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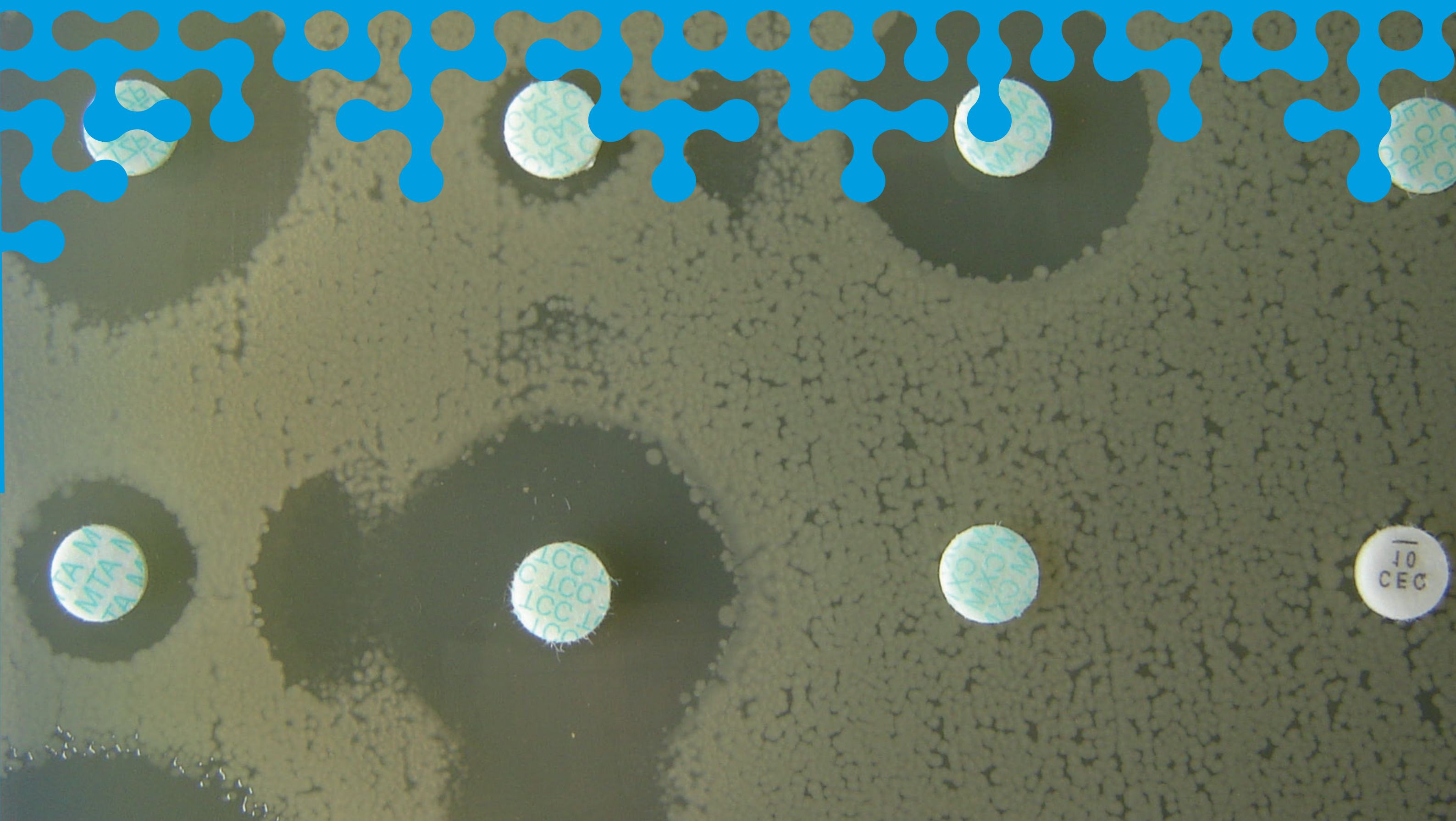
Resapath

French surveillance network for antimicrobial resistance in bacteria from diseased animals

2018 Annual report

March 2020 - Scientifc Publication



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Contents

INTRODUCTION

Monitoring of Antimicrobial Resistance in bacteria from diseased animals in France in 2018: Summary Report of the RESAPATH network (resapath.anses.fr)

The French surveillance network for antimicrobial resistance (AMR) in bacteria from diseased animals (RESAPATH) was set up in 1982 under the name of RESABO (BO for bovines). In 2000, it was expanded to pigs and poultry and in 2007, to other animal species such as small ruminants, companion animals or horses. The RESAPATH is a long-term cooperative effort from 71 veterinary diagnostic laboratories throughout France coordinated by the Lyon and Ploufragan-Plouzané-Niort Laboratories at the French Agency for Food, Environmental and Occupational Health Safety (ANSES). As mentioned below, the information presented here is based on data from this on-going surveillance system estimating the proportions of susceptibilities to relevant antibiotics of bacteria recovered from diseased animals treated by veterinarians as part of their regular clinical services. The RESAPATH is a key component of the strategic National Action Plans (NAPs) (EcoAntibio 1, 2012-2016; EcoAntibio 2: 2017-2021) adopted by the French Ministry of Agriculture, Food and Forest to combat AMR in animals. The RESAPATH is also part of the recent cross-sectorial "One Health" NAP against AMR in humans, animals and the environment adopted by the French Prime Minister on November 17, 2016. Finally, since AMR monitoring in diseased animals is part of the EU strategy to combat AMR globally, the long-term (> 35 years) expertise of ANSES in running the RESAPATH is at the origin of a proposal to ascertain the opportunity for the most appropriate system to report AMR data from diseased animals at EU level in a coordinated way. It has been recently initiated through the Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI, 2017-2020) where ANSES co-leads Task 7.4.2 on this issue.
The epidemiology of AMR is increasingly complex and we strongly believe that providing annual data of AMR trends in animal pathogens contributes to a comprehensive overview of AMR in veterinary medicine and is a key indicator to assess NAP efficacy in the non-human sector. We especially thank all laboratories and staff who are contributing to these surveillance efforts and to a better control of this major issue in animals.

Dr Jean-Yves MADEC, DVM, PhD
ANSES Lyon
On behalf of the RESAPATH

EDITORS

Clémence Bourély. ANSES Lyon
Géraldine Cazeau. ANSES Lyon
Marisa Haenni. ANSES Lyon
Nathalie Jarrige. ANSES Lyon
Eric Jouy. ANSES Ploufragan-Plouzané-Niort
Agnese Lupo. ANSES Lyon
Jean-Yves Madec. ANSES Lyon
Rodolphe Mader. ANSES Lyon

The following persons contributed to the data collection and analysis and to the molecular work:

Odile Balan. ANSES Ploufragan-Plouzané-Niort
Pierre Châtre. ANSES Lyon
Claire Chauvin. ANSES Ploufragan-Plouzané-Niort
Antoine Drapeau. ANSES Lyon
Isabelle Kempf. ANSES Ploufragan-Plouzané-Niort
Laëtitia Le Devendec. ANSES Ploufragan-Plouzané-Niort
Véronique Métayer. ANSES Lyon
Christelle Philippon. ANSES Lyon
Estelle Saras. ANSES Lyon
Charlotte Valat. ANSES Lyon
Jean-Luc Vinard. ANSES Lyon

ORGANISATION AND KEY FIGURES

The objectives of the RESAPATH are the following:
- To monitor AMR in bacteria isolated from diseased animals in France,
- To collect resistant isolates of particular interest and to characterize their genetic background (including the mechanisms of resistance),
- To provide scientific and technical support on antimicrobial susceptibility testing methods and result interpretation to member laboratories.

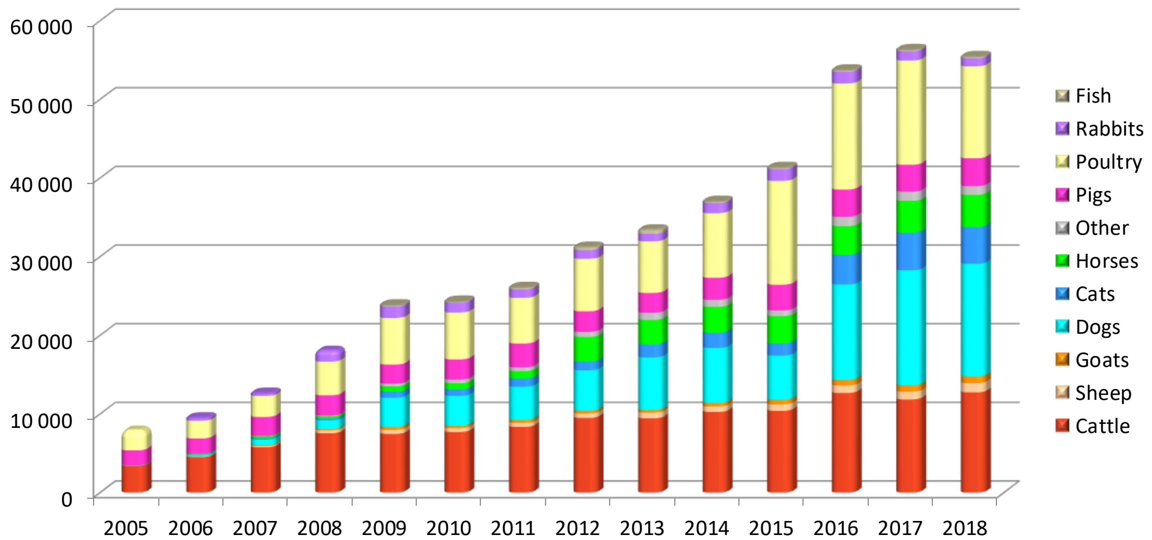
Bacteria recovered from diseased animals and sampled by veterinarians for diagnostic purposes as part of their routine activity are tested for antimicrobial susceptibility by private or public veterinary laboratories throughout France. Antibiograms are performed by disk diffusion according to the guidelines of the veterinary part of the Antibiogram Committee of the French Society of Microbiology (CA-SFM) and of the AFNOR NF U47-107 standard, and inhibition zone diameters are transmitted to ANSES. Isolates are then categorized as susceptible (S), intermediate (I) or resistant (R) according to the recommendations provided by the veterinary section of the CA-SFM. Should no established breakpoints be available, critical values provided by the manufacturer for the corresponding molecules are used.

In addition to data collection, the RESAPATH also allows the collection of isolates demonstrating AMR profiles of specific interest, which are then subjected to in-depth molecular studies. Laboratories participate to annual ring trials (External Quality Assurance System), thus contributing to the quality control of the data gathered by the RESAPATH. In addition, annual training sessions, technical support, on-site training and other actions are also provided to the RESAPATH laboratories.

The RESAPATH is the unique veterinary member of the French National Observatory for Epidemiology of Bacterial Resistance to Antimicrobials (ONERBA), which encompasses 16 other surveillance networks throughout France, all in private or public medical practices (community or health-care centers). The RESAPATH is a passive or 'event-based' surveillance network. Member laboratories join the RESAPATH on a voluntary basis and data collected depend on the initial decision of veterinary practitioners. Hence, those data cannot be considered as perfectly representative of the global AMR burden of pathogenic bacteria but stand as a reliable indicator of AMR rates in field conditions. The major impact of the RESAPATH relies on its ability to detect the most resistant and emerging bacteria circulating in animals in France, to measure AMR trends in diseased animals in France (and thus assess NAP efficacy) and to highlight differences or commonalities of resistant bacterial isolates in the animal and human sectors through in-depth molecular and cross-sectorial studies carried out by ANSES in cooperation with National Reference Centers in human medicine.

In 2018, 71 laboratories were members of the RESAPATH and a total of 55,401 antibiograms were transmitted to ANSES, all animal species combined. The evolution of the distribution of antibiograms per animal sector is presented in *Figure 1*.

Figure 1. *Annual number of antibiograms collected per animal sector*



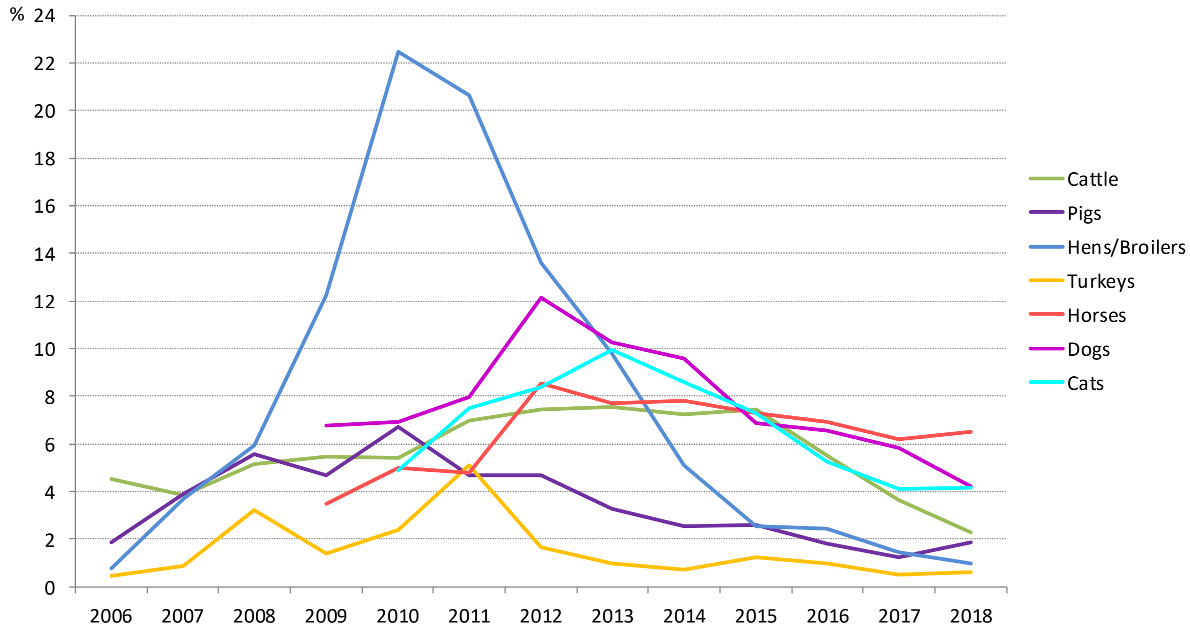
RESISTANCE DATA

This chapter summarizes the key results on AMR trends to the different antimicrobial classes, especially to extended-spectrum cephalosporins (ESCs) and fluoroquinolones (FQs) that are considered of critical importance both in human and veterinary medicines. Other important topics such as resistance trends to other antibiotics or on specific relevant phenotypes are also included. More detailed information on resistance levels per bacterial and animal species are available in annexes at the end of this report.

Resistance to extended-spectrum cephalosporins

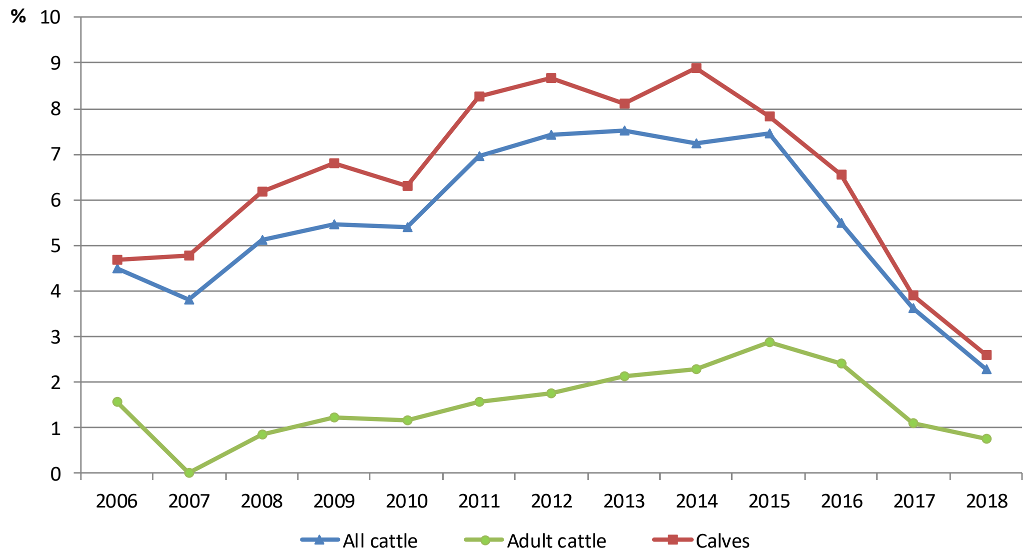
Isolates are routinely tested for their susceptibility to ceftiofur and cefquinome in food animals and horses, and to ceftiofur and cefovecin in companion animals. Resistance has been mainly observed in *Escherichia coli* and to a lesser extent in *Klebsiella pneumoniae* and *Enterobacter* spp. In 2018, the highest rate of resistance to ceftiofur in clinical *E. coli* isolates of animal origin in France was found in horses (6.5%), followed by cats and dogs (4.0%) (Figure 2). Ceftiofur resistance in *E. coli* isolated from other animal species (poultry, pigs, adult cattle, turkeys, small ruminants) was below 3%. It seems that a plateau was reached in several animal species, a tendency that will have to be monitored in the coming years.

Figure 2. Evolution of proportions of *E. coli* isolates non-susceptible (R+I) to ceftiofur in cattle, pigs, poultry, turkeys, horses, cats and dogs (2006-2018)



The analysis of the tendencies should be completed, whenever possible, by data on the pathology or the age group for each animal species. As an example, ESC-R in bovines shows a clear difference in the level of resistance found in adults compared to calves, even though the tendency is identical (Figure 3).

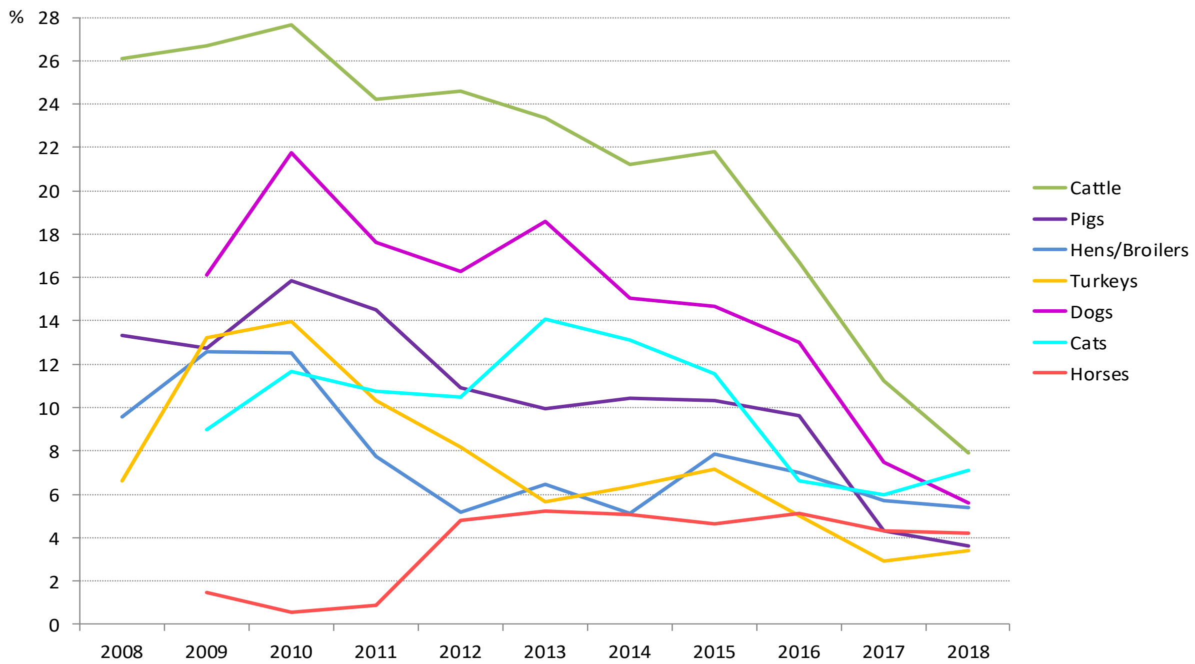
Figure 3. *Evolution of proportions of* E. coli *isolates non-susceptible (R+I) to ceftiofur in cattle, adults and calves (2006-2018)*



Resistance to fluoroquinolones

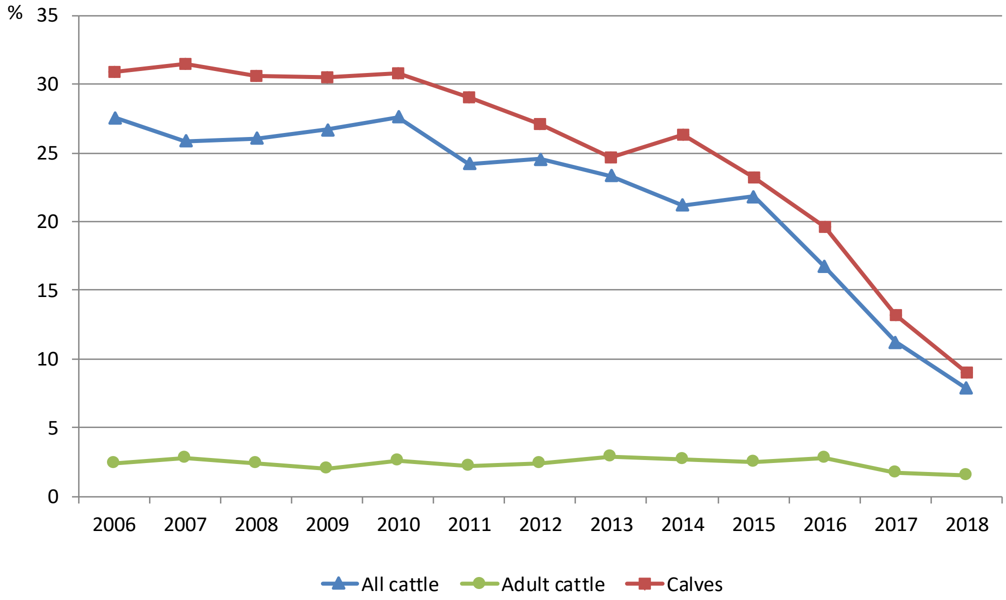
Isolates are routinely tested for their susceptibility to enrofloxacin, marbofloxacin or danofloxacin. Other fluoroquinolones (FQs), such as pradofloxacin in companion animals, are also tested depending on the animal species. In *Figure 4*, resistance to either enrofloxacin or marbofloxacin in *E. coli* isolated from diseased animals was used as an indicator of resistance to FQs.

Figure 4. *Evolution of proportions of* E. coli *isolates non-susceptible (R+I) to enrofloxacin or marbofloxacin in cattle, pigs, poultry, turkeys, horses and dogs (2006-2018)*



In 2018, FQ resistance rates in *E. coli* isolates from diseased animals ranged from 4% to 8% in all animal species (*Figure 4* and *Figure 5*). In particular, FQ resistance displayed a marked decrease over the last 4 years for dogs (*Figure 4*). The large difference between resistance proportions to ESC or FQ that was observed in the past substantially narrowed in 2018.

