veal calves and young beef cattle.

Results

Figure 6 shows the prevalence of ‘extended spectrum beta lactamase’ (ESBL) producing *E. coli* strains. These strains are resistant to ‘cefotaxime’, 3rd generation cephalosporin. From the start of the monitoring in 2011 the presence of **ESBL-producing *E. coli*** strains in fattening pigs, veal calves and young beef cattle has been relatively **low** (maximum prevalence 10%). This is analogous to the situation in other European countries where a **higher prevalence of ESBLs** is observed in **poultry** compared to other animal species. This is attributable to various risk factors (e.g. a shorter lifespan for chickens in comparison with pigs, veal calves and beef cattle). However, it is also due to a higher use of antibiotics which target ESBL-producing *E. coli* strains, specifically aminopenicillins. An increase in the prevention of ESBLs has been observed in all animal species in 2017 and/or 2018, despite the sharp decline in the use of cephalosporins in this period. There is no obvious explanation for this at the present time. Fluctuations in the prevention of resistance between successive years have, however, been observed in other European countries.

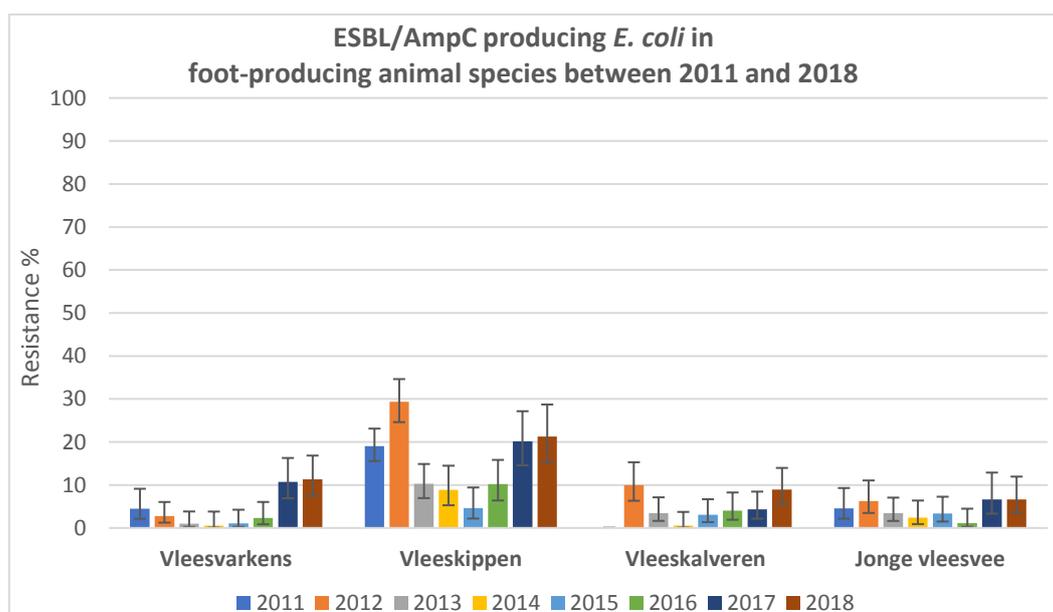


Figure 6 Evolution in resistance to cefotaxime in food-producing animals in Belgium between 2011 and 2018

Figure 7 sets out the resistance of *E. coli* to fluoroquinolones. Resistance totals less than 10% in fattening pigs and young beef cattle. Higher (>20%) and very high (>60%) resistance levels in veal calves

and poultry should receive more attention. Nevertheless, since 2011 or 2012 there has been a significant drop in this resistance to *E. coli* in these animal species.

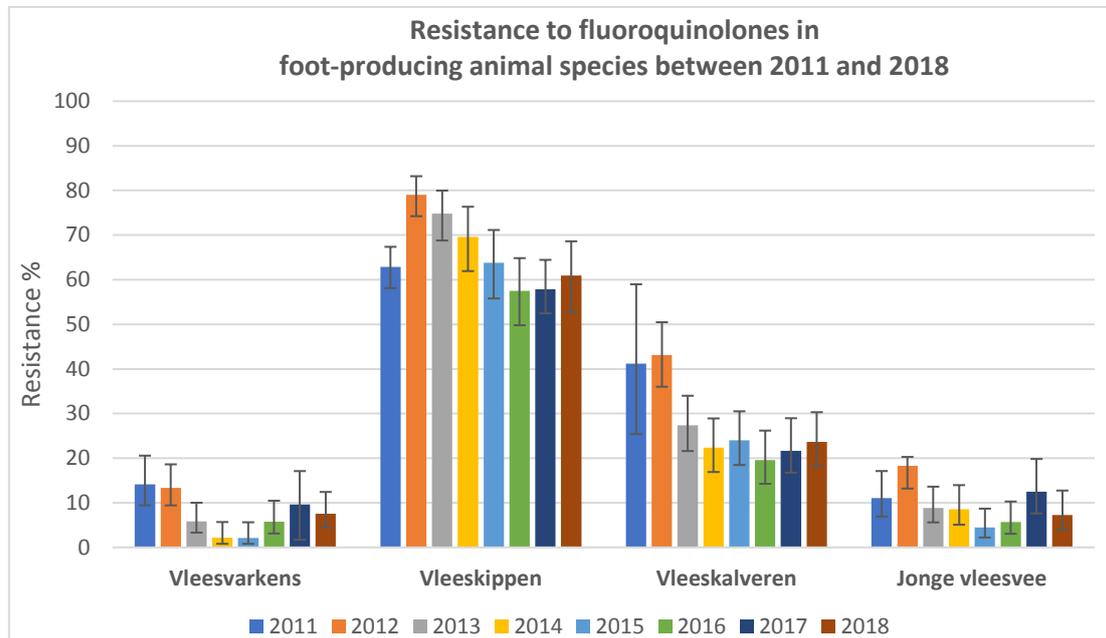


Figure 7 Evolution in the resistance to ciprofloxacin in food-producing animals in Belgium between 2011 and 2018

Since the discovery of horizontally transferable resistance mechanisms, the ‘polymyxins’ class of antibiotics has been upgraded by the World Health Organisation (WHO), resulting in it now being considered as a ‘critically important class of antibiotics with the highest priority for public health’. Colistin is the only antibiotic in this class which is used in food-producing animals. Colistin resistance in *E. coli* for food-producing animals, which was included in the monitoring, is historically low (figure 3). In 2018 there was, just as in earlier years, less than 3% resistance observed.

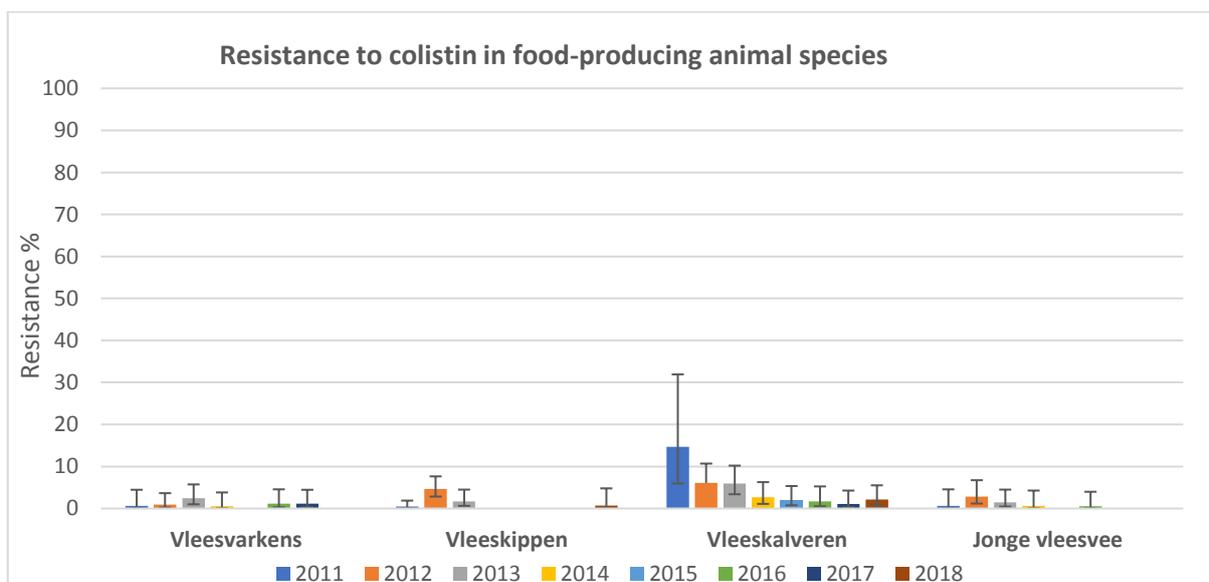


Figure 8 Evolution in the resistance to colistin in food-producing animals in Belgium between 2011 and 2018