***Figure 5**. Evolution of proportions of* E. coli *isolates non-susceptible (R+I) to enrofloxacin or marbofloxacin in cattle, adult cattle and calves(2006-2018)*



Resistance to other antibiotics

Trends were investigated for *E. coli*. Antimicrobials that were considered here included those most frequently tested by the RESAPATH laboratories according to relevant classes in veterinary practice (excluding ESCs and FQs that have been studied separately). Seven antibiotics (five classes) were chosen, namely gentamicin, spectinomycin or streptomycin, trimethoprim-sulfonamides in combination, tetracycline, amoxicillin, amoxicillin and clavulanic acid in combination, and a quinolone (nalidixic or oxolinic acid). Trends were analyzed over the 2006-2018 period in cattle, pigs, hens/broilers and turkeys.

For a majority of the antibiotics considered, and in almost all animal species, the overall downward trend identified in recent years continued in 2018 or remained at the same level as 2017.

In cattle, the proportions of resistance observed in 2018 have stabilized compared to 2017 for almost all antibiotics considered, except for the combination amoxicillin-clavulanic acid which slightly increased and the combination trimethoprim-sulfonamides, where the proportions of resistance slowly increased since 2016 to reach the level observed in 2015 (*Figure 6*).
In pigs, resistance to the combination amoxicillin-clavulanic acid slightly increased since 2015 and resistance to gentamicin increased in 2018. Spectinomycin (or streptomycin) decreased again in 2018 after increasing in 2017 and reached its lowest level since 2006. Resistances to other antibiotics slightly decreased (amoxicillin and trimethoprim-sulfonamides) or stabilized (tetracycline and quinolones) (*Figure 7*).
Like in 2017, resistance rates in poultry decreased in 2018 for all antimicrobials except for the combination amoxicillin-clavulanic acid which slightly increased (*Figure 8*). Considering the trend since 2006, the decrease was significant for all antimicrobials studied except for quinolones (stable trend) and gentamicin (in clear decrease since 2015 only).
In turkeys (*Figure 9*), resistances to amoxicillin and trimethoprim-sulfonamides slightly decreased and resistance to spectinomycin (or streptomycin) significantly decreased to reach its lowest level since 2006. Resistance to gentamicin remained at the same level as 2017. Resistance levels for the others antibiotics (quinolone, tetracycline and the combination amoxicillin-clavulanic acid) slightly increased in 2018 compared to 2017.

Figure 6. *Evolution of proportions (%) of* E. coli *isolates non-susceptible (R+I) to seven antimicrobials in cattle (2006-2018)*

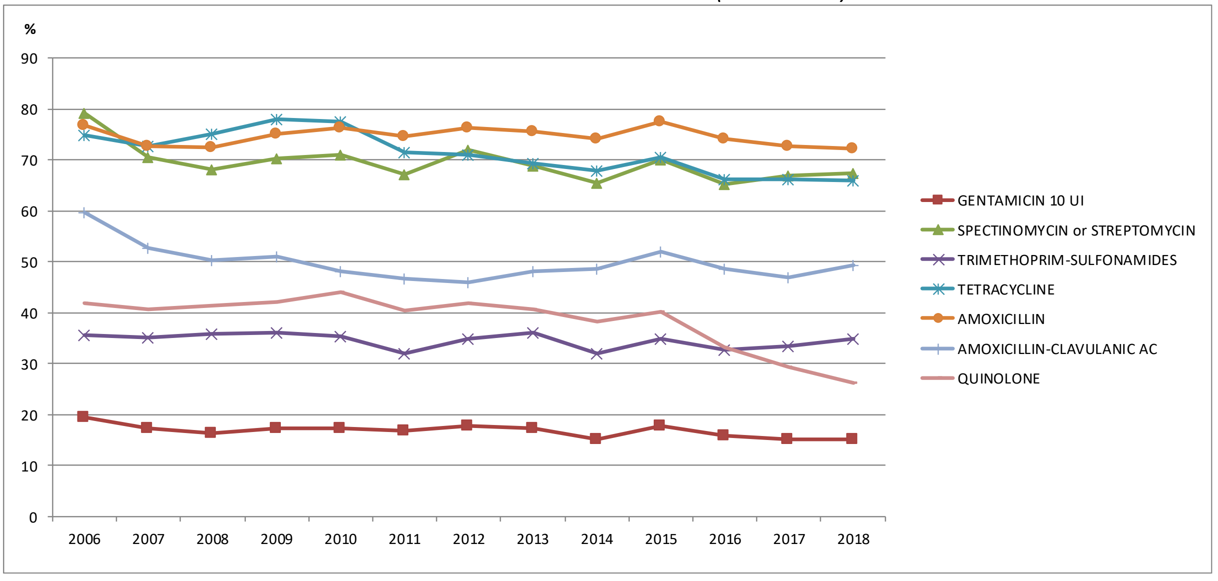


Figure 7. *Evolution of proportions (%) of* E. coli *isolates non-susceptible (R+I) to seven antimicrobial in pigs (2006-2018)*

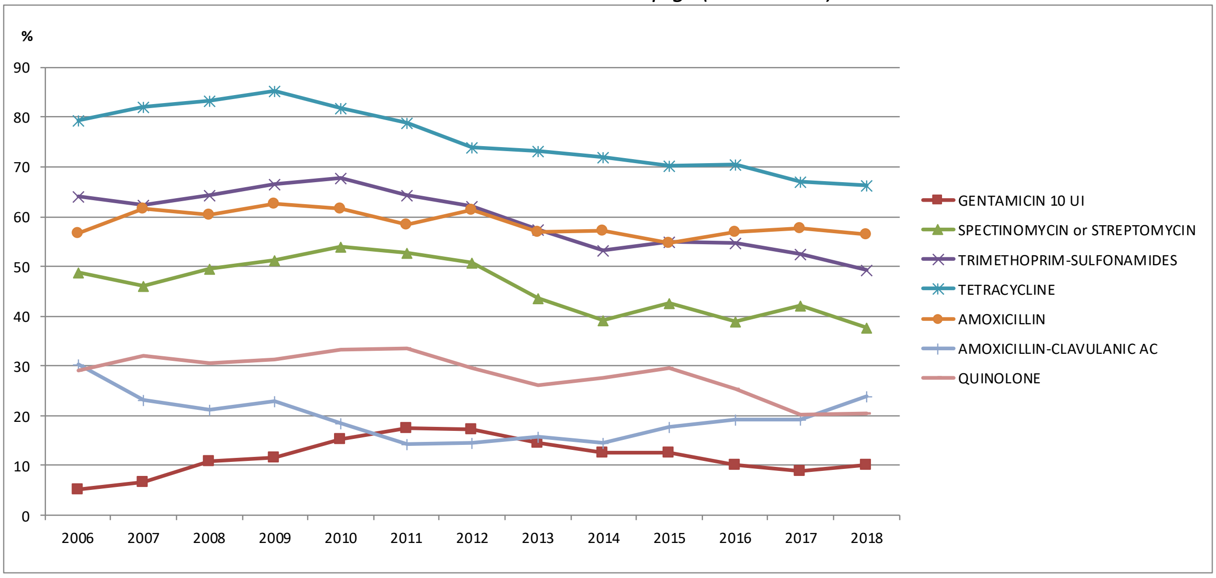


Figure 8. *Evolution of proportions (%) of* E. coli *isolates non-susceptible (R+I) to seven antimicrobials in hens and broilers (2006-2018)*

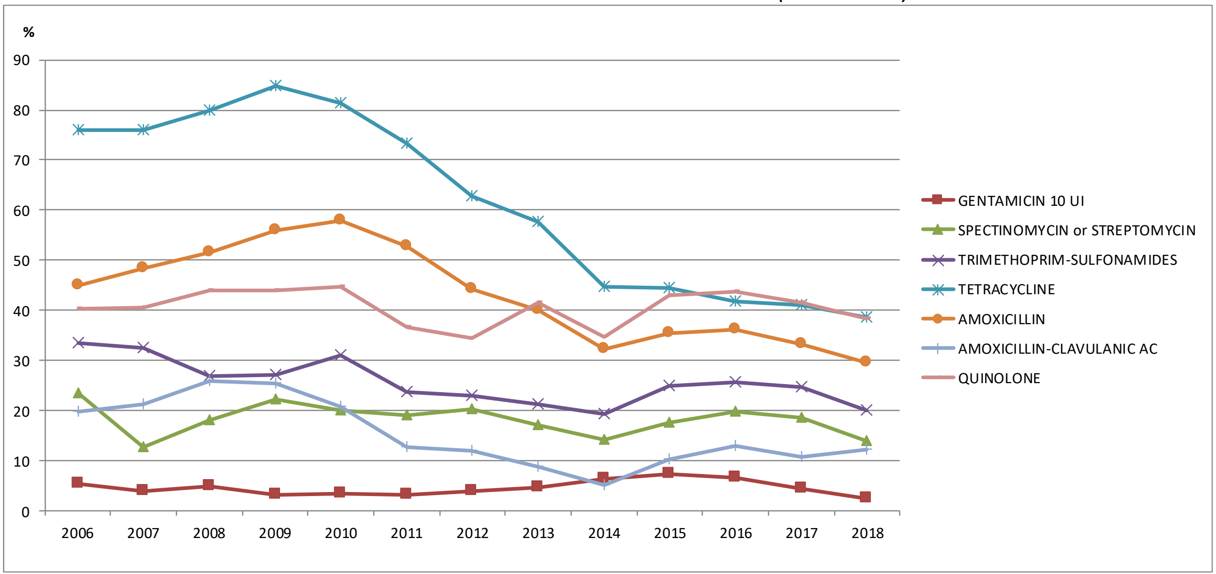
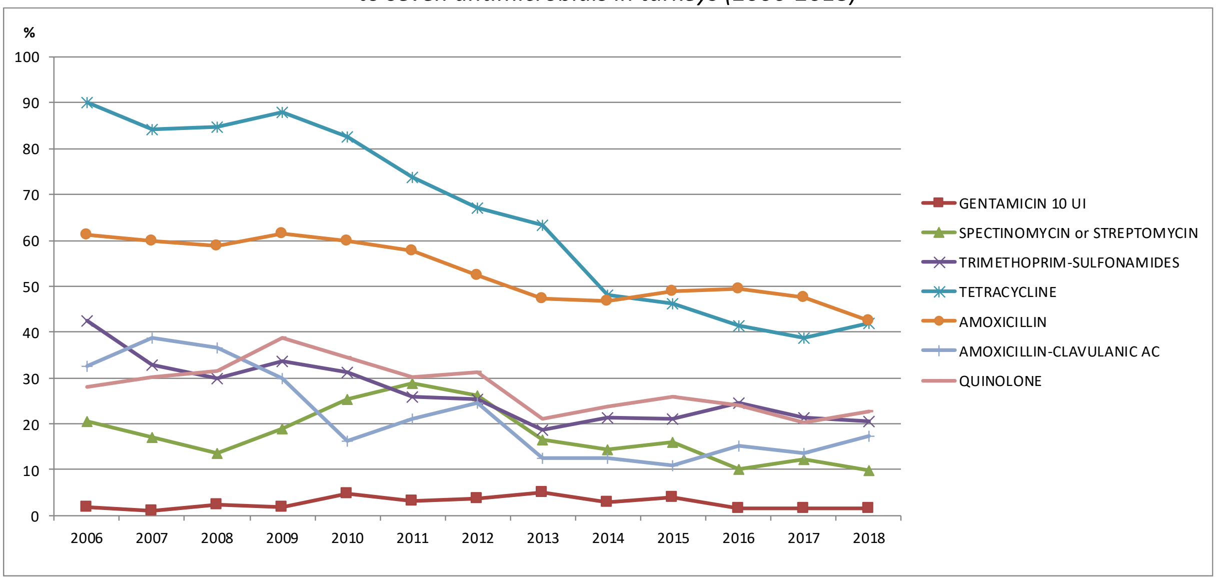


Figure 9. *Evolution of proportions (%) of* E. coli *isolates non-susceptible (R+I) to seven antimicrobials in turkeys (2006-2018)*



Multidrug resistance

Multidrug resistance (MDR) was investigated in *E. coli*, the most frequent bacterial species isolated in the RESAPATH. MDR is defined as resistance to at least three different classes of antimicrobials out of the five tested. The selective criteria used to select antimicrobials analyzed here were: *i)* relevance in veterinary and human medicine; *ii)* a single antimicrobial per class (as resistance mechanisms within a class, with the exception of aminoglycosides, often overlap); *iii)* antimicrobials frequently tested by the Resapath laboratories to guarantee a good representativeness of the data. Five antimicrobials were selected, namely ceftiofur, gentamicin, tetracycline, trimethoprim-sulfonamide in combination, and either enrofloxacin or marbofloxacin.

Food-producing animals (cattle, pigs, poultry)

The proportion of isolates without resistance to the five antimicrobials is still very variable among the different production species. The lowest proportion is found in pigs (22.3%) while it reaches more than one strain in two in poultry (53.7% in hens/chickens and 52.6% in turkeys) *(Table 1).* Between 2011 and 2018, the proportion of isolates susceptible to the five antimicrobials increased slightly but significantly in cattle and doubled for pigs and poultry sectors (Chi² trend, p <0, 0001 for the four species) *(Figure 10).*

The highest proportion of MDR isolates is found in cattle (15.2%), with a significant disparity according to pathologies and age groups. The proportion of MDR accounts for 2.6% in *E. coli* isolated from mastitis, and for 17.1% in digestive diseases which mainly concern young animals. The proportion of MDR is 9.7% for pigs, while being much lower in poultry (3.3% in hens/chickens, 2.9% in turkeys). Over the 2011-2018 period, the proportion of MDR isolates decreased significantly in all production animal species (trend Chi², p <0.0001) *(Figure 11).*

Horses

For horses, the proportion of isolates susceptible to all the antimicrobials remains high (61.1%). However, contrary to all other species, this proportion significantly decreased over the 2012-2018 period (Chi² trend, p=0.003) *(Table 1, Figure 10).* For horses, the proportion of isolates presenting only one or two resistances is less frequent than for food-producing animals. In contrast, the proportion of isolates bearing four (4.7%) or five (1.4%) resistances is higher than for food-producing animals. It should be noted that the proportion of MDR isolates in equines has been increasing since 2015, reaching 10.4% in 2018, but this trend is not statistically significant *(Figure 11).*

Dogs

In 2018, the proportion of susceptible isolates in dogs is 70.7% and follows a significantly increasing trend over the 2013-2018 period. The proportion of MDR isolates is significantly decreasing over the same period and represents 4.8% of the strains in 2018, half as much as in 2013 (Chi2, p <0.0001) *(Table 1 Figures 10 and 11).*

Table 1. *Proportions (in %) of resistant* E. coli *isolates (R + I) according to the number of resistances in 2018*

Number of resistance(s) (R+I)	Proportion of isolates (%)					
	Cattle (n=6,144)	Pigs (n=1,393)	Hens/Broilers (n=4,640)	Turkeys (n=984)	Horses (n=553)	Dogs (n=2 528)
0	27.2	22.3	53.7	52.6	61.1	70.7
1	36.4	35.5	29.6	28.9	19.5	18.5
2	21.2	32.5	13.4	15.5	8.9	6.1
3	11.7	8.7	3.1	2.8	4.3	2.9
4	3.2	0.9	0.1	0.1	4.7	1.5
5	0.3	0.1	0.0	0.0	1.4	0.4
MDR	15.2	9.7	3.3	2.9	10.4	4.8

To conclude, the results obtained are positive as they show a decrease of MDR over the 2011-2018 period for all animal species. However, the situation remains complex concerning resistance associations such as the joint resistances to critically important antimicrobials. For example, ceftiofur-resistant isolates often have higher proportions of co-resistances than those observed for ceftiofur-susceptible isolates. In cattle, 86% of ceftiofur-resistant isolates were also resistant to tetracyclines and 23% to fluoroquinolones, whereas these proportions are of 67% and 8% if all isolates are taken into account. These differences are found in all species and significant for cattle, horses and dogs (Chi² p<0.001).

Figure 10. *Evolution of proportions (%) of* E. coli *isolates* ***susceptible*** *to all five antimicrobials considered in the different animal species*

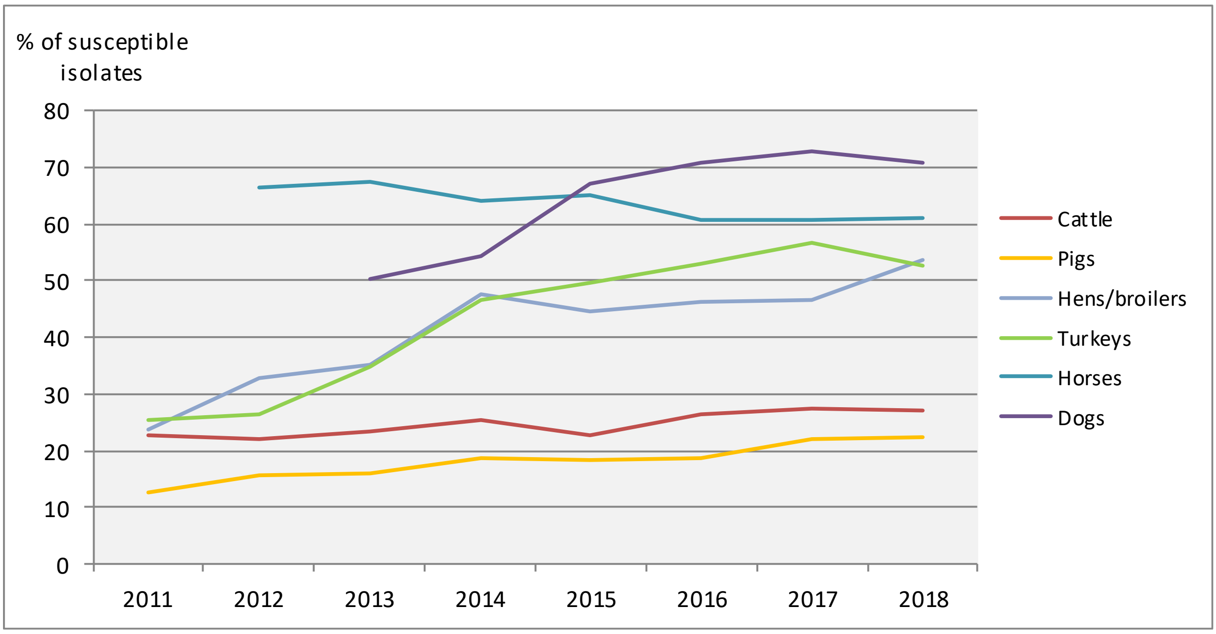
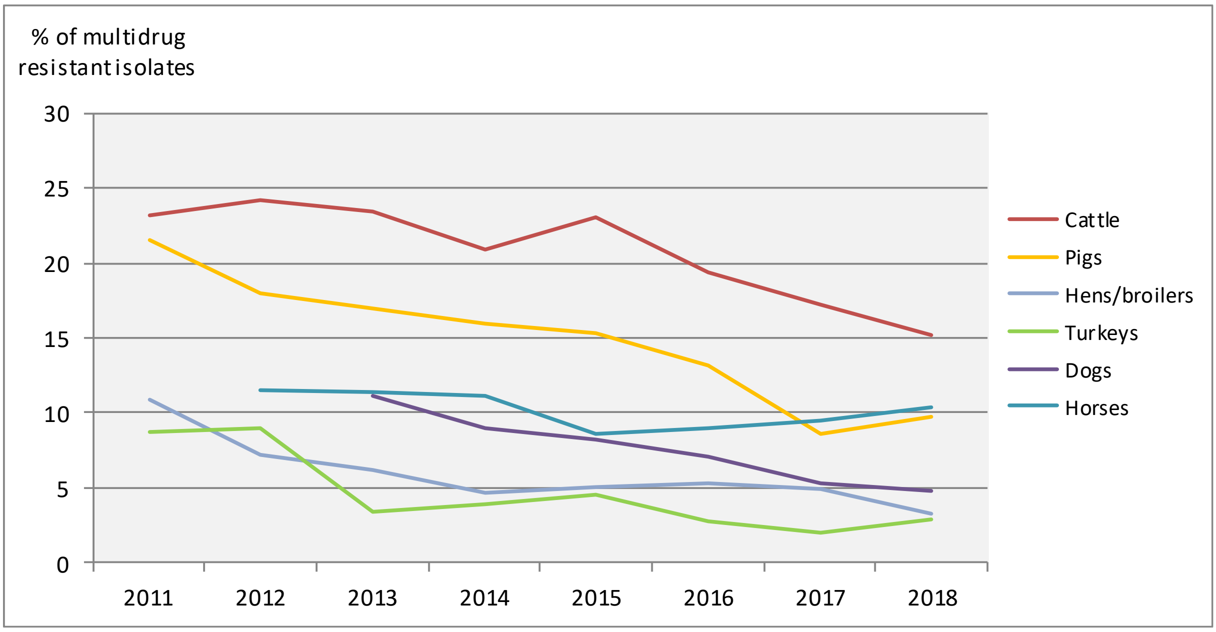


Figure 11. *Evolution of proportions (%) of* ***multidrug resistant*** E. coli *isolates (resistant to at least three out of the five antimicrobials considered) in the different animal species*



Colistin resistance in veterinary medicine

Since the renewed interest for colistin in human medicine in case of therapeutic failures, notably to treat carbapenem-resistant Enterobacterales, its use in veterinary medicine has been questioned by different institutions (European Medicine Agency[1,2], ANSES[3], European Commission[4]). However, colistin use in veterinary medicine has only been seriously challenged since the description of the first plasmid-borne colistin-resistance gene *mcr-1* in China, 2015. Today, the *mcr* family has expanded and is now counting nine members, some of which encompassing several variants. In France, only *mcr-3* was identified beside *mcr-1*. This *mcr-3* gene was detected in the bovine sector associated to an epidemic burst and was always co-expressed with the particular CTX-M-55 enzyme. Of note, non-transmissible molecular mechanisms have also been described, such as *mgrB* mutations in *Klebsiella pneumoniae*, and the first veterinary isolate presenting an *mgrB* mutation originated from a French bovine mastitis.[5]

In France, the *mcr-1* gene of animal origin has been described first in *Salmonella*[6], and then in *E. coli* from bovines (21% of ESBL-producing *E. coli* co-carried the *mcr-1* gene) or swines, where 70 *mcr-1* positive *E. coli* were detected among 79 colistin-resistant isolates collected between 2009 and 2013.[7] *E. coli* with *mcr-1* gene were also reported from animals at slaughter (turkeys, broilers and pigs) in 2 to 6% of fecal samples plated on agar without colistin supplementation.[8] Interestingly, while colistin use was decreasing, the proportion of ESBL-producing *E. coli* co-harboring the *mcr-1* gene was increasing, suggesting complex factors for the selection of colistin resistance.[9] In 2017, the Ministry of the Agriculture launched the EcoAntibio 2 plan which includes a specific point (action 12, axis 2) entirely dedicated to colistin, with the objective of reducing its use by half over five years in poultry, swine and cattle.

To determine the MIC to colistin, microdilution assay is the only recommended method.[10] This method is not well-adapted to the routine work of French veterinary laboratories still using disc diffusion, a method which is not entirely reliable for detecting colistin resistance in a clinical perspective. Nevertheless, since biases were *a priori* constant, the evolution of the resistance over the years is considered reliable from an epidemiological perspective. Moreover, according to experimental data accumulated by the veterinary laboratories as well as the ANSES laboratories, interpretation rules for diameters zones around the colistin disc (50 µg) were defined. Indeed for *E. coli*, diameters of <15 mm or ≥18 mm correspond to MICs of >2 mg/L (resistant) or <2 mg/L (susceptible), respectively. Intermediate diameters (15, 16 and 17 mm) are non-informative and require the determination of the MIC. However, the probability for the MIC to be >2 mg/L (resistant) is decreasing in parallel with the increase in diameters.

1 European Medicines Agency (2013). Use of colistin products in animals within the European Union: Development of resistance and possible impact on human and animal health. EMA/755938/2012, 19 July 2013.
URL : http://www.ema.europa.eu/docs/en_GB/document_library/Report/2013/07/WC500146813.pdf

2 European Medicines Agency (2014). Answers to the requests for scientific advice on the impact on public health and animal health of the use of antibiotics in animals. EMA/381884/2014, 18 December 2014.

3 Avis de l'Anses relatif à l'évaluation des risques d'émergence d'antibiorésistance liés aux modes d'utilisation des antibiotiques dans le domaine de la santé animale (2014). URL : https://www.anses.fr/fr/system/files/SANT2011sa0071Ra.pdf.

4 Décision adoptée le 16 mars 2015, suite à un référé pris au titre de l'article 35 de la directive 2001/82/CE relative aux médicaments vétérinaires et concernant toutes les AMM de formes orales de colistine (EMA/EC/2015)

5 Kieffer N., Poirel L., Nordmann P., Madec J.-Y., Haenni M. (2015). Emergence of colistin resistance in *Klebsiella* pneumoniae from veterinary medicine. *Journal of Antimicrobial Chemotherapy*, 70 (4): 1265-1267. http://www.ncbi.nlm.nih.gov/pubmed/25428921

6 Webb H.E., Granier S.A., Marault M., Millemann Y., Den Bakker H.C., Nightingale K.K., Bugarel M., Ison S.A., Scott H.M. and Loneragan G.H. (2016). Dissemination of the *mcr-1* colistin resistance gene. *Lancet Infectious Diseases,* 16**,** 144-145. doi: 10.1016/S1473-3099(15)00538-1.

7 Delannoy S., Le Devendec L., Jouy E., Fach P., Drider D., Kempf I. (2017). Characterization of colistin-resistant *Escherichia coli* isolated from diseased pigs in France. Frontiers in Microbiology, 8, 2278. doi: 10.3389/fmicb.2017.02278.

8 Perrin-Guyomard A., Bruneau M., Houee P., Deleurme K., Legrandois P., Poirier C., Soumet C., and Sanders P. (2016). Prevalence of mcr-1 in commensal *Escherichia coli* from French livestock, 2007 to 2014. *Euro surveillance,* 21. doi: 10.2807/1560-7917.ES.2016.21.6.30135.

9 Haenni M., Metayer V., Gay E., and Madec J.-Y. (2016). Increasing trends in *mcr-1* prevalence among extended-spectrum-beta-lactamase-producing *Escherichia coli* isolates from French calves despite decreasing exposure to colistin. *Antimicrobial Agents Chemotherapy* 60**,** 6433-6434. doi: 10.1128/AAC.01147-16.

10 CLSI-EUCAST (2016). Polymyxin Breakpoints Working Group. Recommendations for MIC determination of colistin (polymyxin E). URL: http://www.eucast.org/fileadmin/src/media/PDFs/EUCAST_files/General_documents/Recommendations_for_MIC_determination_of_colistin_March_2016.pdf

During 2018, some diagnostic laboratories involved in RESAPATH performed, in parallel to the disk diffusion method, an alternative test called "Colispot".[11] This liquid diffusion method developed in ANSES laboratories is in perfect agreement with MICs obtained using the microdilution method for 197 *E. coli*.[12] Data provided by diagnostic laboratories in routine conditions confirm the very good correlation between an inhibition zone diameter ≥18 mm and the susceptibility to colistin. Indeed, among 3,644 *E. coli* susceptible to colistin using disk diffusion, only six (0.2%) were resistant by liquid diffusion. Among 179 not interpretable *E. coli* (inhibition zone diameters of 15, 16 or 17 mm), the liquid diffusion results indicated a susceptibility for 131 strains (73.2%) and a resistance for the 48 others (26.8%). Finally, among 19 *E. coli* with an inhibition zone diameter <15 mm, 14 were also classified resistant using liquid diffusion method but five were found susceptible.

The evolution of the proportions of the different diameters was observed between 2003 and 2017 (*Figures 12 to 16*) and a Chi² test for trend was performed on diameters ≥ 18mm. Susceptible isolates are on a continuous and significant increasing trend in all animal species albeit with various dynamics (*Figure 12 and 16*). Overall, these data suggest that the spread of colistin-resistant *E. coli* that are pathogenic for animals is under control in France.

Figure 12. *Relative proportion of diameters < 15 mm. 15 mm. 16 mm. 17 mm and ≥ 18 mm around the colistin disc (50 µg) for* E. coli *isolated from* ***digestive pathologies in piglets*** *(n min.: 296 (2005); n max.: 812 (2018))*

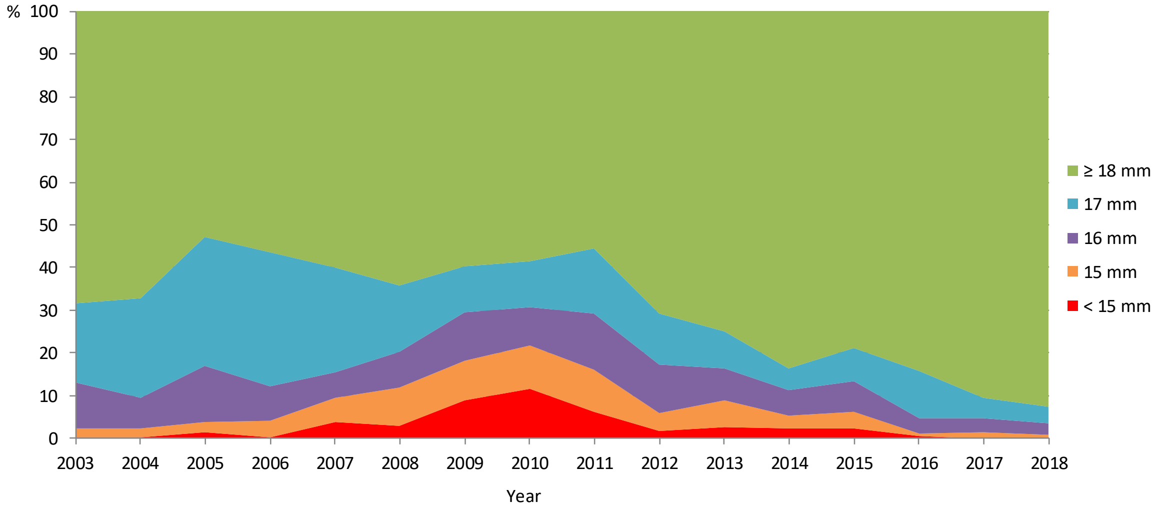
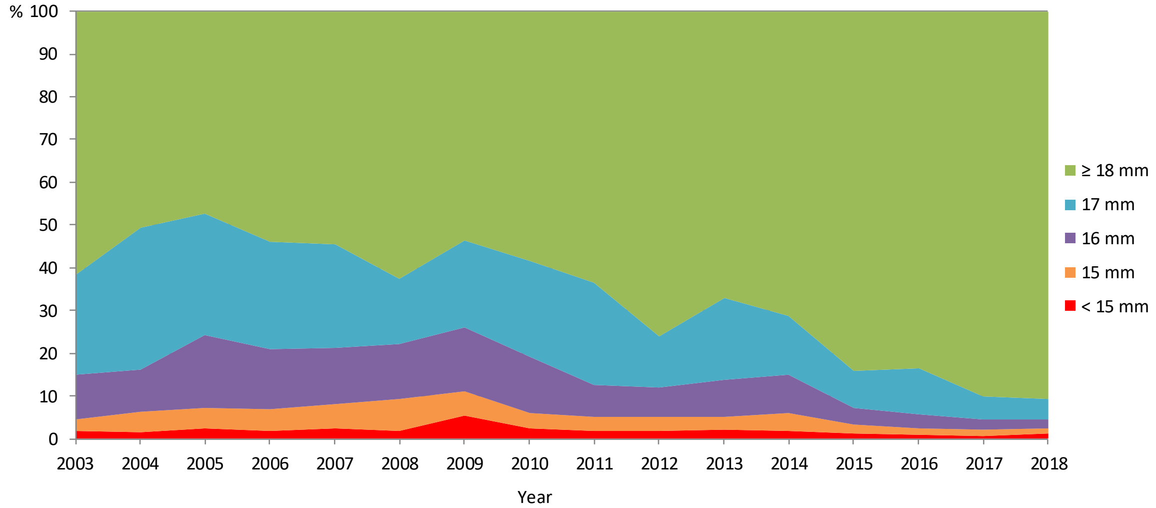


Figure 13. *Relative proportion of diameters < 15 mm. 15 mm. 16 mm. 17 mm and ≥ 18 mm around the colistin disc (50 µg) for* E. coli *isolated from* ***digestive pathologies in veal calves*** *(n min.: 1.139 (2003); n max.: 4.219 (2016))*



[11] Jouy E., Haenni M., Le Devendec L., Le Roux A., Châtre P., Madec J.Y., Kempf I. (2017). Improvement in routine detection of colistin resistance in *E. coli* isolated in veterinary diagnostic laboratories. *Journal of Microbiological Methods*, 132:125-127.

[12] Anses (2018). French surveillance network for antimicrobial resistance in pathogenic bacteria of animal origin. 2016 Annual Report. (https://resapath.anses.fr/resapath_uploadfiles/files/Documents/2016_RESAPATH%20Rapport%20Annuel_GB.pdf).

Figure 14. *Relative proportion of diameters < 15 mm. 15 mm. 16 mm. 17 mm and ≥ 18 mm around the colistin disc (50 µg) for* E. coli *isolated from* ***bovine mastitis*** *(n min.: 188 (2004); n max.: 1.212 (2018))*

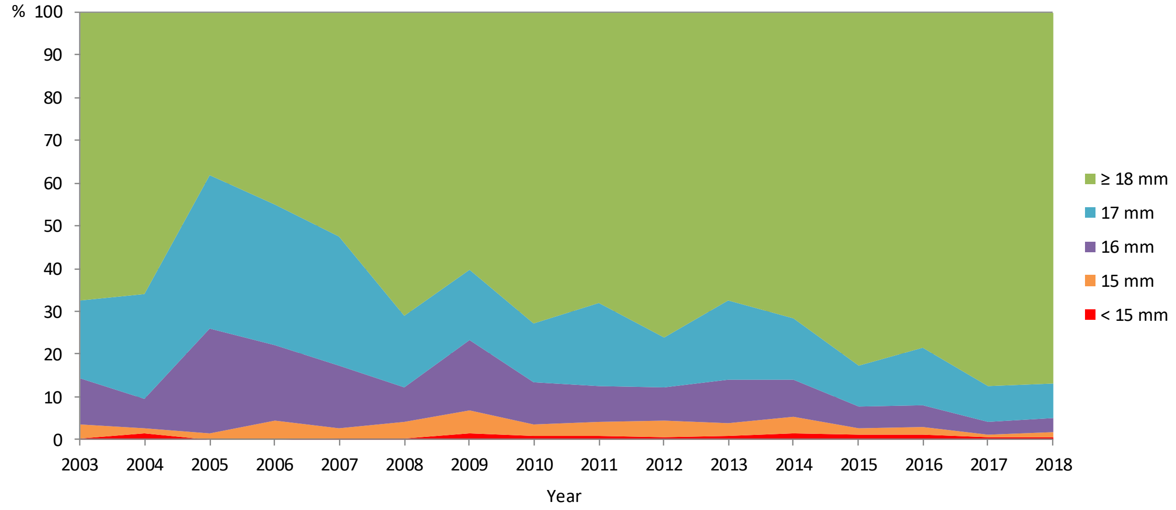


Figure 15. *Relative proportion of diameters < 15 mm. 15 mm. 16 mm. 17 mm and ≥ 18 mm around the colistin disc (50 µg) for* E. coli *isolated from* ***turkey*** *(n min.: 862 (2013); n max.: 2.220 (2015))*

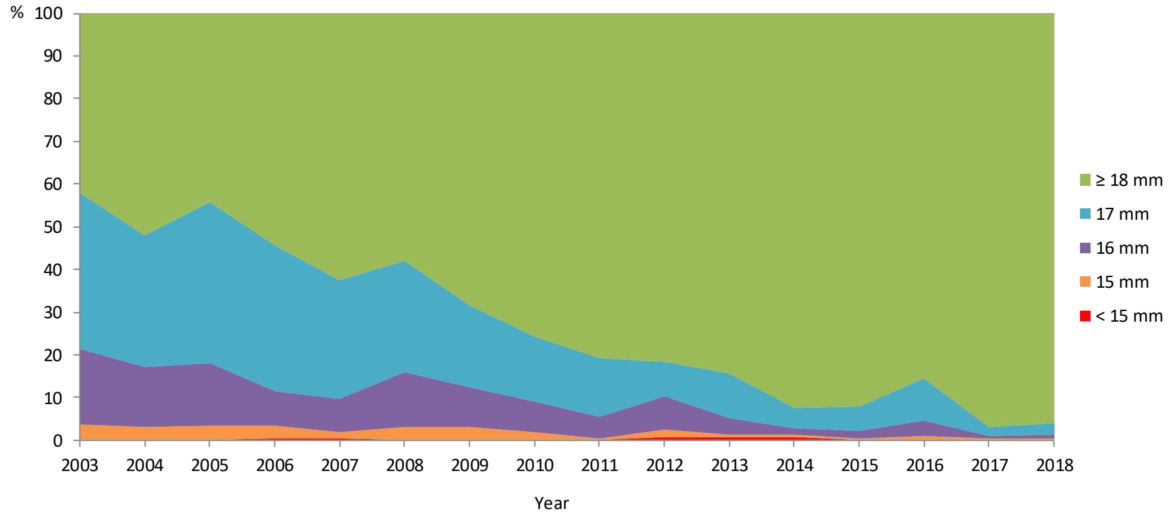
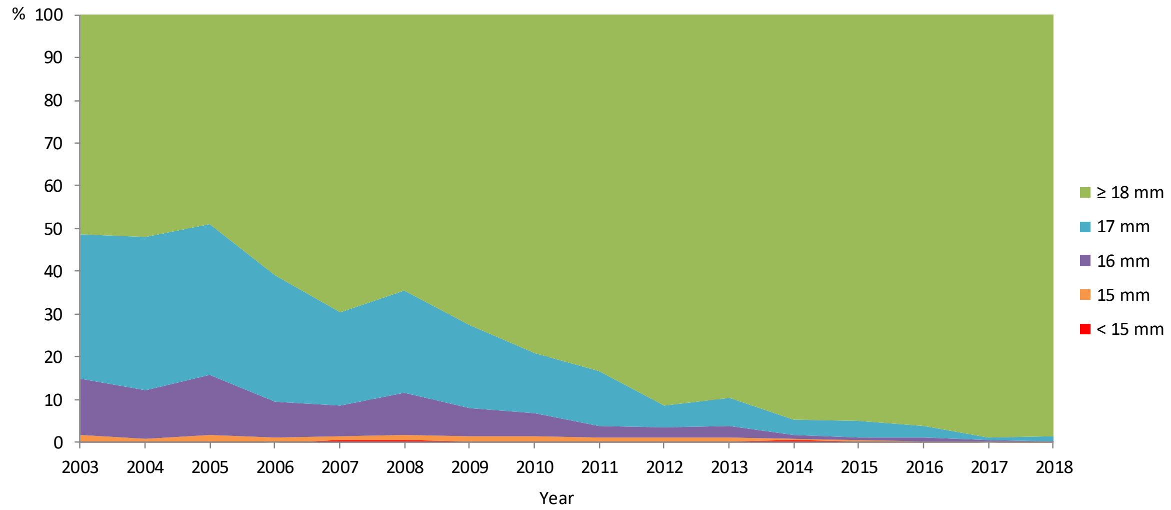


Figure 16. *Relative proportion of diameters < 15 mm. 15 mm. 16 mm. 17 mm and ≥ 18 mm around the colistin disc (50 µg) for* E. coli *isolated from* ***hens and broilers*** *(n min.: 559 (2004); n max.: 7.008 (2017))*



Antimicrobial resistance of *Pasteurella multocida* isolated from food-producing animals and pets

Pasteurella multocida is a zoonotic bacterium that can infect a wide range of species, including humans. In animals, *P. multocida* primarily causes respiratory diseases, leading to significant economic losses, particularly in production animals such as cattle, swine and rabbits. Surveillance of *P. multocida* resistance in food-producing animals is essential to guide the first-line treatment of respiratory diseases and to limit losses. Since *Pasteurella* are the most common bacteria isolated from dog and cat bites, this surveillance is also needed to guide treatment in humans in case of bites. Data collected between 2012 and 2017 by the RESAPATH were analysed in order to characterize the phenotypic resistance of *P. multocida* strains isolated from respiratory infections in food-producing animals (cattle, swine, sheep, duck and rabbit) and pets (dog and cat)[13]. Resistances to eight antibiotic families of interest in human and veterinary medicine were studied.

Over the whole period (2012-2017), resistance proportions of *P. multocida* were almost all below 25%, and all resistance proportions were below 10% for rabbits, sheep and dogs (Table 2). The highest resistance proportions to enrofloxacin were identified for cattle (4.5% [3.5; 5.6]) and dogs (5.2% [3.1; 8.1]). Despite its frequent use in livestock, resistance to florfenicol was less than 1% in *P. multocida* strains, regardless of the animal species considered.

Since the 1950s, penicillins have generally been used as empirical treatments of cat and dog bites, before antibiogram results are obtained. According to the results of our study, given the low resistance of *P. multocida* isolates from dogs (4.9% [2.8; 7.9]) and cats (4.1% [2.7; 5.9]) to penicillins, the use of these antibiotics is still a valid therapeutic option.

Table 2. *Antimicrobial resistance in clinical* Pasteurella multocida *isolated from diseased food-producing animals and pets in France over the period 2012-2017 in a context of respiratory disease*

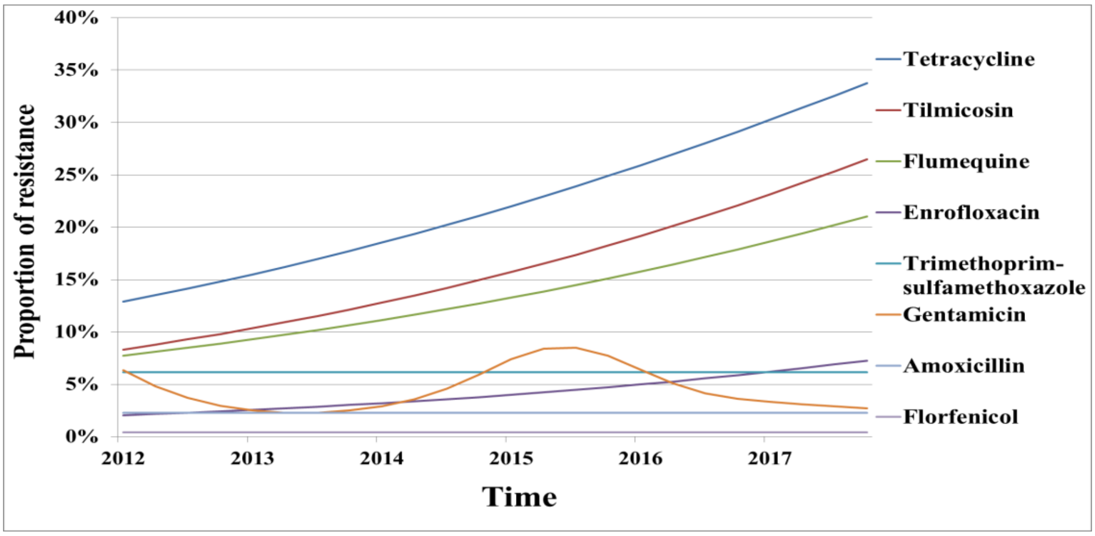
	Cat	Dog	Cattle	Duck	Sheep	Swine	Rabbit
Amoxicillin	4.1	4.9	2.3	0.9	2.3	0.3	1.3
Gentamicin	9.3	6.0	4.6	Not-tested	6.7	3.5	1.8
Tetracyclin	4.1	4.2	23.4	13.0	4.5	6.7	3.5
Trimethoprim-sulfamethoxazole	13.0	7.5	6.2	11.4	7.1	15.4	3.2
Florfenicol	0.5	0.0	0.4	0.3	0.0	0.8	0.0
Tilmicosin	7.4	Not-tested	17.2	0.9	7.3	2.1	5.1
Quinolone[1]	3.6	8.7	14.3	26.1	2.7	2.7	6.9
Enrofloxacin	2.6	5.2	4.5	3.7	1.4	0.5	0.2

[1] Nalidixic acid for dog, cat and sheep, flumequine otherwise

Time series analyses were performed for cattle isolates, for which we had sufficient data. Models revealed continuous increases in resistance to tetracycline, tilmicosin, flumequine and enrofloxacin (Figure 17), whereas the overall use of antibiotics in cattle decreased over the same period in France. Furthermore, these trends contrast with decreasing resistance trends of *Escherichia coli* strains isolated from cattle in recent years. These differences likely reflect differing practices according to the pathological contexts, stressing the importance of monitoring bacteria other than *E. coli*, which is commonly monitored.

[13] Bourély C., Cazeau G., Jouy E., Haenni M., Madec J-Y., Jarrige N., Leblond A., Gay E. (2019). Antimicrobial resistance of *Pasteurella multocida* isolated from diseased food-producing animals and pets. *Veterinary Microbiology.* 235:280-284.

Figure 17. *Trends for antimicrobial resistance in* P. multocida *isolates from cattle with respiratory diseases* during the 2012-2017 period



Antimicrobial resistance in streptococci of animal origin: what's new in France?

Streptococcus agalactiae has been for long time a major etiological agent of clinical mastitis in bovines. Nowadays, *S. agalactie* is sporadically reported leaving its primacy to *Streptococcus uberis*, followed by *Streptococcus dysgalactiae* subsp. *dysgalactiae*. *S. dysgalactiae* subsp. *equisimilis* is rare among bovines. Other streptococci are responsible for infections in animals, such as *S. suis* for swine and *S. canis* for dog. Moreover, *S. suis*, together with other few streptococcal species (e.g. *S. dysgalactiae* subsp. *equisimilis*), may cause severe zoonotic infections in humans. Globally, first line tratment of streptococcal infections in animals include penicillins, alone or in combination with aminoglycosides, macrolides, and tetracyclines. No isolates resistant to penicillin G has been, so far, isolated in France.

The rates of erythromycin and lincomycin resistance in *S. uberis* observed in 2018 are 15% and 18%, respectively, thus decreasing compared to 2015 (20% for both antibiotics), but similar to 2007 (17%). The comparable levels of erythromycin and lincomycin resistance suggests the circulation of a cross-resistance mechanism, such as the methylation of the target site of these antibiotics. An analysis on 125 isolates collected during the 2007-2008 period highlited the presence of the *erm*(B) gene in 111 isolates[14]. The remaining 14 isolates were resistant only to lincomycin and harbored the *lnu*(B) gene. Tetracycline resistance rised during the 2006-2015 period (from 14% to 21%), and remained stable (20%). Resistance to streptomycin is stable (14%) compared to 2015 (16%), whereas resistance to other aminoglycosides remains low (2% for gentamicin, and 7% for kanamycin).