Antibiotics use and resistance in veal calves, pigs and broilers in 2018

Background

Since March 2017 veterinarians record all antibiotics that they prescribe, administer or provide to holdings for sectors involving veal calves, pigs, broilers and laying hens. This antibiotics use information is collected by the Federal Agency for Medicines and Health Products (FAMPH) through the 'Sanitel-Med' data collection system. Antibiotics usage data per animal species collected in 2018 was linked for the first time to the resistance data of *E. coli*, as derived from the monitoring of antibiotic resistance in veal calves, fattening pigs and broilers.

Results

Table 1 gives a summary of the classes of antibiotics recorded in Sanitel-Med for veal calves, pigs and chickens. For each class of antibiotics, the corresponding AMCRA colour code is shown. The awarding of colour codes is based on the importance of the class of antibiotics for human and animal health. The colour code indicates what the conditions are for the use¹ of that class of antibiotics in animals. Per class of antibiotics, only one antibiotic is tested for its effectiveness against *E. coli* by means of an antibiotics-sensitivity test (Table 1).

Antibiotic tested for prevalence of resistance	Antibiotics class recorded in Sanitel-Med + AMCRA colour code ²
Chloramphenicol	Amphenicols
Ampicillin	ES Penicillins
Sulfamethoxazole	Trimethoprim-sulphonamides
Trimethoprim	Trimethoprim-sulphonamides
Gentamicin	Aminoglycosides
Azithromycin	Macrolides
Colistin	Polymyxins
Tetracycline	Tetracyclines
Cefotaxime	3 rd and 4 th generation (3G/4G) cephalosporins
Ceftazidime	3 rd and 4 th generation (3G/4G) cephalosporins
Ciprofloxacin	Fluoroquinolones
Nalidixic acid	Fluoroquinolones
Tigecycline	Tigecyclines not used in veterinary medicine
Meropenem	Carbapenems not used in veterinary medicine

Table 1 Antibiotics classes – with AMCRA colour code – recorded in Sanitel-Med for veal calves, pigs and chicken. One antibiotic from each class is included in the sensitivity test for *E. coli*.

Figure 9 combines 2018 antibiotics use and resistance data for pigs, broilers and veal calves, respectively. Classes of antibiotics with an orange AMCRA colour code are the most used and represent more than 80% of use in all animal species.

***E. coli* in fattening pigs, broilers and veal calves show the highest resistance for the most-used antibiotics (tetracyclines and broad spectrum (ES) penicillins (figure 9). However, a high degree of resistance was also observed to antibiotics that are used less often (e.g. trimethoprim-sulphonamides).** Genes that are coded for resistance to various types of antibiotics often occur in the same mobile genetic elements. The use of one antibiotic simultaneously targets multiple resistance mechanisms and thus maintains the combined occurrence of resistance on the genetic element. This

¹ Use of the red colour coded class of antibiotics is subject to restrictions under the Royal Decree of 21 June 2016. AMCRA has published recommendations regarding the use of antibiotics in veterinary medicine (www.e-formularium.be).

is referred to as co-selection of resistance genes. Co-selection may be the reason for the high levels of resistance observed to less-frequently used antibiotics.