In *S. dysgalactiae*, resistance to erythromycin (16%) decreased compared to 2015 (22%), however lincomycin resistance remained stable (12%). Similarly to *S. uberis*, the most common resistance mechanisms conferring macrolides resistance is the *erm*(B) gene. A decrease of streptomycin resistance has been observed since 2015 (6% versus 3% in 2018), whereas tetracycline resistance is stable and elevated (80%). Most likely, this prevalence is linked to the mobility of the conjugative transposon Tn*916* harboring the *tet*(M) gene.

Resistance level in streptococci of animal origin is stable[15], however surveillance is crucial for detecting emergences. Indeed, high level of gentamicin resistance has been detected in *S. dysgalactiae* subsp. *equisimilis* isolated from horses since 2017. This resistance is conferred by genes acquired by horizontal transfer and the dissemination of such resistance among isolates with zoonotic potential deserves further surveillance.

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[14] Haenni M., Saras E., Chaussière S., Treilles M. and Madec J.-Y. (2011). *ermB*-mediated erythromycin resistance in *Streptococcus uberis* from bovine mastitis in France. *The Veterinary Journal*, 189 (3): 356-358.

[15] Haenni M., Lupo A., Madec J.-Y. (2018). Antimicrobial Resistance in *Streptococcus* spp. *Microbiological Spectrum*, 6 (2). https://doi:10.1128/microbiolspec.ARBA-0008-2017

Evolution of *Staphylococcus pseudintermedius* clones in France

S. pseudintermedius is both a commensal and opportunistic pathogen in dogs. It is not considered a zoonotic pathogen *per se* even though human cases have been sporadically reported. Methicillin-resistant *S. pseudintermedius* (MRSP) has emerged in the 2000s, causing serious therapeutic troubles because of their associated multi-resistance. Numerous studies showed the dominance of a limited number of specific clones, namely ST71 in Europe, ST68 in the USA and ST45/ST112 in Asia. Recently, studies performed in Northern Europe showed that the dominance of ST71 was decreasing, while other clones (among which the ST258) were on an increasing trend. Of note, those clones tend to be more susceptible to antibiotics, which may be considered a good news.

In France, the same decreasing trend of ST71 proportion was observed between two collections of dogs' isolates obtained through the Résapath network, one dating from 2012-2013 (95 isolates) and the second one from 2015-2016 (85 isolates)[16]. In line with other data in Europe, results also showed the emergence of numerous different clones that were globally more susceptible than the ST71 lineage. Only the two ST258 and ST496 clones seemed to emerge and will have to be monitored. Whole-genome sequencing performed on a subset of isolates further proved that ST71 and ST496 formed highly homogeneous clusters, while isolates belonging to ST258 were more diverse. Furthermore, ST496 showed an impressive arsenal of resistance genes so that it would escape the action of all veterinary-licensed antibiotics. This clone is a major exception to the global decrease in antibiotic resistance in MRSP, so that its emergence will have to be surveyed.

Emergence of ST131 *E. coli* belonging to the C1-M27 clade in French dogs

The spread of *E. coli* producing Extended-Spectrum Beta-Lactamases (ESBLs) in companion animals is a public health issue given the close contacts with humans. In veterinary medicine, ESBLs are spread by a large variety of *E. coli* genetic backgrounds, while the unique ST131 clone is responsible for the majority of *E. coli* infections in humans. For this reason, the sporadic detection of ST131 clones in dogs has often been considered a spillover effect of its presence in humans.

In France, 269 *E. coli* isolate presenting either an ESBL (n=204), a pAmpC phenotype (n=63) or both (n=2) were collected through the Resapath network between 2010 and 2016. MLST typing of all B2 isolates revealed that 56 isolates belonged to the ST131 clone (56/269, 20.8%)[17]. All ST131 isolates presented an ESBL phenotype, principally due to the presence of the $bla_{CTX\text{-}M\text{-}15}$ gene. Most of the isolates (50/56) presented the *fimH*30 allele indicating the dominance of the widely disseminated clade C ST131 *E. coli*. Additionally, seven isolates carrying the $bla_{CTX\text{-}M\text{-}27}$ and one carrying the $bla_{CTX\text{-}M\text{-}14}$ gene belonged to the C1-M27 clade, which recently emerged in humans. First identified in Japan, this CA-M27 clade is now spreading worldwide, including in France[18].

Our results demonstrate a high proportion of the ST131 clone in dogs, as well as the presence of the C1-M27 clade that can be traced back to 2011. These data question the potential adaptation of certain ST131 lineages to the animal host, a hypothesis that is currently investigated using whole-genome analysis.

[16] Bergot M., Martins-Simoes P., Kilian H., Chatre P., Worthing K.A., Norris J.M., Madec J.Y., Laurent F., and Haenni M. (2018). Evolution of the population structure of *Staphylococcus pseudintermedius* in France. *Frontiers in Microbioly,* 9: 3055.

[17] Melo L.C., Haenni M., Saras E., Duprilot M., Nicolas-Chanoine M.H., and Madec J.Y. (2019). Emergence of the C1-M27 cluster in ST131 *Escherichia coli* from companion animals in France. *Journal of Antimicrobial Chemotherapy*, in press.

[18] Birgy A., Bidet P., Levy C., Sobral E., Cohen R., and Bonacorsi S. (2017). CTX-M-27-producing *Escherichia coli* of Sequence Type 131 and clade C1-M27, France. *Emerging Infectious Disease,* 23: 885.

ESBL in animals: a few examples outside France – comparison with the Resapath data

Resistance to extended-spectrum cephalosporins is often mediated by genes encoding extended-spectrum beta-lactamases (ESBLs), which are motly carried by plasmids. All Enterobacterales can display bla_{ESBL} genes, but the most frequent ones are by far *Escherichia coli* and *Klebsiella pneumoniae*. In order to put the Resapath data in the international context, it is valuable to compare ESBLs types reported in French animals with those in other countries, in Europe and beyond. These comparative studies were mainly performed with Sweden, Tunisia, Lebanon and Brazil.

E. coli responsible from bovine mastitis are globally susceptible to antibiotics and only a few of them carry bla_{ESBL} genes. This is the case in most European countries, and also in Tunisia. ESBLs in bovine mastitis in France are mainly due to the presence of the CTX-M-1 enzyme. On the contrary, the CTX-M-15 enzyme – which is widespread in the human sector worldwide - is dominating in bovines in Tunisia[19,20,21] In Lebanon, the carriage rate of ESBL-positive *E. coli* is higher than in France, with 84% of positive farms, and the CTX-M-15 enzyme is also widely distributed [22]. In this country, carbapenemase-producing (OXA-48) *K. pneumoniae* have also been detected in raw milk from healthy cows on farm[23], a situation that has never been found in Europe.

Another comparative study performed on ESBL-producing *E. coli* in horses between Sweden and France revealed a particular epidemiology of plasmids carrying the $bla_{CTX\text{-}M\text{-}1}$ gene. Similar IncHI1 plasmids differing by only a few nucleotides were detected in both countries, and in about 80% of the ESBL-producing *E. coli*[24]. A similar observation was made in Czech Republic, Denmark and the Netherlands.

Finally, a comparison between ESBL-producing *E. coli* from Brazil and France proved that the most frequent ESBL enzymes found in dogs were those dominating in humans in each country, namely CTX-M-15 in France and CTX-M-8 in Brazil[25,26]. The bla_{ESBL}-carrying plasmids circulating in Brazil mostly belonged to the IncI1 type that had already been reported in Brazilian dogs (especially the IncI1/ST113 subtype), and which differs from the IncF plasmid more frequently found in France[27].

These studies are only few examples of similarities and discrepancies between resistance determinants (clones, plasmids) spreading in France or in other countries in the animal sector. Such studies are of help in formulating hypotheses on the distribution of these genetic determinants, their transmission from or to humans, correlations with antibiotic use or the impact of animal trade in disseminating resistance genes and resistant bacteria.

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19 Saidani M, Messadi L, Soudani A, Daaloul-Jedidi M, Châtre P, Ben Chehida F, Mamlouk A, Mahjoub W, Madec J.-Y., Haenni M. (2018). Epidemiology, Antimicrobial Resistance, and Extended-Spectrum Beta-Lactamase-Producing Enterobacteriaceae in Clinical Bovine Mastitis in Tunisia. *Microbial Drug Resistance,* 24 (8): 1242-1248.

20 Grami R., Dahmen S., Mansour W., Mehri W., Haenni M., Aouni M., Madec J.-Y. (2014). $bla_{CTX\text{-}M\text{-}15}$-carrying F2:A-:B- plasmid in *Escherichia coli* from cattle milk in Tunisia. *Microbial Drug Resistance*, 20(4): 344-349

21 Dahmen S., Métayer V., Gay E., Madec J.-Y., Haenni M. (2013). Characterization of extended-spectrum beta-lactamase (ESBL)-carrying plasmids and clones of Enterobacteriaceae causing cattle mastitis in France. *Veterinary Microbiology*, 162: 793-799.

22 Diab M., Hamze M., Madec J.-Y., Haenni M. (2017). High Prevalence of Non-ST131 CTX-M-15-Producing *Escherichia coli* in Healthy Cattle in Lebanon. *Microbial Drug Resistance*, 23(2): 261-266

23 Diab M., Hamze M., Bonnet R., Saras E., Madec J.-Y., Haenni M. (2017). OXA-48 and CTX-M-15 extended-spectrum beta-lactamases in raw milk in Lebanon: epidemic spread of dominant *Klebsiella pneumoniae* clones. *Journal of Medical Microbiology,* 66 (11): 1688-1691.

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25 Melo L. C., Oresco C., Leigue L., Netto H. M., Melville P. A., Benites N. R., Saras E., Haenni M., Lincopan N., Madec J.-Y. (2018). Prevalence and molecular features of ESBL/pAmpC-producing Enterobacteriaceae in healthy and diseased companion animals in Brazil. *Veterinary Microbiology,* 221: 59-66.

26 Dahmen S, Haenni M, Châtre P, Madec JY. (2013). Characterization of $bla_{CTX\text{-}M}$/IncFII plasmids and clones of Escherichia coli from pets in France. *Journal of Antimicrobial Chemotherapy*, 68(12): 2797-2801.

27 Dahmen S., Haenni M. and Madec J.-Y. (2012) IncI1/ST3 plasmids contribute to the dissemination of the $bla_{CTX\text{-}M\text{-}1}$ gene in *Escherichia coli* from several animal species in France. *Journal of Antimicrobial Chemotherapy,* 67(12): 3011-3012.

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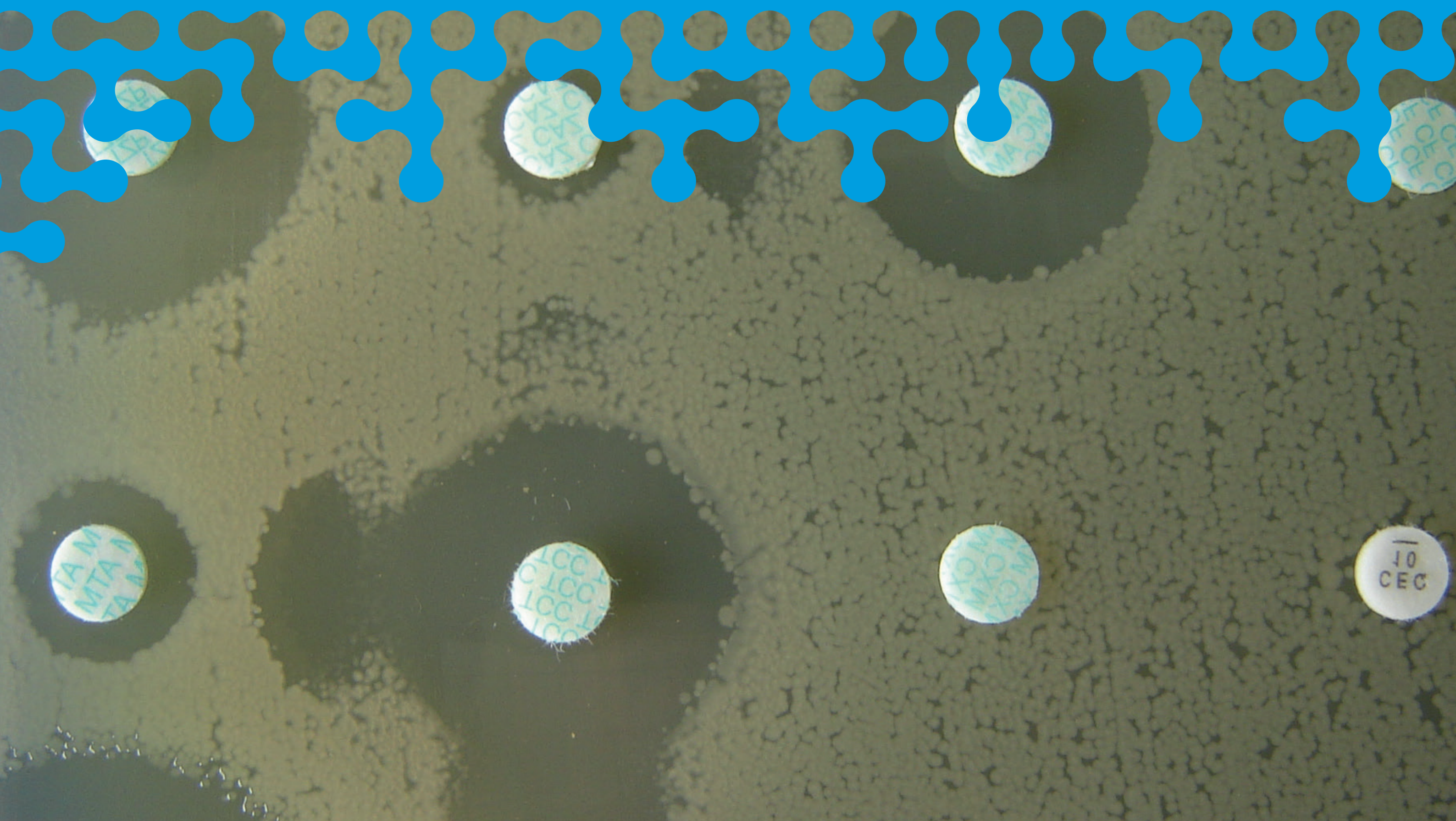
Annex 1

List of the RESAPATH laboratories



Laboratories members

Laboratoire Départemental d'Analyses - BOURG EN BRESSE (01)
Eurofins Laboratoire Cœur de France - MOULINS (03)
Laboratoire Départemental Vétérinaire et Hygiène Alimentaire - GAP (05)
Laboratoire Vétérinaire Départemental - SOPHIA ANTIPOLIS (06)
Laboratoire Départemental d'Analyses - HAGNICOURT (08)
Laboratoire Départemental d'Analyses - TROYES (10)
Aveyron Labo - RODEZ (12)
Laboratoire Départemental d'Analyses - MARSEILLE (13)
ANSES Laboratoire de pathologie équine de Dozulé - GOUSTRANVILLE (14)
LABEO Frank Duncombe - CAEN (14)
Laboratoire Départemental d'Analyses et de Recherches - AURILLAC (15)
Laboratoire Départemental d'Analyses de la Charente - ANGOULEME (16)
Laboratoire Départemental d'Analyses – BOURGES (18)
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LABOCEA Ploufragan - PLOUFRAGAN (22)
LABOFARM - LOUDEAC (22)
Laboratoire Départemental d'Analyse - (23) AJAIN
Laboratoire Départemental d'Analyse et de Recherche - COULOUNIEIX CHAMIERS (24)
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LABOCEA Quimper - QUIMPER (29)
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SOCSA Analyse - L'UNION (31)
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Laboratoire Départemental Vétérinaire - MONTPELLIER (34)
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Biovilaine - REDON (35)
LABOCEA- FOUGERES (35)
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Laboratoire TERANA LOIRE- MONTBRISON (42)
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VEBIO - ARCUEIL (94)

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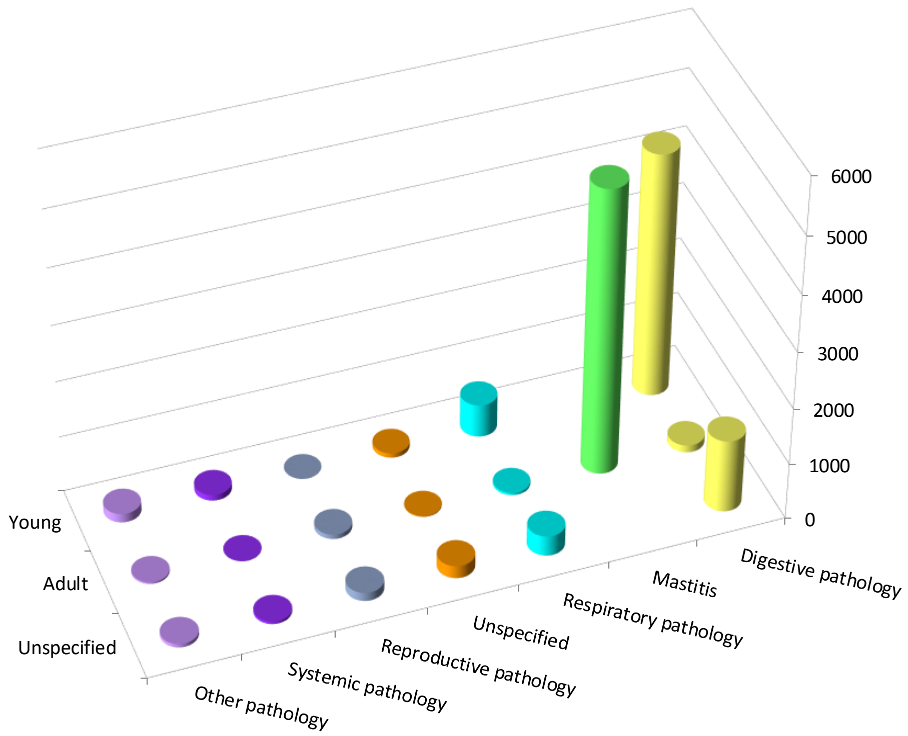
Annex 2
Cattle

Figure 1 - Cattle 2018 – Number of antibiograms by age group and pathology

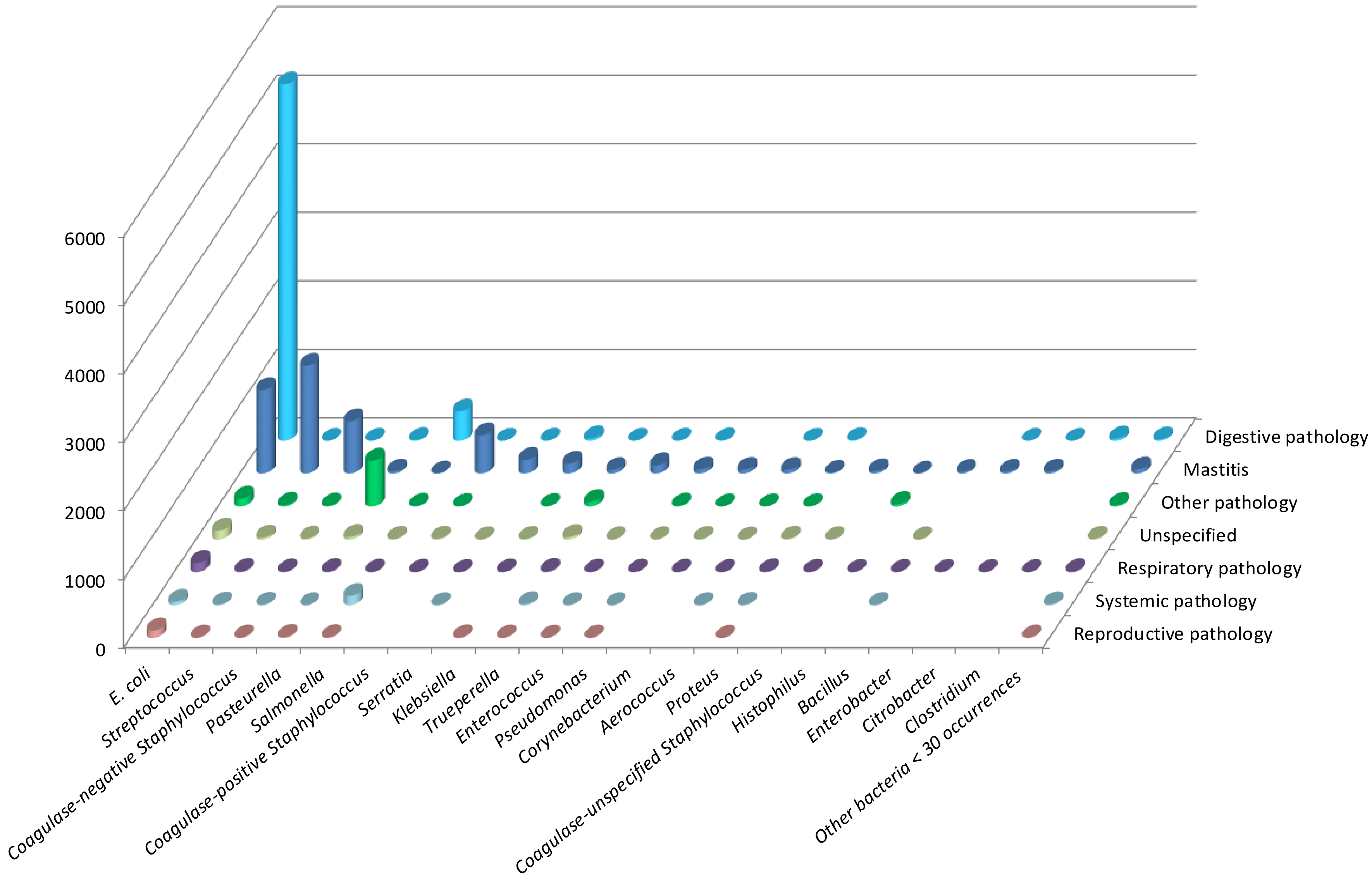


Note: *all values are detailed in table 1 (including other pathologies, representing less than 1%, grouped together)*

Table 1 - Cattle 2018 – Number of antibiograms by age group and pathology

	Age group N (%)			
Pathology N (%)	Adult	Young	Unspecified	**Total N *(%)***
Digestive pathology	128 *(1.00)*	4,339 *(34.05)*	1,291 *(10.13)*	**5,758 *(45.18)***
Mastitis	5,055 *(39.67)*			**5,055 *(39.67)***
Respiratory pathology	42 *(0.33)*	582 *(4.57)*	356 *(2.79)*	**980 *(7.69)***
Unspecified	15 *(0.12)*	81 *(0.64)*	222 *(1.74)*	**318 *(2.50)***
Reproductive pathology	81 *(0.64)*	1 *(0.01)*	149 *(1.17)*	**231 *(1.81)***
Systemic pathology	5 *(0.04)*	104 *(0.82)*	43 *(0.34)*	**152 *(1.19)***
Septicemia		74 *(0.58)*	6 *(0.05)*	**80 *(0.63)***
Kidney and urinary tract pathology	10 *(0.08)*	18 *(0.14)*	18 *(0.14)*	**46 *(0.36)***
Arthritis	6 *(0.05)*	15 *(0.12)*	13 *(0.10)*	**34 *(0.27)***
Omphalitis		26 *(0.20)*		**26 *(0.2)***
Nervous system pathology	3 *(0.02)*	13 *(0.10)*	6 *(0.05)*	**22 *(0.17)***
Skin and soft tissue infections	10 *(0.08)*	1 *(0.01)*	8 *(0.06)*	**19 *(0.15)***
Cardiac pathology		7 *(0.05)*	5 *(0.04)*	**12 *(0.09)***
Ocular pathology	1 *(0.01)*	2 *(0.02)*	7 *(0.05)*	**10 *(0.08)***
Oral pathology		1 *(0.01)*		**1 *(0.01)***
Total N *(%)*	**5,356 *(42.03)***	**5,264 *(41.31)***	**2,124 *(16.67)***	**12,744 *(100.00)***