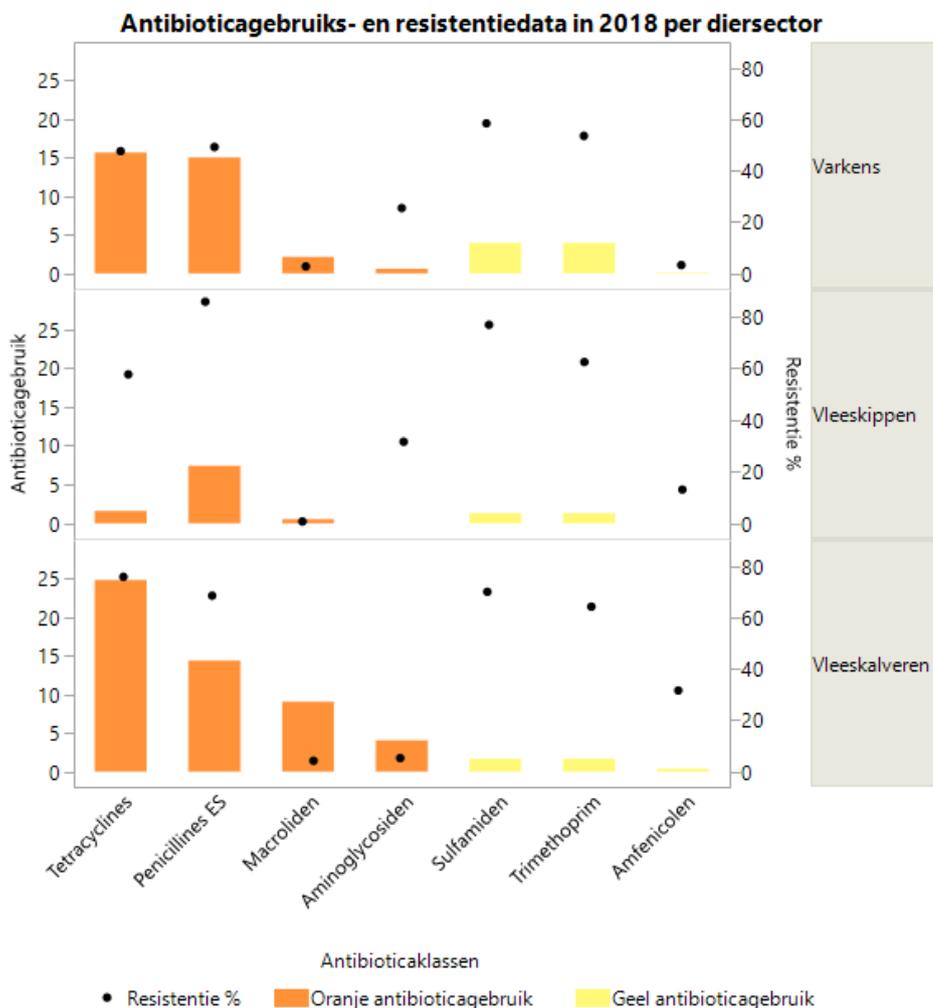


Figure 9 Antibiotics usage and resistance data for pigs, broilers and veal calves in 2018. Antibiotics with a yellow or orange AMCRA colour code. Antibiotics use is expressed per million daily doses used (DDDA_{bel}²) compared to the estimated treated kilograms of animal.

² DDDA_{bel} stands for **Defined Daily Dose**, as defined for Belgium. A DDDA_{bel} value is the recommended daily dose of antibiotic expressed in mg per kg bodyweight.

Certain classes of antibiotics are considered to be 'critically important with the highest priority for public health'. The 'polymyxins', 'fluoroquinolones' and '3rd/4th generation cephalosporins' are classes of antibiotics that are used in animals, and that belong to this important group of antibiotics. Colistin is the only polymyxin that is used in food-producing animals. In 2018 resistance to these for *E. coli* from fattening pigs, broilers and veal calves was very low. It is worth noting that there was also low use of colistin (< 4 DDDA_{bel}²) in these animal species in 2018 (figure 10). **Colistin resistance is, however, also low in countries where its use is higher than in Belgium, despite the existence of horizontal transferable resistance mechanisms.**

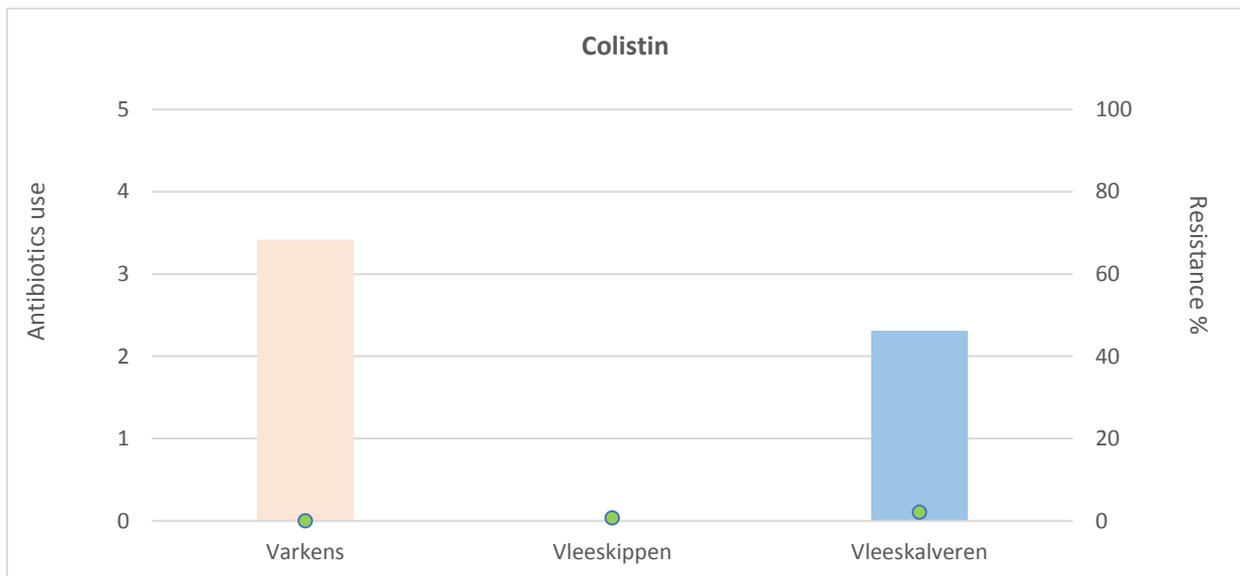


Figure 10 Antibiotics use and resistance data for colistin in pigs, broilers and veal calves in 2018. Colistin has an orange AMCRA colour code. The use of antibiotics is expressed per million daily doses used (DDDA_{bel}²) in comparison to the estimated number of treated kilograms of animal.

Figure 11 shows antibiotics use and resistance for 2018 with respect to fluoroquinolones and 3rd/4th generation cephalosporins (critically important antibiotics with a red AMCRA colour code) for pigs, chickens and veal calves. Use in food-producing animals has decreased drastically since 2016 due to the adoption of the royal decree stipulating conditions for use. The use in pigs is marginal (< 0.01 DDDA_{bel}²) and there is only a low prevalence of resistance found for *E. coli* in pigs. Fluoroquinolones are more often used in chickens and veal calves (0.4 DDDA_{bel}² and 0.13 DDDA_{bel}²) respectively, which is the likely explanation for the higher levels of resistance of *E. coli* in these animal species.