Figure 2 - Cattle 2018 – Number of antibiograms by bacteria and pathology (all age groups included)



Note: *only values for pathologies >1% and bacterial groups having more than 30 occurrences are represented. Detailed values are presented in table 2 below.*

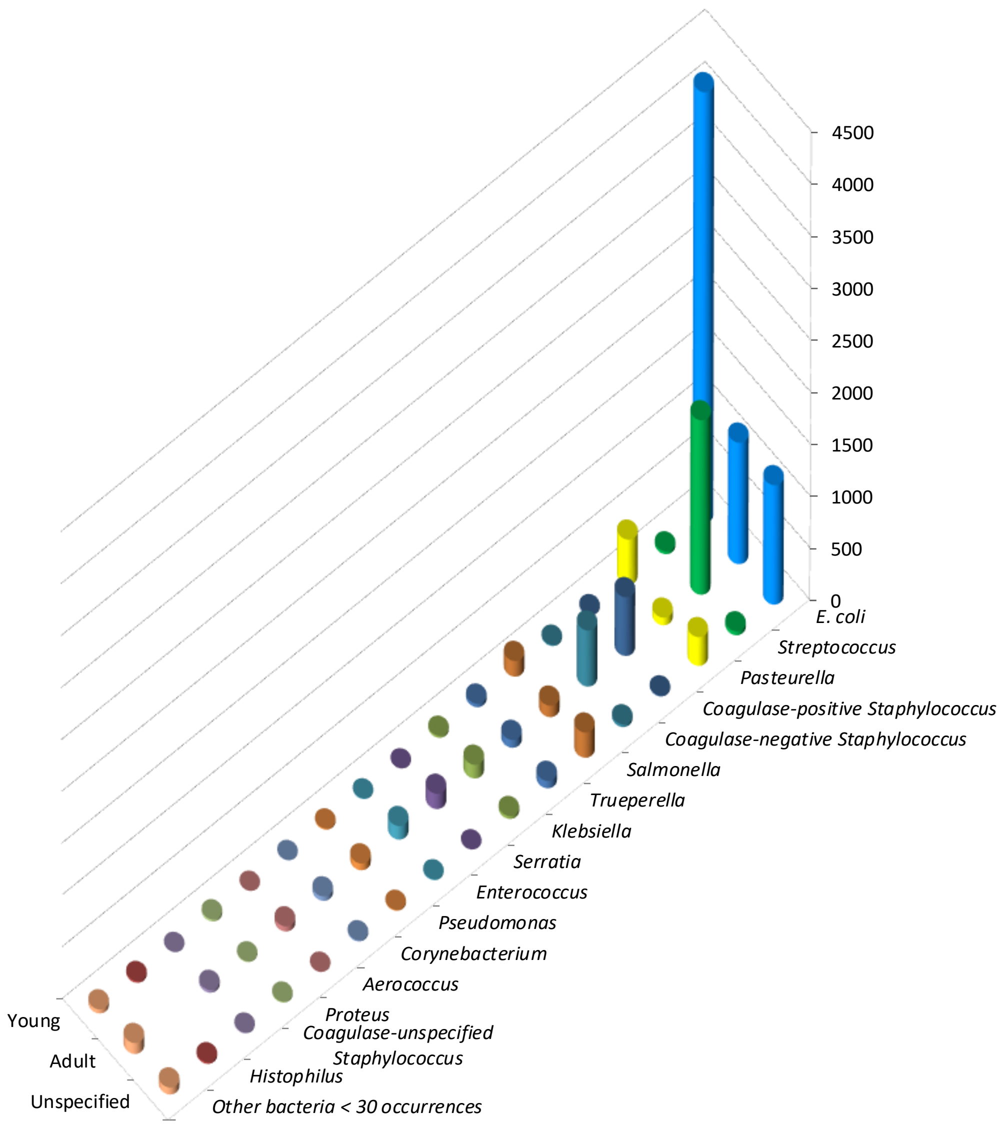
Table 2, part1 - Cattle 2018 – Number of antibiograms by bacteria and pathology (all age groups included)

Bacteria N (%)	Pathology N (%)															Total N *(%)*
	Digestive pathology	Mastitis	Respiratory pathology	Unspecified	Reproductive pathology	Systemic pathology	Septicemia	Kidney and urinary tract pathology	Arthritis	Omphalitis	Nervous system pathology	Skin and soft tissue infections	Cardiac pathology	Ocular pathology	Oral pathology	
E. coli	5,199 *(40.8)*	1,220 *(9.57)*	114 *(0.89)*	129 *(1.01)*	49 *(0.38)*	105 *(0.82)*	62 *(0.49)*	30 *(0.24)*	10 *(0.08)*	10 *(0.08)*	13 *(0.10)*	1 *(0.01)*	7 *(0.05)*			**6,949** ***(54.53)***
Streptococcus	1 *(0.01)*	1,572 *(12.34)*	23 *(0.18)*	27 *(0.21)*	7 *(0.05)*	3 *(0.02)*	1 *(0.01)*	3 *(0.02)*	2 *(0.02)*	3 *(0.02)*	1 *(0.01)*	2 *(0.02)*		1 *(0.01)*	1 *(0.01)*	**1,647** ***(12.92)***
Coagulase-negative Staphylococcus	3 *(0.02)*	762 *(5.98)*	13 *(0.10)*	14 *(0.11)*	5 *(0.04)*	4 *(0.03)*			2 *(0.02)*	2 *(0.02)*		2 *(0.02)*	1 *(0.01)*	2 *(0.02)*		**810** ***(6.36)***
Pasteurella	12 *(0.09)*	32 *(0.25)*	670 *(5.26)*	38 *(0.30)*	1 *(0.01)*	13 *(0.1)*	6 *(0.05)*	2 *(0.02)*	3 *(0.02)*	1 *(0.01)*	1 *(0.01)*		2 *(0.02)*			**781** ***(6.13)***
Salmonella	427 *(3.35)*	2 *(0.02)*	9 *(0.07)*	10 *(0.08)*	133 *(1.04)*	10 *(0.08)*	4 *(0.03)*	1 *(0.01)*			1 *(0.01)*					**597** ***(4.68)***
Coagulase positive Staphylococcus	1 *(0.01)*	559 *(4.39)*	6 *(0.05)*	12 *(0.09)*					1 *(0.01)*			4 *(0.03)*				**583** ***(4.57)***
Serratia	3 *(0.02)*	201 *(1.58)*		2 *(0.02)*	1 *(0.01)*			1 *(0.01)*								**208** ***(1.63)***
Klebsiella	35 *(0.27)*	146 *(1.15)*	6 *(0.05)*	8 *(0.06)*		6 *(0.05)*	5 *(0.04)*		1 *(0.01)*		1 *(0.01)*					**208** ***(1.63)***
Trueperella	2 *(0.02)*	56 *(0.44)*	65 *(0.51)*	35 *(0.27)*	14 *(0.11)*	3 *(0.02)*		2 *(0.02)*	9 *(0.07)*	2 *(0.02)*	1 *(0.01)*	2 *(0.02)*		1 *(0.01)*		**192** ***(1.51)***
Enterococcus	3 *(0.02)*	124 *(0.97)*		3 *(0.02)*	1 *(0.01)*	1 *(0.01)*			1 *(0.01)*			1 *(0.01)*	2 *(0.02)*			**136** ***(1.07)***
Pseudomonas	8 *(0.06)*	64 *(0.50)*	12 *(0.09)*	4 *(0.03)*	1 *(0.01)*	2 *(0.02)*	1 *(0.01)*		1 *(0.01)*	1 *(0.01)*	2 *(0.02)*					**96** ***(0.75)***
Corynebacterium		58 *(0.46)*	2 *(0.02)*	8 *(0.06)*				1 *(0.01)*	1 *(0.01)*	1 *(0.01)*		2 *(0.02)*				**73** ***(0.57)***
Aerococcus	1 *(0.01)*	56 *(0.44)*	2 *(0.02)*	1 *(0.01)*	1 *(0.01)*			2 *(0.02)*								**63** ***(0.49)***
Proteus	10 *(0.08)*	13 *(0.10)*	3 *(0.02)*	12 *(0.09)*	4 *(0.03)*	1 *(0.01)*	1 *(0.01)*	2 *(0.02)*	1 *(0.01)*	4 *(0.03)*		2 *(0.02)*				**53** ***(0.42)***
Coagulase-unspecified Staphylococcus		36 *(0.28)*		3 *(0.02)*				1 *(0.01)*				1 *(0.01)*				**41** ***(0.32)***

Table 2. part2 - Cattle 2018 – Number of antibiograms by bacteria and pathology (all age groups included)

Bacteria N (%)	Pathology N (%)															Total N *(%)*
	Digestive pathology	Mastitis	Respiratory pathology	Unspecified	Reproductive pathology	Systemic pathology	Septicemia	Kidney and urinary tract pathology	Arthritis	Omphalitis	Nervous system pathology	Skin and soft tissue infections	Cardiac pathology	Ocular pathology	Oral pathology	
Histophilus		1 *(0.01)*	36 *(0.28)*													**37** ***(0.29)***
Bacillus		27 *(0.21)*		2 *(0.02)*	2 *(0.02)*				1 *(0.01)*			1 *(0.01)*				**33** ***(0.26)***
Enterobacter	2 *(0.02)*	29 *(0.23)*							1 *(0.01)*							**32** ***(0.25)***
Citrobacter	1 *(0.01)*	31 *(0.24)*														**32** ***(0.25)***
Clostridium	31 *(0.24)*															**31** ***(0.24)***
Other bacteria < 30 occurrences	19 *(0.15)*	66 *(0.52)*	19 *(0.15)*	10 *(0.08)*	12 *(0.09)*	4 *(0.03)*		1 *(0.01)*		2 *(0.02)*	2 *(0.02)*	1 *(0.01)*		6 *(0.05)*		**142** ***(1.11)***
Total N *(%)*	**5,758** ***(45.18)***	**5,055** ***(39.67)***	**980** ***(7.69)***	**318** ***(2.50)***	**231** ***(1.81)***	**152** ***(1.19)***	**80** ***(0.63)***	**46** ***(0.36)***	**34** ***(0.27)***	**26** ***(0.20)***	**22** ***(0.17)***	**19** ***(0.15)***	**12** ***(0.09)***	**10** ***(0.08)***	**1** ***(0.01)***	**12,744** ***(100.00)***

Figure 3 - Cattle 2018 – Number of antibiograms by bacteria and age group



Note: *only bacterial groups having more than 30 occurrences are represented. Detailed values are presented in table 3 below.*

Table 3 - Cattle 2018 – Number of antibiograms by bacteria and age group

Bacteria N (%)	Age group N (%)			Total N (%)
	Adult	Young	Unspecified	
E. coli	1,311 *(10.29)*	4,450 *(34.92)*	1,188 *(9.32)*	**6,949** ***(54.53)***
Streptococcus	1,582 *(12.41)*	23 *(0.18)*	42 *(0.33)*	**1,647** ***(12.92)***
Coagulase-negative Staphylococcus	769 *(6.03)*	12 *(0.09)*	29 *(0.23)*	**810** ***(6.36)***
Pasteurella	67 *(0.53)*	457 *(3.59)*	257 *(2.02)*	**781** ***(6.13)***
Salmonella	98 *(0.77)*	148 *(1.16)*	351 *(2.75)*	**597** ***(4.68)***
Coagulase-positive Staphylococcus	560 *(4.39)*	4 *(0.03)*	19 *(0.15)*	**583** ***(4.57)***
Serratia	202 *(1.59)*	2 *(0.02)*	4 *(0.03)*	**208** ***(1.63)***
Klebsiella	146 *(1.15)*	40 *(0.31)*	22 *(0.17)*	**208** ***(1.63)***
Trueperella	80 *(0.63)*	46 *(0.36)*	66 *(0.52)*	**192** ***(1.51)***
Enterococcus	125 *(0.98)*	2 *(0.02)*	9 *(0.07)*	**136** ***(1.07)***
Pseudomonas	65 *(0.51)*	10 *(0.08)*	21 *(0.16)*	**96** ***(0.75)***
Corynebacterium	63 *(0.49)*	4 *(0.03)*	6 *(0.05)*	**73** ***(0.57)***
Aerococcus	58 *(0.46)*	1 *(0.01)*	4 *(0.03)*	**63** ***(0.49)***
Proteus	19 *(0.15)*	18 *(0.14)*	16 *(0.13)*	**53** ***(0.42)***
Coagulase-unspecified Staphylococcus	37 *(0.29)*		4 *(0.03)*	**41** ***(0.32)***
Histophilus	2 *(0.02)*	20 *(0.16)*	15 *(0.12)*	**37** ***(0.29)***
Bacillus	29 *(0.23)*		4 *(0.03)*	**33** ***(0.26)***
Enterobacter	31 *(0.24)*	1 *(0.01)*		**32** ***(0.25)***
Citrobacter	31 *(0.24)*	1 *(0.01)*		**32** ***(0.25)***
Clostridium		5 *(0.04)*	26 *(0.20)*	**31** ***(0.24)***
Other bacteria < 30 occurrences	81 *(0.64)*	20 *(0.16)*	41 *(0.32)*	**142** ***(1.11)***
Total N *(%)*	**5,356 *(42.03)***	**5,264 *(41.31)***	**2,124 *(16.67)***	**12,744 *(100.00)***

Table 4 - Cattle 2018 – Digestive pathology – Young animals – *E. coli*: susceptibility to antibiotics (proportion) (N= 4,148)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*4,048*	**17**
Amoxicillin-Clavulanic ac.	*4,142*	**44**
Cephalexin	*3,611*	**84**
Cephalothin	*841*	**77**
Cefoxitin	*3,641*	**91**
Cefuroxime	*1,829*	**83**
Cefoperazone	*1,100*	**92**
Cefovecin	*75*	**96**
Ceftiofur	*4,120*	**97**
Cefquinome 30 µg	*3,832*	**94**
Streptomycin 10 UI	*2,501*	**17**
Spectinomycin	*1,567*	**55**
Kanamycin 30 UI	*1,349*	**38**
Gentamicin 10 UI	*4,117*	**81**
Neomycin	*3,041*	**48**
Apramycin	*2,057*	**94**
Tetracycline	*3,931*	**24**
Doxycycline	*225*	**12**
Chloramphenicol	*202*	**56**
Florfenicol	*2,971*	**76**
Nalidixic ac.	*2,528*	**70**
Oxolinic ac.	*712*	**69**
Flumequine	*1,443*	**68**
Enrofloxacin	*3,537*	**91**
Marbofloxacin	*3,003*	**91**
Danofloxacin	*1,171*	**91**
Sulfonamides	*892*	**22**
Trimethoprim	*517*	**62**
Trimethoprim-Sulfonamides	*4,146*	**60**

Table 5 - Cattle 2018 – Mastitis – Adults – *E. coli:* susceptibility to antibiotics (proportion) (N= 1,220)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,193*	**66**
Amoxicillin-Clavulanic ac.	*1,219*	**77**
Cephalexin	*1,113*	**86**
Cephalothin	*351*	**89**
Cefoxitin	*1,083*	**95**
Cefuroxime	*593*	**92**
Cefoperazone	*737*	**98**
Cefovecin	*108*	**97**
Ceftiofur	*1,103*	**99**
Cefquinome 30 µg	*1,067*	**99**
Streptomycin 10 UI	*745*	**72**
Spectinomycin	*234*	**92**
Kanamycin 30 UI	*546*	**88**
Gentamicin 10 UI	*1,216*	**98**
Neomycin	*778*	**88**
Apramycin	*395*	**99**
Tetracycline	*1,076*	**76**
Chloramphenicol	*58*	**88**
Florfenicol	*787*	**94**
Nalidixic ac.	*811*	**96**
Oxolinic ac.	*163*	**95**
Flumequine	*324*	**89**
Enrofloxacin	*1,040*	**99**
Marbofloxacin	*1,005*	**99**
Danofloxacin	*387*	**99**
Sulfonamides	*258*	**75**
Trimethoprim	*223*	**82**
Trimethoprim-Sulfonamides	*1,176*	**87**

Table 6 - Cattle 2018 – All pathologies and age groups included – *Salmonella* Typhimurium*:* susceptibility to antibiotics (proportion) (N= 241)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*238*	**17**
Amoxicillin-Clavulanic ac.	*241*	**51**
Cephalexin	*226*	**99**
Cephalothin	*77*	**95**
Cefoxitin	*221*	**99**
Cefuroxime	*110*	**95**
Cefoperazone	*90*	**58**
Ceftiofur	*238*	**100**
Cefquinome 30 µg	*189*	**100**
Streptomycin 10 UI	*130*	**8**
Spectinomycin	*100*	**49**
Kanamycin 30 UI	*84*	**94**
Gentamicin 10 UI	*223*	**97**
Neomycin	*188*	**95**
Apramycin	*138*	**99**
Tetracycline	*232*	**16**
Florfenicol	*207*	**55**
Nalidixic ac.	*137*	**88**
Oxolinic ac.	*83*	**95**
Flumequine	*93*	**96**
Enrofloxacin	*214*	**99**
Marbofloxacin	*214*	**100**
Danofloxacin	*89*	**98**
Sulfonamides	*69*	**0**
Trimethoprim	*58*	**95**
Trimethoprim-Sulfonamides	*241*	**94**

Table 7 - Cattle 2018 – All pathologies and age groups included – *Salmonella* Mbandaka*:* susceptibility to antibiotics (proportion) (N= 79)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*77*	**97**
Amoxicillin-Clavulanic ac.	*79*	**99**
Cephalexin	*77*	**97**
Cephalothin	*53*	**94**
Cefoxitin	*79*	**100**
Cefuroxime	*54*	**98**
Cefoperazone	*64*	**100**
Ceftiofur	*78*	**100**
Cefquinome 30 µg	*70*	**100**
Streptomycin 10 UI	*60*	**82**
Kanamycin 30 UI	*60*	**100**
Gentamicin 10 UI	*79*	**100**
Neomycin	*79*	**100**
Tetracycline	*79*	**97**
Florfenicol	*79*	**100**
Nalidixic ac.	*54*	**100**
Enrofloxacin	*79*	**100**
Marbofloxacin	*78*	**100**
Danofloxacin	*63*	**100**
Sulfonamides	*58*	**81**
Trimethoprim	*54*	**96**
Trimethoprim-Sulfonamides	*79*	**97**

Table 8 - Cattle 2018 – All pathologies and age groups included – *Salmonella* Montevideo*:* susceptibility to antibiotics (proportion) (N= 140)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*131*	**99**
Amoxicillin-Clavulanic ac.	*140*	**99**
Cephalexin	*129*	**100**
Cephalothin	*97*	**100**
Cefoxitin	*140*	**99**
Cefuroxime	*100*	**97**
Cefoperazone	*117*	**100**
Ceftiofur	*139*	**100**
Cefquinome 30 µg	*138*	**100**
Streptomycin 10 UI	*118*	**92**
Spectinomycin	*30*	**93**
Kanamycin 30 UI	*117*	**97**
Gentamicin 10 UI	*140*	**99**
Neomycin	*134*	**97**
Apramycin	*40*	**100**
Tetracycline	*139*	**97**
Florfenicol	*136*	**99**
Nalidixic ac.	*108*	**100**
Flumequine	*31*	**97**
Enrofloxacin	*136*	**100**
Marbofloxacin	*135*	**100**
Danofloxacin	*115*	**100**
Sulfonamides	*97*	**99**
Trimethoprim	*89*	**99**
Trimethoprim-Sulfonamides	*139*	**99**

Table 9 - Cattle 2018 – Respiratory pathology – Young animals – *Pasteurella multocida:* susceptibility to antibiotics (proportion) (N= 238)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*232*	**99**
Amoxicillin-Clavulanic ac.	*229*	**99**
Cephalexin	*98*	**100**
Ceftiofur	*233*	**100**
Cefquinome 30 µg	*206*	**99**
Streptomycin 10 UI	*176*	**36**
Kanamycin 30 UI	*34*	**76**
Gentamicin 10 UI	*210*	**97**
Neomycin	*49*	**67**
Tetracycline	*227*	**63**
Doxycycline	*128*	**61**
Florfenicol	*235*	**100**
Nalidixic ac.	*87*	**87**
Oxolinic ac.	*115*	**61**
Flumequine	*142*	**70**
Enrofloxacin	*237*	**91**
Marbofloxacin	*204*	**99**
Danofloxacin	*31*	**100**
Trimethoprim-Sulfonamides	*237*	**88**

Table 10 - Cattle 2018 – Respiratory pathology – Young animals – *Mannheimia haemolytica:* susceptibility to antibiotics (proportion) (N= 154)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*150*	**90**
Amoxicillin-Clavulanic ac.	*139*	**97**
Cephalexin	*63*	**100**
Ceftiofur	*152*	**99**
Cefquinome 30 µg	*117*	**99**
Streptomycin 10 UI	*93*	**16**
Gentamicin 10 UI	*117*	**86**
Neomycin	*37*	**51**
Tetracycline	*149*	**75**
Doxycycline	*74*	**64**
Florfenicol	*152*	**98**
Nalidixic ac.	*67*	**76**
Oxolinic ac.	*55*	**75**
Flumequine	*86*	**80**
Enrofloxacin	*153*	**95**
Marbofloxacin	*117*	**98**
Trimethoprim-Sulfonamides	*154*	**95**

Table 11 - Cattle 2018 – Mastitis – Adults – *Serratia Marcescens:* susceptibility to antibiotics (proportion) (N= 172)

Antibiotic	*Total (N)*	**% S**
Amoxicillin-Clavulanic ac.	*169*	**14**
Cephalothin	*56*	**5**
Cefoxitin	*150*	**27**
Cefuroxime	*78*	**4**
Cefoperazone	*108*	**98**
Ceftiofur	*168*	**98**
Cefquinome 30 µg	*161*	**100**
Streptomycin 10 UI	*120*	**55**
Kanamycin 30 UI	*89*	**100**
Gentamicin 10 UI	*172*	**100**
Neomycin	*112*	**98**
Apramycin	*49*	**100**
Tetracycline	*157*	**4**
Florfenicol	*103*	**91**
Nalidixic ac.	*101*	**99**
Flumequine	*72*	**94**
Enrofloxacin	*147*	**99**
Marbofloxacin	*144*	**100**
Danofloxacin	*62*	**98**
Sulfonamides	*32*	**100**
Trimethoprim	*31*	**100**
Trimethoprim-Sulfonamides	*164*	**99**

Table 12 - Cattle 2018 – Mastitis – Adults – *Klebsiella pneumoniae:* susceptibility to antibiotics (proportion) (N= 88)