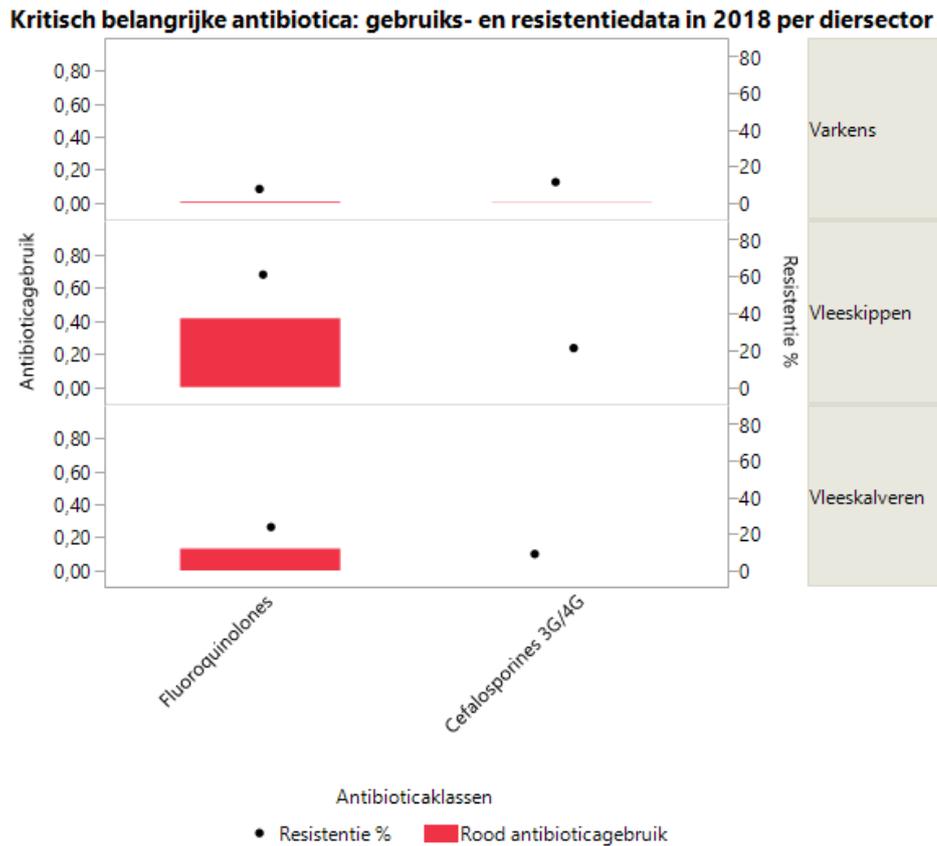


Figure 11 Antibiotic use and resistance data for fluoroquinolones and 3rd/4th generation cephalosporins in pigs in 2018. These antibiotics have a red colour code. The use of antibiotics is expressed per million daily doses used (DDDA_{be}²) in comparison to the estimated number of treated kilograms of animal.

Finally, in 2018, no resistance was found to *E. coli* in fattening pigs, broilers, or veal calves for specific antibiotics that are for human use only (carbapenems and tigecyclines).

Conclusions

Antibiotic resistance to critically important antibiotics of *E. coli* in food-producing animals has remained relatively stable since 2011. A **continued low use** of these critically important antibiotics is crucial to achieving a continued low degree of, or further decrease in the resistance to these antibiotics. Antibiotics use is, after all, the most important cause of the selection and spread of antibiotic resistance in bacteria. Co-selection plays an important role in the maintenance of resistance against various classes of antibiotics. Therefore, further **efforts must be made toward reducing the use of all classes of antibiotics**. Resistance is the result of use of antibiotics.

Due to the recent availability of antibiotics use data in various food-producing animal species, it was possible to combine it with *E. coli* resistance data for these species for the first time. **Continued monitoring of antibiotics use and resistance over time will assist us to understand the impact that reduced use of antibiotics will have on the occurrence of levels of resistance.**

Final conclusion

The encouraging results regarding antibiotics use in animals illustrate the effectiveness of the policies pursued and are the outcome of the good cooperation between AMCRA, the Government and all the organisations that signed the 30 June 2016 Convenant. In 2018 there was a decrease of at least 12.8%

in the total use of antibiotics compared to 2017. This is **the sharpest decrease since the monitoring of antibiotics use in animals in the reference year, 2011**. Moreover, in 2018 the use of **medicated feed containing antibiotics also fell again**, after the spectacular fall in use in 2017. With two of the three reduction objectives already achieved and a significant decrease in total use in 2018, **a tone has been set for making the necessary effort to achieve the remaining 14.6% in the next two years**.

Further reduction in the use of colistin as well as zinc oxide over past years also show that the sector is taking preventive measures and implementing alternative treatment methods for the use of antibiotics to manage sanitary problems on the farm.

Thanks to **animal-specific data collection, usage per sector** is coming to light and individual companies with (too) high usage can also be identified. Especially with respect to veal calves and weaned piglets, in addition to high use there is also a great variation in use seen between companies. Livestock farmers are being informed about their use via the **periodic farm reports**. Where this use is higher than the average use for their animal sector and category, they are encouraged to develop measures for a sustainable reduction of use at their farm. For this, veterinarians and livestock farmers can use **farm health plans** and the **plan of action**.

All animal sectors must continue to make an effort to achieve a reduction in resistance in the coming years. This is in the interest of the wellbeing and the health of animals and people.