Antibiotic	*Total (N)*	**% S**
Amoxicillin-Clavulanic ac.	*88*	**84**
Cefoxitin	*73*	**93**
Cefuroxime	*38*	**95**
Cefoperazone	*53*	**98**
Ceftiofur	*71*	**99**
Cefquinome 30 µg	*77*	**97**
Streptomycin 10 UI	*65*	**85**
Kanamycin 30 UI	*34*	**97**
Gentamicin 10 UI	*88*	**99**
Neomycin	*53*	**100**
Tetracycline	*82*	**79**
Florfenicol	*48*	**100**
Nalidixic ac.	*49*	**98**
Flumequine	*35*	**94**
Enrofloxacin	*70*	**100**
Marbofloxacin	*71*	**100**
Trimethoprim-Sulfonamides	*85*	**92**

Table 13 - Cattle 2018 – Mastitis – Adults – Coagulase-positive *Staphylococcus*: susceptibility to antibiotics (proportion) (N= 559)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*553*	**80**
Cefoxitin	*521*	**82**
Oxacillin	*56*	**96**
Cefovecin	*130*	**98**
Erythromycin	*495*	**95**
Tylosin	*379*	**98**
Spiramycin	*550*	**97**
Lincomycin	*547*	**96**
Pirlimycin	*53*	**94**
Streptomycin 10 UI	*436*	**91**
Kanamycin 30 UI	*351*	**99**
Gentamicin 10 UI	*543*	**99**
Neomycin	*344*	**99**
Tetracycline	*519*	**92**
Florfenicol	*177*	**99**
Enrofloxacin	*445*	**99**
Marbofloxacin	*499*	**99**
Trimethoprim-Sulfonamides	*482*	**100**
Rifampicin	*143*	**99**

Table 14 - Cattle 2018 – Mastitis – Adults – Coagulase-negative *Staphycoccus*: susceptibility to antibiotics (proportion) (N= 762)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*758*	**73**
Cefoxitin	*706*	**94**
Oxacillin	*98*	**96**
Cefovecin	*138*	**96**
Erythromycin	*703*	**87**
Tylosin	*508*	**93**
Spiramycin	*755*	**92**
Lincomycin	*756*	**82**
Pirlimycin	*55*	**96**
Streptomycin 10 UI	*555*	**86**
Kanamycin 30 UI	*448*	**98**
Gentamicin 10 UI	*751*	**99**
Neomycin	*509*	**99**
Tetracycline	*731*	**87**
Florfenicol	*272*	**98**
Enrofloxacin	*633*	**99**
Marbofloxacin	*653*	**99**
Trimethoprim-Sulfonamides	*645*	**97**
Rifampicin	*239*	**97**

Table 15 - Cattle 2018 – Mastitis – Adults – *Streptococcus uberis*: susceptibility to antibiotics (proportion) (N= 1,250)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*1,052*	**88**
Cefovecin	*32*	**94**
Erythromycin	*1,178*	**85**
Tulathromycin	*31*	**90**
Tylosin	*761*	**79**
Spiramycin	*1,208*	**82**
Lincomycin	*1,215*	**82**
Streptomycin 500 µg	*1,089*	**86**
Kanamycin 1000 µg	*904*	**93**
Gentamicin 500 µg	*1,153*	**98**
Tetracycline	*1,139*	**80**
Doxycycline	*45*	**93**
Florfenicol	*457*	**96**
Enrofloxacin	*1,068*	**63**
Marbofloxacin	*1,001*	**92**
Trimethoprim-Sulfonamides	*1,164*	**78**
Rifampicin	*359*	**50**

Table 16 - Cattle 2018 – Mastitis – Adults – *Streptococcus dysgalactiae:* susceptibility to antibiotics (proportion) (N= 207)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*182*	**98**
Erythromycin	*184*	**84**
Tylosin	*140*	**86**
Spiramycin	*202*	**91**
Lincomycin	*201*	**88**
Streptomycin 500 µg	*176*	**97**
Kanamycin 1000 µg	*152*	**98**
Gentamicin 500 µg	*189*	**99**
Tetracycline	*183*	**19**
Florfenicol	*66*	**95**
Enrofloxacin	*172*	**53**
Marbofloxacin	*161*	**92**
Trimethoprim-Sulfonamides	*180*	**85**
Rifampicin	*57*	**54**

Annex 3

Sheep

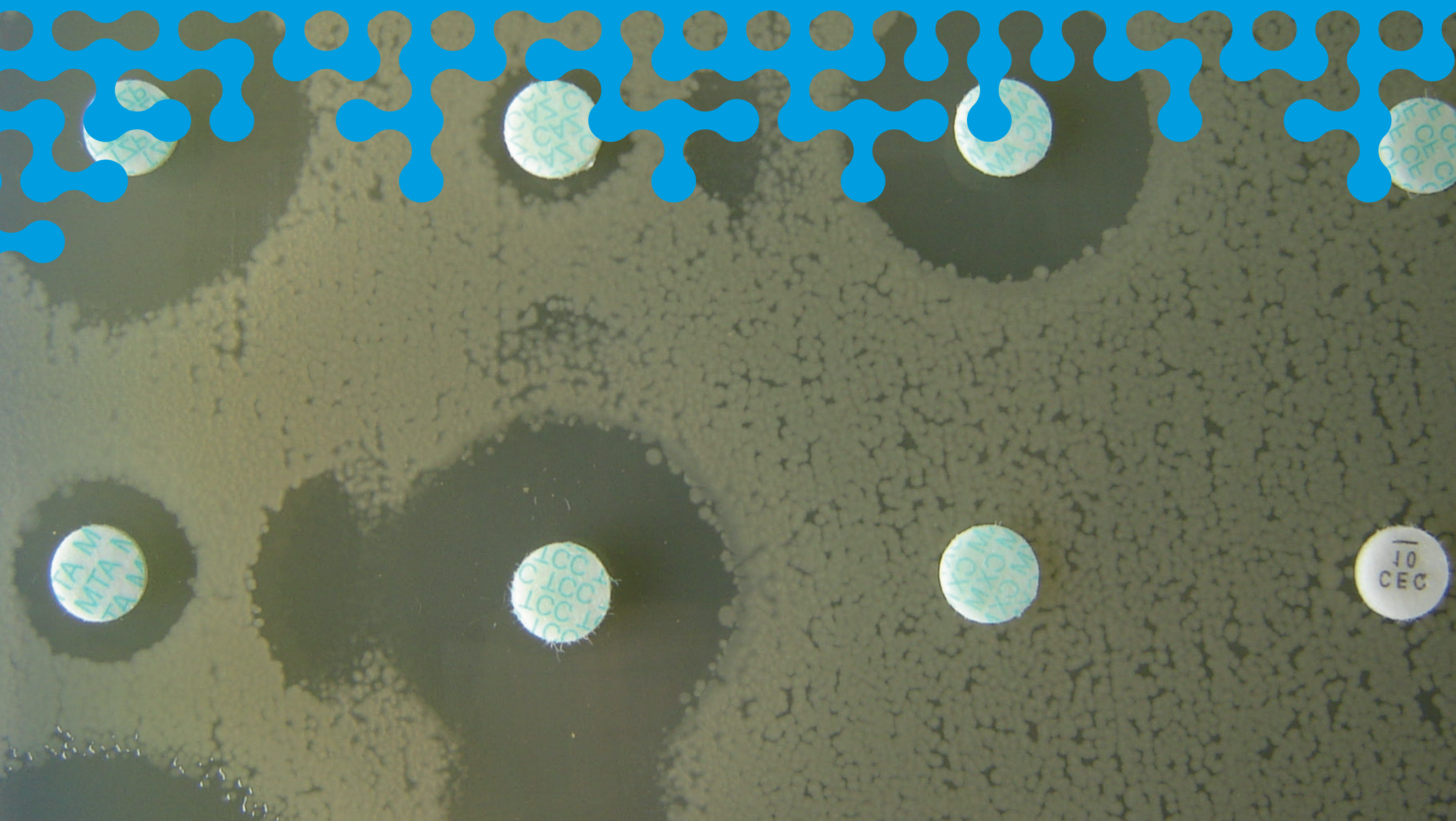
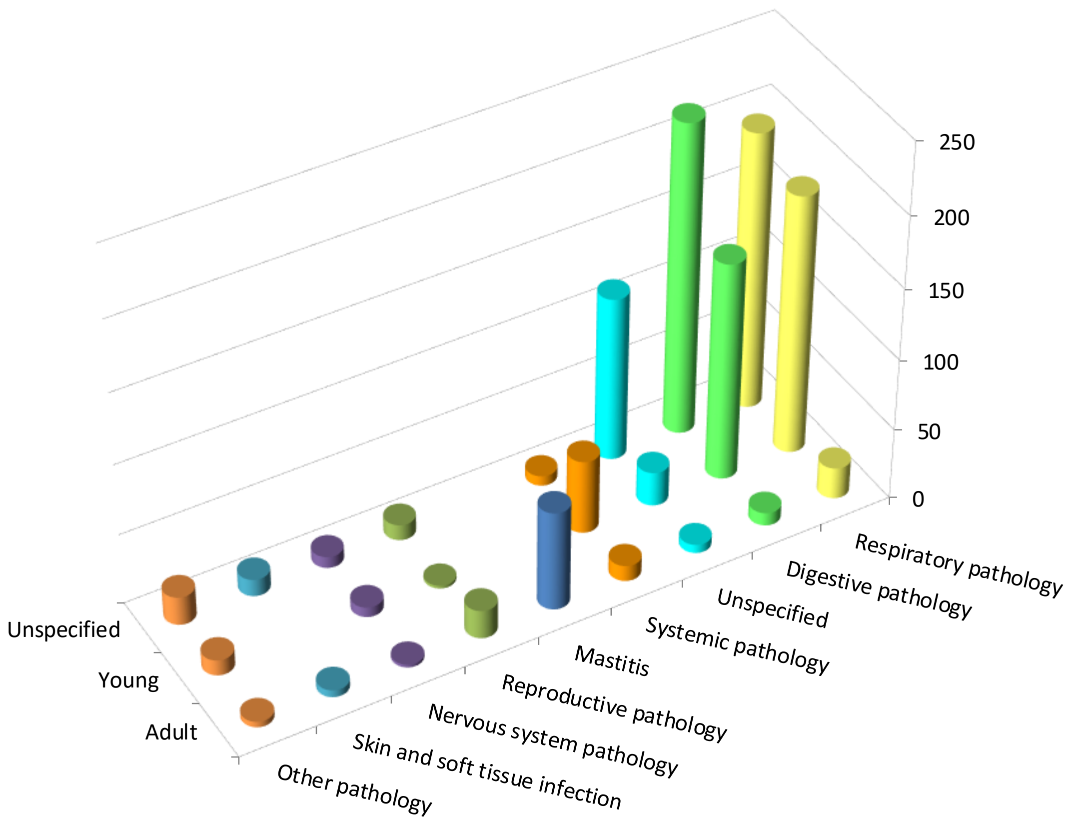


Figure 1 - Sheep 2018 – Number of antibiograms by age group and pathology

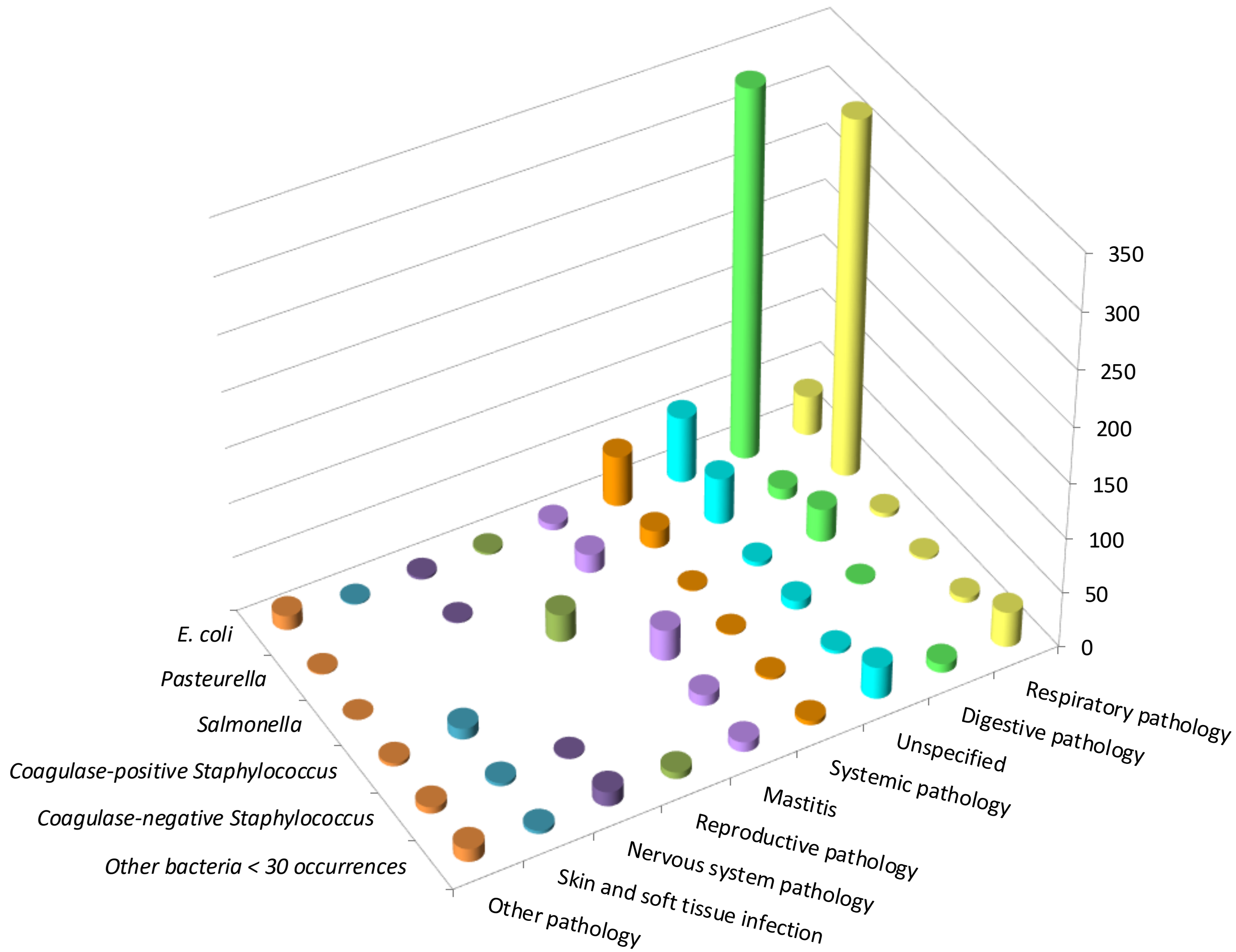


Note: *all values are detailed in table 1 (including other pathologies. representing less than 1%, grouped together)*

Table 1 - Sheep 2018 – Number of antibiograms by age group and pathology

Pathology N (%)	Age group N (%)			Total N (%)
	Unspecified	Young	Adult	
Respiratory pathology	196 *(16.7)*	183 *(15.6)*	22 *(1.9)*	**401** ***(34.2)***
Digestive pathology	220 *(18.8)*	154 *(13.1)*	9 *(0.8)*	**383** ***(32.7)***
Unspecified	116 *(9.9)*	24 *(2)*	6 *(0.5)*	**146** ***(12.5)***
Systemic pathology	7 *(0.6)*	52 *(4.4)*	11 *(0.9)*	**70** ***(6.0)***
Mastitis			70 *(6)*	**70** ***(6.0)***
Reproductive pathology	11 *(0.9)*	2 *(0.2)*	20 *(1.7)*	**33** ***(2.8)***
Nervous system pathology	8 *(0.7)*	7 *(0.6)*	2 *(0.2)*	**17** ***(1.5)***
Skin and soft tissue infections	12 *(1)*		5 *(0.4)*	**17** ***(1.5)***
Arthritis	8 *(0.7)*	1 *(0.1)*		**9** ***(0.8)***
Septicemia	2 *(0.2)*	6 *(0.5)*		**8** ***(0.7)***
Ocular pathology	3 *(0.3)*		4 *(0.3)*	**7** ***(0.6)***
Cardiac pathology	3 *(0.3)*	2 *(0.2)*		**5** ***(0.4)***
Kidney and urinary tract pathology	3 *(0.3)*	1 *(0.1)*		**4** ***(0.3)***
Bone pathology	1 *(0.1)*			**1** ***(0.1)***
Omphalitis		1 *(0.1)*		**1** ***(0.1)***
Total N ***(%)***	**590** ***(50.3)***	**433** ***(36.9)***	**149** ***(12.7)***	**1,172** ***(100.0)***

Figure 2 - Sheep 2018 – Number of antibiograms by bacterial group and pathology



Note: *only values for pathologies >1% and bacterial groups having more than 30 occurrences are represented. Detailed values are presented in table 2 below.*

Table 2 - Sheep 2018 – Number of antibiograms by bacterial group and pathology

Bacteria N (%)	Pathology N (%)															Total N (%)
	Respiratory pathology	Digestive pathology	Unspecified	Systemic pathology	Mastitis	Reproductive pathology	Nervous system pathology	Skin and soft tissue infections	Arthritis	Septicemia	Ocular pathology	Cardiac pathology	Kidney and urinary tract pathology	Bone pathology	Omphalitis	
E. coli	36 *(3.1)*	334 *(28.5)*	60 *(5.1)*	46 *(3.9)*	6 *(0.5)*	2 *(0.2)*	2 *(0.2)*	1 *(0.1)*		6 *(0.5)*		3 *(0.3)*	3 *(0.3)*		1 *(0.1)*	**500 *(42.7)***
Pasteurella	322 *(27.5)*	10 *(0.9)*	42 *(3.6)*	16 *(1.4)*	17 *(1.5)*		1 *(0.1)*			1 *(0.1)*						**409 *(34.9)***
Salmonella	4 *(0.3)*	30 *(2.6)*	4 *(0.3)*	1 *(0.1)*		25 *(2.1)*										**64 *(5.5)***
Coagulase-positive Staphylococcus	2 *(0.2)*	1 *(0.1)*	8 *(0.7)*	1 *(0.1)*	28 *(2.4)*			10 *(0.9)*	1 *(0.1)*	1 *(0.1)*	1 *(0.1)*					**53 *(4.5)***
Coagulase-negative Staphylococcus	5 *(0.4)*		3 *(0.3)*	2 *(0.2)*	10 *(0.9)*		1 *(0.1)*	3 *(0.3)*			4 *(0.3)*	1 *(0.1)*		1 *(0.1)*		**30 *(2.6)***
Other bacteria < 30 occurrences	32 *(2.7)*	8 *(0.7)*	29 *(2.5)*	4 *(0.3)*	9 *(0.8)*	6 *(0.5)*	13 *(1.1)*	3 *(0.3)*	8 *(0.7)*		2 *(0.2)*	1 *(0.1)*	1 *(0.1)*			**116 *(9.9)***
Total N *(%)*	**401 *(34.2)***	**383 *(32.7)***	**146 *(12.5)***	**70 *(6.0)***	**70 *(6.0)***	**33 *(2.8)***	**17 *(1.5)***	**17 *(1.5)***	**9 *(0.8)***	**8 *(0.7)***	**7 *(0.6)***	**5 *(0.4)***	**4 *(0.3)***	**1 *(0.1)***	**1 *(0.1)***	**1,172 *(100.0)***

Table 3 - Sheep 2018 – Digestive pathology – *E. coli:* susceptibility to antibiotics (proportion) (N= 334)

Antibiotic	*Total (N)*	% S
Amoxicillin	*332*	**45**
Amoxicillin-Clavulanic ac.	*333*	**66**
Cephalexin	*313*	**92**
Cephalothin	*44*	**77**
Cefoxitin	*294*	**98**
Cefuroxime	*69*	**94**
Cefoperazone	*39*	**100**
Ceftiofur	*332*	**99**
Cefquinome 30 µg	*284*	**99**
Streptomycin 10 UI	*265*	**41**
Spectinomycin	*68*	**93**
Kanamycin 30 UI	*46*	**91**
Gentamicin 10 UI	*332*	**95**
Neomycin	*154*	**91**
Apramycin	*58*	**98**
Tetracycline	*311*	**44**
Florfenicol	*264*	**89**
Nalidixic ac.	*293*	**92**
Enrofloxacin	*318*	**96**
Marbofloxacin	*129*	**99**
Danofloxacin	*58*	**98**
Sulfonamides	*73*	**44**
Trimethoprim	*34*	**71**
Trimethoprim-Sulfonamides	*334*	**61**

Table 4 - Sheep 2018 – Respiratory pathology – All age groups – *Mannheimia haemolytica:* susceptibility to antibiotics (proportion) (N= 196)

Antibiotic	*Total (N)*	% S
Amoxicillin	*191*	**98**
Amoxicillin-Clavulanic ac.	*182*	**99**
Cephalexin	*161*	**99**
Cefoxitin	*107*	**100**
Ceftiofur	*193*	**99**
Cefquinome 30 µg	*166*	**98**
Streptomycin 10 UI	*145*	**19**
Gentamicin 10 UI	*178*	**93**
Neomycin	*45*	**49**
Tetracycline	*192*	**91**
Florfenicol	*194*	**99**
Nalidixic ac.	*160*	**89**
Enrofloxacin	*191*	**95**
Marbofloxacin	*77*	**100**
Danofloxacin	*30*	**87**
Trimethoprim-Sulfonamides	*196*	**96**

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Annex 4
Goats

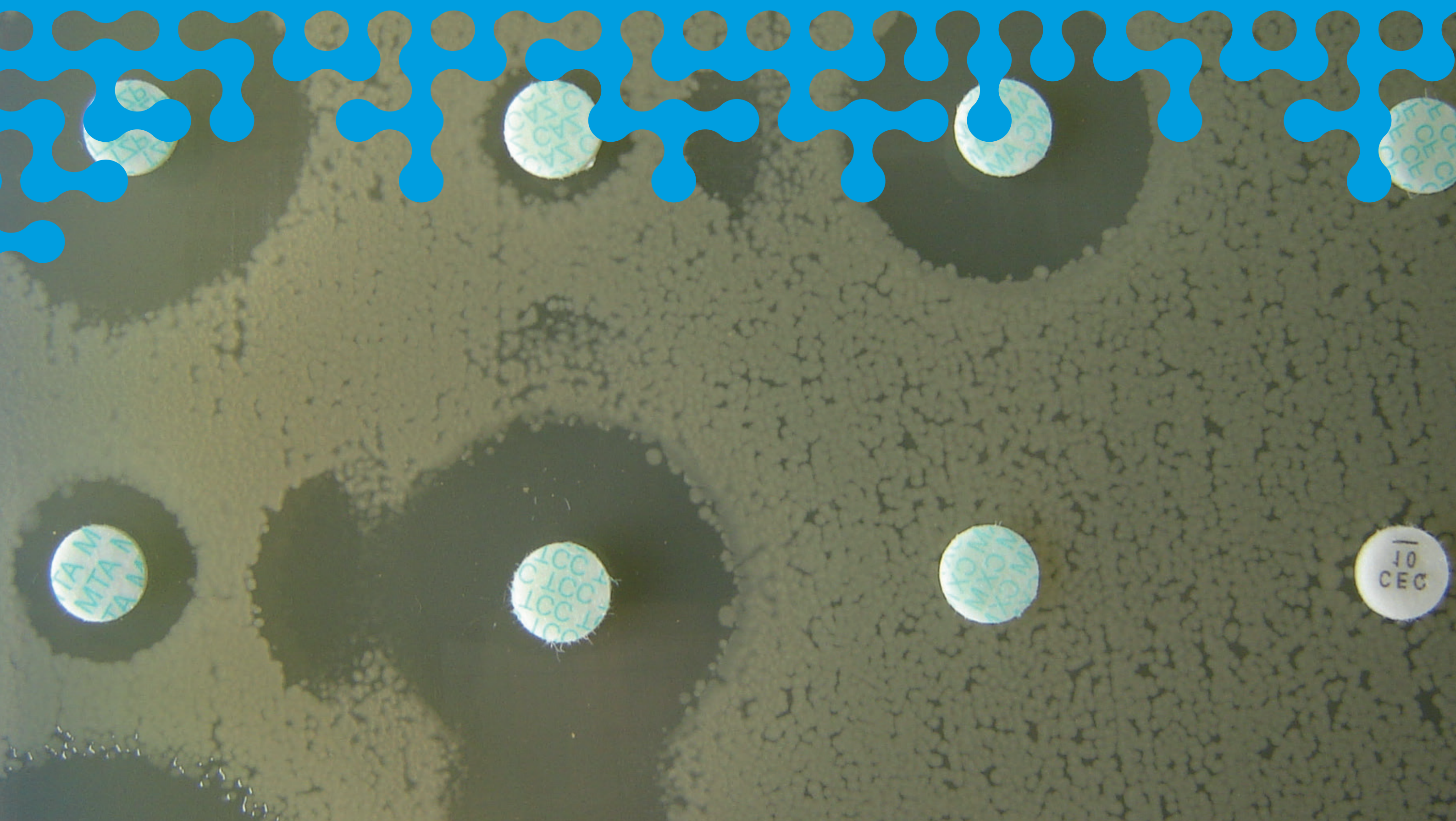
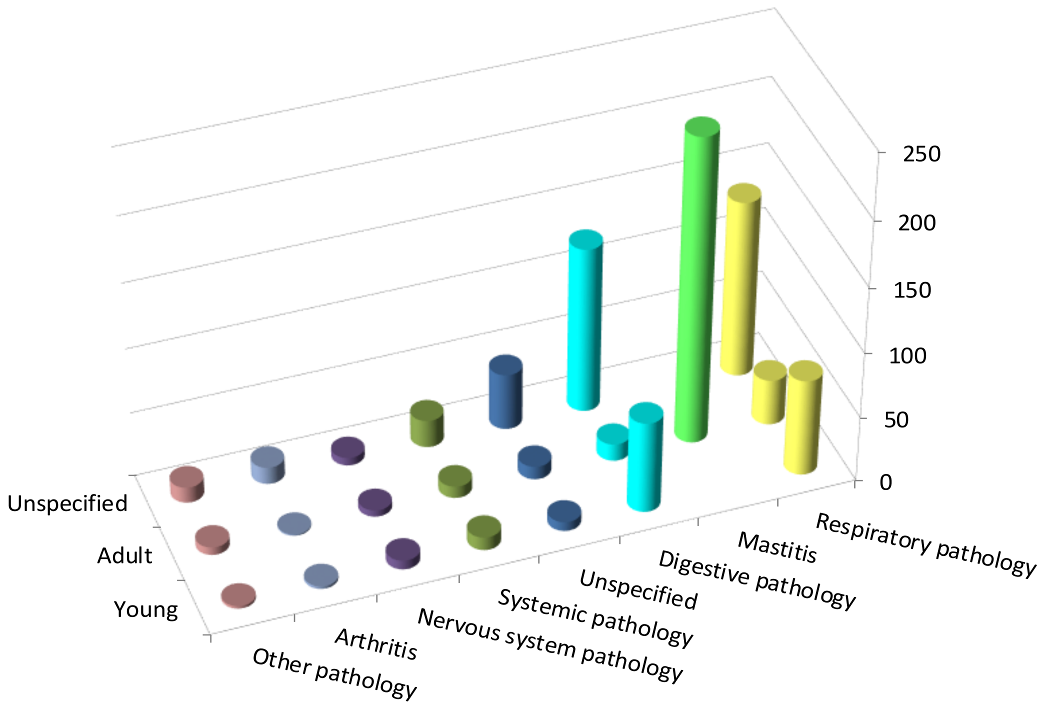


Figure 1 - Goats 2018 – Number of antibiograms by age group and pathology

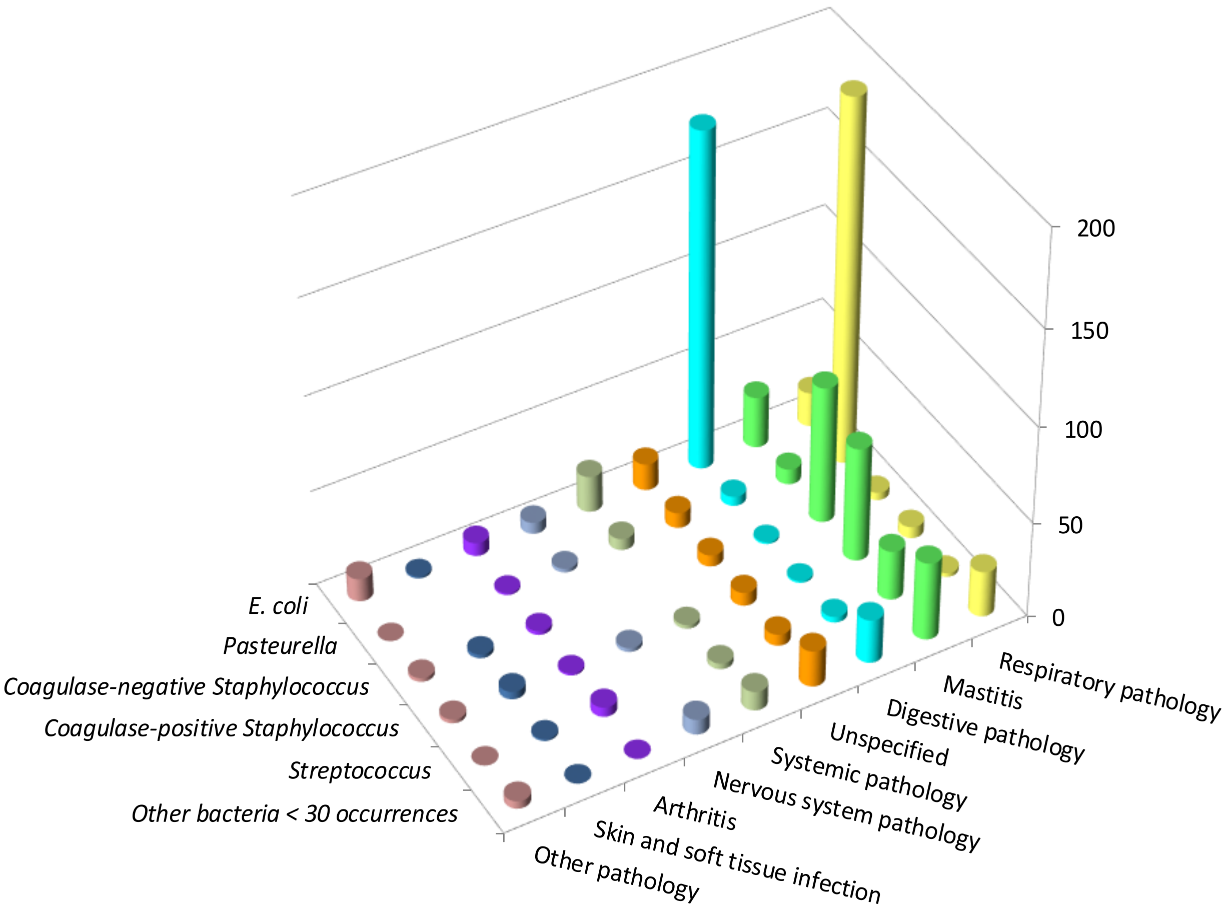


Note: *all values are detailed in table 1 (including other pathologies. representing less than 1%. grouped together)*

Table 1 - Goats 2018 – Number of antibiograms by age group and pathology

Pathology N (%)	Age group N (%)			Total N (%)
	Unspecified	Adult	Young	
Respiratory pathology	136 *(16.0)*	35 *(4.1)*	74 *(8.7)*	**245** ***(28.8)***
Mastitis		234 *(27.5)*		**234** ***(27.5)***
Digestive pathology	127 *(14.9)*	13 *(1.5)*	70 *(8.2)*	**210** ***(24.7)***
Unspecified	43 *(5.1)*	10 *(1.2)*	7 *(0.8)*	**60** ***(7.1)***
Systemic pathology	21 *(2.5)*	9 *(1.1)*	10 *(1.2)*	**40** ***(4.7)***
Nervous system pathology	6 *(0.7)*	5 *(0.6)*	7 *(0.8)*	**18** ***(2.1)***
Arthritis	13 *(1.5)*	1 *(0.1)*	2 *(0.2)*	**16** ***(1.9)***
Skin and soft tissue infections	4 *(0.5)*	3 *(0.4)*	1 *(0.1)*	**8** ***(0.9)***
Reproductive pathology	3 *(0.4)*	3 *(0.4)*		**6** ***(0.7)***
Kidney and urinary tract pathology	4 *(0.5)*	1 *(0.1)*		**5** ***(0.6)***
Otitis	2 *(0.2)*			**2** ***(0.2)***
Oral pathology		1 *(0.1)*	1 *(0.1)*	**2** ***(0.2)***
Cardiac pathology	2 *(0.2)*			**2** ***(0.2)***
Ocular pathology	1 *(0.1)*	1 *(0.1)*		**2** ***(0.2)***
Septicemia			1 *(0.1)*	**1** ***(0.1)***
Total N ***(%)***	**362** ***(42.5)***	**316** ***(37.1)***	**173** ***(20.3)***	**851** ***(100.0)***

Figure 2 - Goats 2018 – Number of antibiograms by bacterial group and pathology



Note: *only values for pathologies >1% and bacterial groups having more than 30 occurrences are represented. Detailed values are presented in table 2 below.*

Table 2 - Goats 2018 – Number of antibiograms by bacterial group and pathology

Bacteria N (%)	**Pathology N (%)**															**Total N *(%)***
	Respiratory pathology	Mastitis	Digestive pathology	Unspecified	Systemic pathology	Nervous system pathology	Arthritis	Skin and soft tissue infections	Reproductive pathology	Kidney and urinary tract pathology	Otitis	Oral pathology	Cardiac pathology	Ocular pathology	Septicemia	
E. coli	18 *(2.1)*	27 *(3.2)*	177 *(20.8)*	14 *(1.6)*	19 *(2.2)*	6 *(0.7)*	7 *(0.8)*	1 *(0.1)*	4 *(0.5)*	5 *(0.6)*		1 *(0.1)*	1 *(0.1)*		1 *(0.1)*	**281 *(33.0)***
Pasteurella	191 *(22.4)*	8 *(0.9)*	5 *(0.6)*	8 *(0.9)*	6 *(0.7)*	2 *(0.2)*	1 *(0.1)*									**221 *(26.0)***
Coagulase-negative Staphylococcus	4 *(0.5)*	72 *(8.5)*	1 *(0.1)*	6 *(0.7)*			2 *(0.2)*	2 *(0.2)*					1 *(0.1)*	1 *(0.1)*		**89 *(10.5)***
Coagulase-positive Staphylococcus	6 *(0.7)*	60 *(7.1)*	1 *(0.1)*	7 *(0.8)*	2 *(0.2)*	2 *(0.2)*	1 *(0.1)*	4 *(0.5)*			1 *(0.1)*	1 *(0.1)*				**85 *(10.0)***
Streptococcus	2 *(0.2)*	26 *(3.1)*	3 *(0.4)*	6 *(0.7)*	3 *(0.4)*		5 *(0.6)*	1 *(0.1)*								**46 *(5.4)***
Other bacteria < 30 occurrences	24 *(2.8)*	41 *(4.8)*	23 *(2.7)*	19 *(2.2)*	10 *(1.2)*	8 *(0.9)*			2 *(0.2)*		1 *(0.1)*			**1** *(0.1)*		**129 *(15.2)***
Total N *(%)*	**245 *(28.8)***	**234 *(27.5)***	**210 *(24.7)***	**60 *(7.1)***	**40 *(4.7)***	**18 *(2.1)***	**16 *(1.9)***	**8 *(0.9)***	**6 *(0.7)***	**5 *(0.6)***	**2 *(0.2)***	**2 *(0.2)***	**2 *(0.2)***	**2 *(0.2)***	**1 *(0.1)***	**851 *(100.0)***

Table 3 - Goats 2018 – All pathologies and age groups included – *E. coli:* susceptibility to antibiotics (proportion) (N= 281)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*280*	**47**
Amoxicillin-Clavulanic ac.	*281*	**68**
Cephalexin	*259*	**86**
Cephalothin	*124*	**83**
Cefoxitin	*254*	**95**
Cefuroxime	*148*	**95**
Cefoperazone	*127*	**97**
Ceftiofur	*278*	**97**
Cefquinome 30 µg	*257*	**96**
Streptomycin 10 UI	*206*	**41**
Spectinomycin	*143*	**90**
Kanamycin 30 UI	*125*	**80**
Gentamicin 10 UI	*270*	**91**
Neomycin	*190*	**82**
Apramycin	*86*	**98**
Tetracycline	*268*	**43**
Florfenicol	*232*	**85**
Nalidixic ac.	*228*	**84**
Flumequine	*65*	**85**
Enrofloxacin	*258*	**91**
Marbofloxacin	*198*	**94**
Danofloxacin	*121*	**95**
Sulfonamides	*33*	**39**
Trimethoprim	*30*	**77**
Trimethoprim-Sulfonamides	*280*	**64**

Table 4 - Goats 2018 – All pathologies and age groups included – *Pasteurella*: susceptibility to antibiotics (proportion) (N= 221)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*216*	**90**
Amoxicillin-Clavulanic ac.	*199*	**93**
Cephalexin	*172*	**96**
Cephalothin	*76*	**100**
Cefoxitin	*92*	**100**
Cefuroxime	*73*	**100**
Cefoperazone	*74*	**97**
Ceftiofur	*210*	**98**
Cefquinome 30 µg	*201*	**95**
Streptomycin 10 UI	*175*	**33**
Spectinomycin	*97*	**35**
Kanamycin 30 UI	*83*	**51**
Gentamicin 10 UI	*199*	**92**
Neomycin	*114*	**46**
Tetracycline	*211*	**84**
Doxycycline	*36*	**83**
Florfenicol	*208*	**99**
Nalidixic ac.	*169*	**85**
Oxolinic ac.	*31*	**90**
Flumequine	*51*	**80**
Enrofloxacin	*217*	**90**
Marbofloxacin	*173*	**97**
Danofloxacin	*102*	**92**
Sulfonamides	*31*	**32**
Trimethoprim-Sulfonamides	*221*	**75**

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Pigs

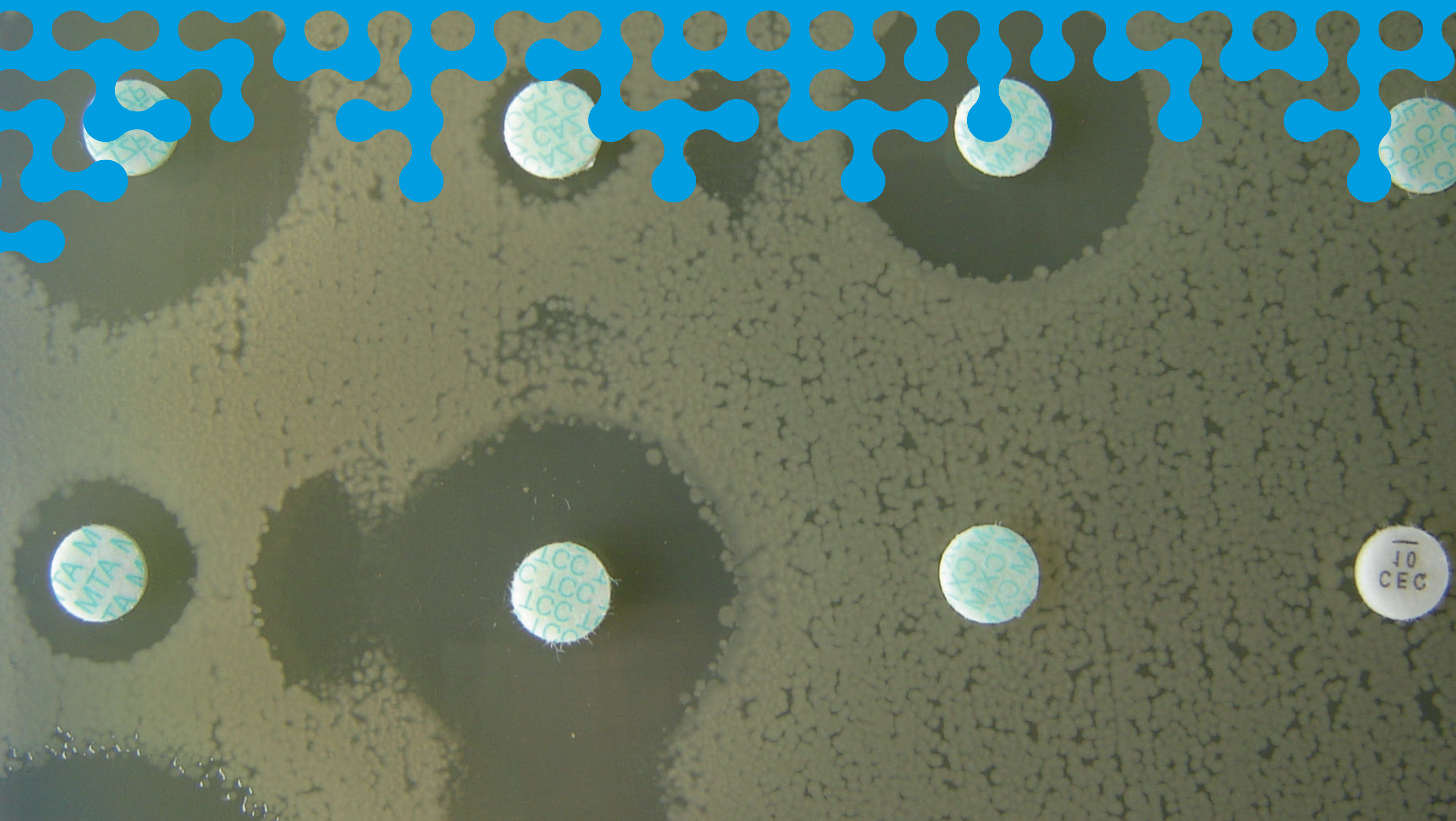


Figure 1 - Pigs 2018 – Antibiogram proportions by animal category

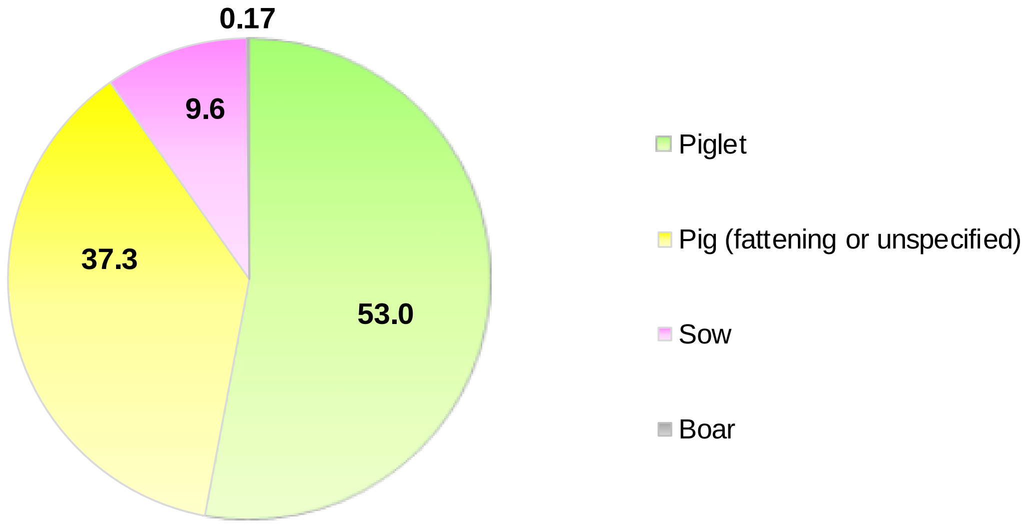
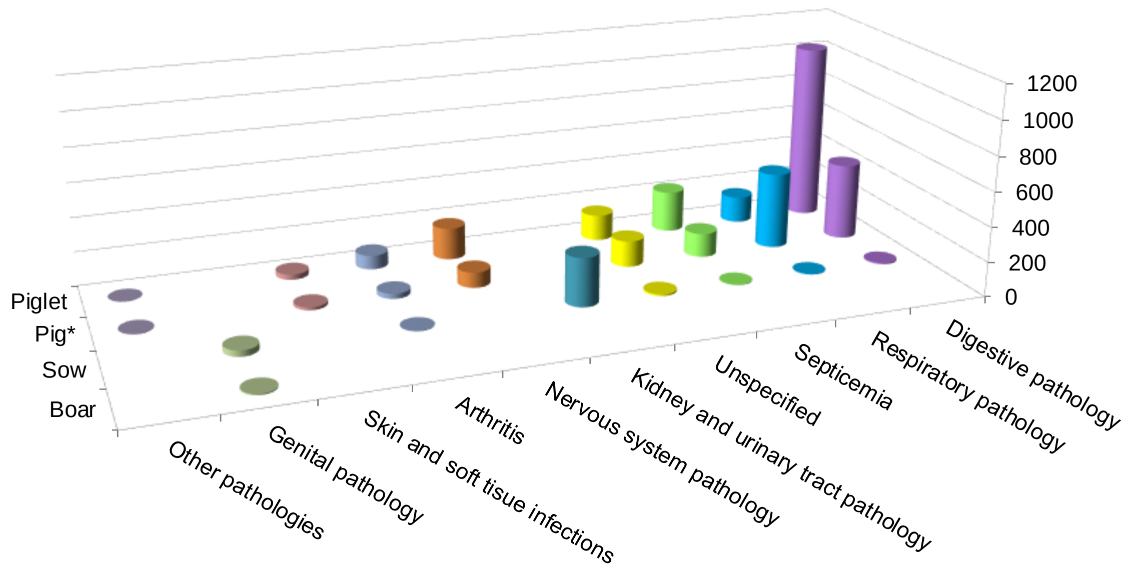


Figure 2 - Pigs 2018 – Number of antibiograms by pathology and animal category

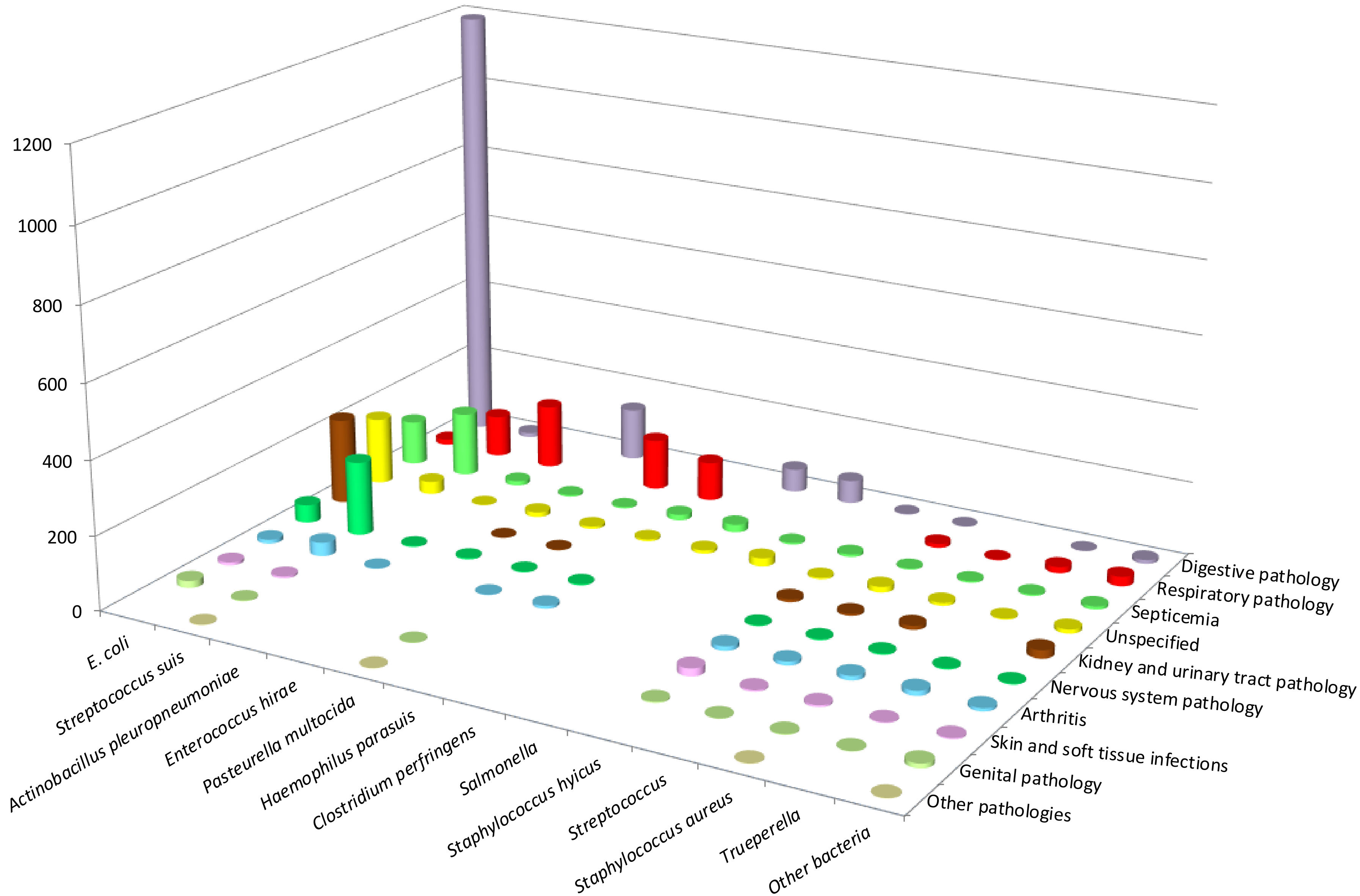


* fattening or unspecified

Table 1 - Pigs 2018 – Number of antibiograms by pathology and animal category

Age group or physiological stage N (%)	Pathology N *(%)*										Total N *(%)*
	Digestive pathology	Respiratory pathology	Septicemia	Unspecified	Kidney and urinary tract pathology	Nervous system pathology	Arthritis	Skin and soft tissue infections	Genital pathology	Other	
Piglet	1,034 *(29.09)*	155 *(4.36)*	241 *(6.78)*	152 *(4.28)*		186 *(5.23)*	82 *(2.31)*	31 *(0.87)*		1 *(0.03)*	**1,882** ***(52.95)***
Porc	447 *(12.58)*	445 *(12.52)*	140 *(3.94)*	153 *(4.31)*		90 *(2.53)*	29 *(0.82)*	17 *(0.48)*		3 *(0.08)*	**1,324** ***(37.25)***
Sow	7 *(0.20)*	3 *(0.08)*	2 *(0.06)*	10 *(0.28)*	284 *(7.99)*		1 *(0.03)*		35 *(0.98)*		**342** ***(9.62)***
Boar									6 *(0.17)*		**6** ***(0.17)***
Total N **(*%*)**	**1,488** ***(41.87)***	**603** ***(16.97)***	**383** ***(10.78)***	**315** ***(8.86)***	**284** ***(7.99)***	**276** ***(7.77)***	**112** ***(3.15)***	**48** ***(1.35)***	**41** ***(1.15)***	**4** ***(0.11)***	**3,554** ***(100.00)***

Figure 3 - Pigs 2018 – Number of antibiograms by bacteria and pathology



Note: *only values for pathologies and bacteria having more than 30 occurrences are represented. Detailed values are presented in table 2 below.*

Table 2 - Pigs 2018 – Number of antibiograms by bacteria and pathology

Bacteria N *(%)*	Pathology N *(%)*: Digestive pathology	Respiratory pathology	Septicemia	Unspecified	Kidney and urinary tract pathology	Nervous system pathology	Arthritis	Skin and soft tissue infections	Genital pathology	Other	**Total N *(%)***
E. coli	1,194 *(33.60)*	15 *(0.42)*	121 *(3.40)*	183 *(5.15)*	234 *(6.58)*	49 *(1.38)*	11 *(0.31)*	8 *(0.23)*	19 *(0.53)*		**1,834 *(51.60)***
Streptococcus suis	12 *(0.34)*	114 *(3.21)*	175 *(4.92)*	34 *(0.96)*		202 *(5.68)*	37 *(1.04)*	5 *(0.14)*	2 *(0.06)*	1 *(0.03)*	**582 *(16.38)***
Actinobacillus pleuropneumoniae		174 *(4.90)*	12 *(0.34)*	1 *(0.03)*		3 *(0.08)*	1 *(0.03)*				**191 *(5.37)***
Enterococcus hirae	142 *(4.00)*		5 *(0.14)*	13 *(0.37)*	1 *(0.03)*	4 *(0.11)*					**165 *(4.64)***
Pasteurella multocida		138 *(3.88)*	4 *(0.11)*	7 *(0.20)*	2 *(0.06)*	2 *(0.06)*	1 *(0.03)*		1 *(0.03)*	1 *(0.03)*	**156 *(4.39)***
Haemophilus parasuis		106 *(2.98)*	15 *(0.42)*	5 *(0.14)*		3 *(0.08)*	7 *(0.20)*				**136 *(3.83)***
Clostridium perfringens	63 *(1.77)*		21 *(0.59)*	9 *(0.25)*							**93 *(2.62)***
Salmonella	63 *(1.77)*		4 *(0.11)*	22 *(0.62)*							**89 *(2.50)***
Staphylococcus hyicus	2 *(0.06)*		7 *(0.20)*	4 *(0.11)*	8 *(0.23)*	2 *(0.06)*	12 *(0.34)*	21 *(0.59)*	3 *(0.08)*		**59 *(1.66)***
Streptococcus	1 *(0.03)*	11 *(0.31)*	3 *(0.08)*	15 *(0.42)*	6 *(0.17)*	3 *(0.08)*	10 *(0.28)*	4 *(0.11)*	1 *(0.03)*		**54 *(1.52)***
Staphylococcus aureus		2 *(0.06)*	4 *(0.11)*	8 *(0.23)*	11 *(0.31)*	3 *(0.08)*	12 *(0.34)*	5 *(0.14)*	2 *(0.06)*	1 *(0.03)*	**48 *(1.35)***
Trueperella	1 *(0.03)*	17 *(0.48)*	4 *(0.11)*	3 *(0.08)*		3 *(0.08)*	13 *(0.37)*	2 *(0.06)*	1 *(0.03)*		**44 *(1.24)***
Other bacteria < 30 occurrences	10 *(0.28)*	26 *(0.73)*	8 *(0.23)*	11 *(0.31)*	22 *(0.62)*	2 *(0.06)*	8 *(0.23)*	3 *(0.08)*	12 *(0.34)*	1 *(0.03)*	**103 *(2.90)***
Total N (%)	**1,488 *(41.87)***	**603 *(16.97)***	**383 *(10.78)***	**315 *(8.86)***	**284 *(7.99)***	**276 *(7.77)***	**112 *(3.15)***	**48 *(1.35)***	**41 *(1.15)***	**4 *(0.11)***	**3,554 *(100.00)***

Table 3 - Pigs 2018 – All pathologies and age groups included – *E. coli*: susceptibility to antibiotics (proportion) (N= 1,834)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,817*	**44**
Amoxicillin-Clavulanic ac.	*1,798*	**76**
Cephalexin	*930*	**91**
Cephalothin	*451*	**84**
Cefoxitin	*1,393*	**97**
Cefuroxime	*252*	**93**
Cefoperazone	*243*	**98**
Ceftiofur	*1,812*	**98**
Cefquinome 30 µg	*501*	**99**
Streptomycin 10 UI	*200*	**50**
Spectinomycin	*1,480*	**66**
Gentamicin 10 UI	*1,703*	**90**
Neomycin	*1,733*	**80**
Apramycin	*1,694*	**92**
Tetracycline	*1,529*	**34**
Florfenicol	*1,727*	**88**
Nalidixic ac.	*987*	**79**
Oxolinic ac.	*794*	**80**
Flumequine	*784*	**82**
Enrofloxacin	*1,755*	**96**
Marbofloxacin	*1,365*	**96**
Danofloxacin	*242*	**95**
Trimethoprim	*435*	**51**
Trimethoprim-Sulfonamides	*1,791*	**51**

Table 4 - Pigs 2018 – Digestive pathology – Piglets (post-weaning included) – *E. coli*: susceptibility to antibiotics (proportion) (N= 813)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*806*	**42**
Amoxicillin-Clavulanic ac.	*809*	**77**
Cephalexin	*462*	**93**
Cephalothin	*173*	**88**
Cefoxitin	*658*	**97**
Ceftiofur	*811*	**98**
Cefquinome 30 µg	*161*	**99**
Spectinomycin	*716*	**63**
Gentamicin 10 UI	*786*	**87**
Neomycin	*803*	**75**
Apramycin	*798*	**89**
Tetracycline	*630*	**32**
Florfenicol	*760*	**85**
Nalidixic ac.	*376*	**77**
Oxolinic ac.	*405*	**82**
Flumequine	*279*	**84**
Enrofloxacin	*807*	**96**
Marbofloxacin	*618*	**96**
Trimethoprim	*167*	**57**
Trimethoprim-Sulfonamides	*783*	**48**

Table 5 - Pigs 2018 – Kidney and urinary tract pathology – Sows – *E. coli*: susceptibility to antibiotics (proportion) (N= 234)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*231*	**53**
Amoxicillin-Clavulanic ac.	*216*	**73**
Ceftiofur	*217*	**99**
Spectinomycin	*154*	**79**
Gentamicin 10 UI	*184*	**98**
Neomycin	*170*	**94**
Apramycin	*164*	**100**
Tetracycline	*231*	**34**
Florfenicol	*231*	**92**
Nalidixic ac.	*142*	**85**
Enrofloxacin	*172*	**94**
Marbofloxacin	*222*	**95**
Trimethoprim-Sulfonamides	*233*	**63**

Table 6 - Pigs 2018 – All pathologies included – *Actinobacillus pleuropneumoniae*: susceptibility to antibiotics (proportion) (N= 191)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*183*	**99**
Ceftiofur	*190*	**100**
Tilmicosin	*187*	**95**
Tetracycline	*128*	**90**
Doxycycline	*153*	**89**
Florfenicol	*188*	**100**
Marbofloxacin	*157*	**99**
Trimethoprim-Sulfonamides	*191*	**96**

Table 7 - Pigs 2018 – All pathologies included – *Pasteurella multocida*: susceptibility to antibiotics (proportion) (N= 156)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*142*	**100**
Amoxicillin-Clavulanic ac.	*114*	**99**
Ceftiofur	*151*	**99**
Tilmicosin	*150*	**97**
Tetracycline	*133*	**94**
Florfenicol	*153*	**100**
Enrofloxacin	*114*	**100**
Marbofloxacin	*108*	**100**
Trimethoprim-Sulfonamides	*155*	**86**

Table 8 - Pigs 2018 – All pathologies included – *Streptococcus suis*: susceptibility to antibiotics (proportion) (N= 582)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*549*	**100**
Oxacillin	*576*	**97**
Erythromycin	*460*	**37**
Tylosin	*310*	**34**
Spiramycin	*323*	**37**
Lincomycin	*449*	**36**
Streptomycin 500 µg	*290*	**95**
Kanamycin 1000 µg	*216*	**95**
Gentamicin 500 µg	*457*	**99**
Tetracycline	*325*	**18**
Doxycycline	*150*	**24**
Trimethoprim-Sulfonamides	*582*	**79**

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Annex 6
Poultry

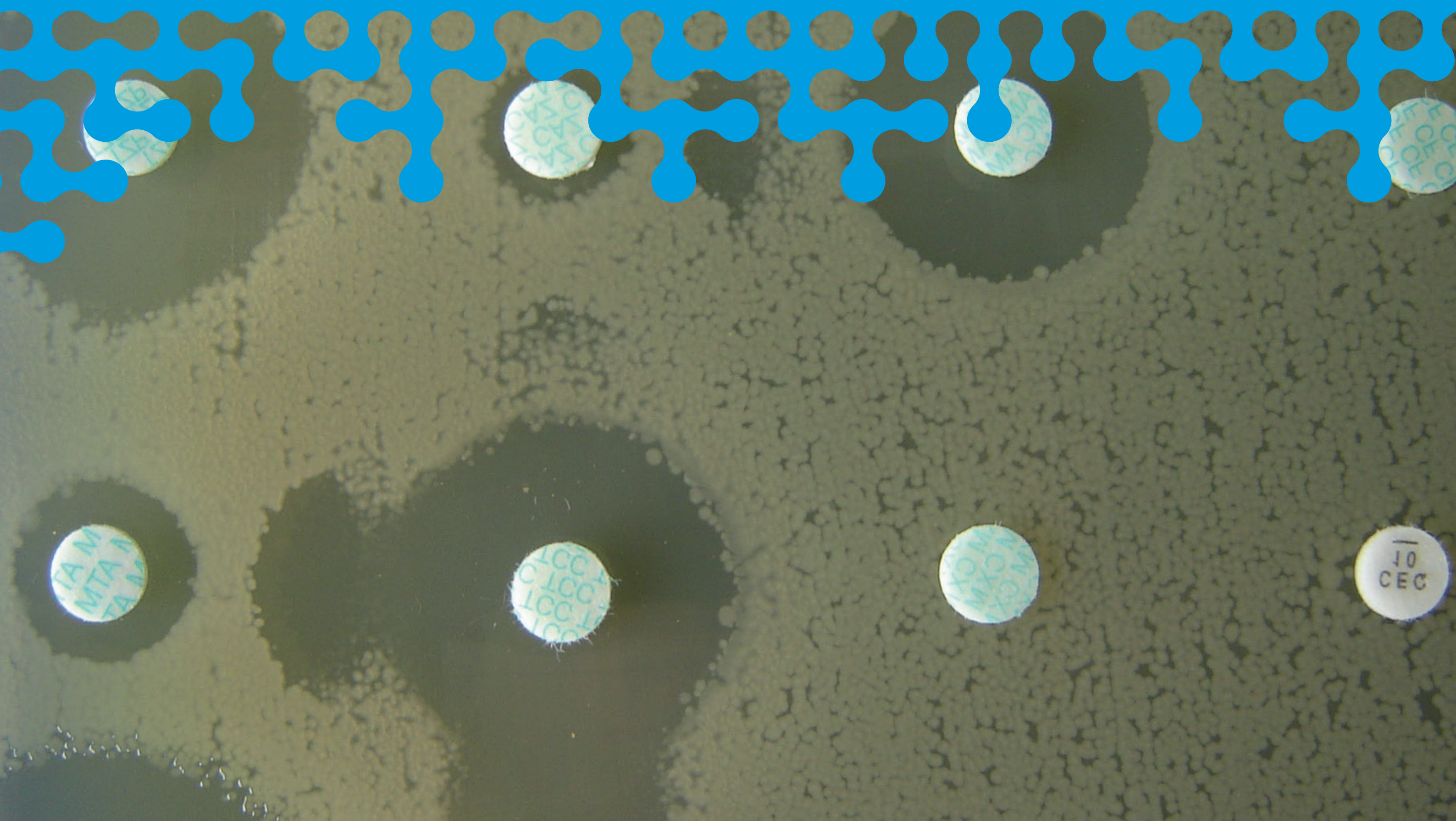
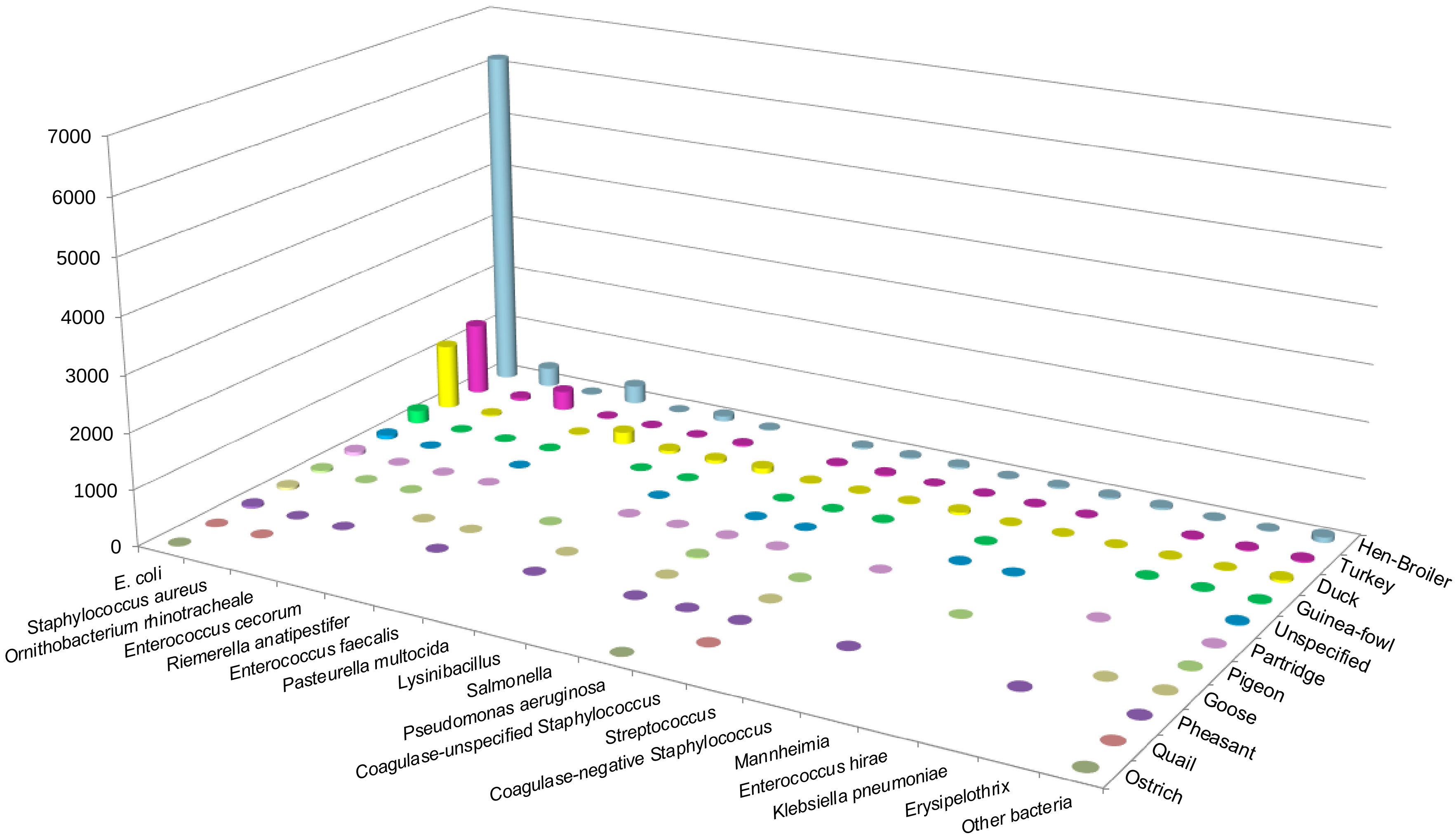


Figure 1 - Poultry 2018 – Number of antibiograms by bacteria and animal



Note: *only values for bacterial groups having more than 30 occurrences are represented. Detailed values are presented in table 1 below.*

Table 1. part 1 - Poultry 2018 – Number of antibiograms by bacteria and animal

Bacteria N *(%)*	**Animal species N *(%)***											**Total N *(%)***
	Hen-chicken	Turkey	Duck	Guinea-fowl	Poultry	Partridge	Pigeon	Goose	Pheasant	Quail	Ostrich	
E. coli	6,208 *(53.10)*	1,303 *(11.14)*	1,185 *(10.14)*	230 *(1.97)*	71 *(0.61)*	65 *(0.56)*	41 *(0.35)*	51 *(0.44)*	39 *(0.33)*	6 *(0.05)*	4 *(0.03)*	**9,203 *(78.71)***
Staphylococcus aureus	342 *(2.93)*	59 *(0.50)*	23 *(0.20)*	4 *(0.03)*	3 *(0.03)*	3 *(0.03)*	3 *(0.03)*		2 *(0.02)*	2 *(0.02)*		**441 *(3.77)***
Ornithobacterium rhinotracheale	8 *(0.07)*	351 *(3.00)*		4 *(0.03)*		5 *(0.04)*	1 *(0.01)*		2 *(0.02)*			**371 *(3.17)***
Enterococcus cecorum	332 *(2.84)*	9 *(0.08)*	7 *(0.06)*	5 *(0.04)*	1 *(0.01)*	2 *(0.02)*		1 *(0.01)*				**357 *(3.05)***
Riemerella anatipestifer	1 *(0.01)*	4 *(0.03)*	223 *(1.91)*					2 *(0.02)*	1 *(0.01)*			**231 *(1.98)***
Enterococcus faecalis	94 *(0.80)*	3 *(0.03)*	54 *(0.46)*	1 *(0.01)*			2 *(0.02)*					**154 *(1.32)***
Pasteurella multocida	17 *(0.15)*	30 *(0.26)*	60 *(0.51)*	1 *(0.01)*	1 *(0.01)*	1 *(0.01)*		1 *(0.01)*	3 *(0.03)*			**114 *(0.98)***
Lysinibacillus			95 *(0.81)*			1 *(0.01)*						**96 *(0.82)***
Salmonella	32 *(0.27)*	16 *(0.14)*	10 *(0.09)*	1 *(0.01)*	4 *(0.03)*	2 *(0.02)*	22 *(0.19)*	3 *(0.03)*	3 *(0.03)*			**93 *(0.80)***
Pseudomonas aeruginosa	27 *(0.23)*	26 *(0.22)*	5 *(0.04)*	2 *(0.02)*	1 *(0.01)*	4 *(0.03)*			2 *(0.02)*		1 *(0.01)*	**68 *(0.58)***
Coagulase-unspecified Staphylococcus	38 *(0.33)*	5 *(0.04)*	9 *(0.08)*	6 *(0.05)*			2 *(0.02)*	1 *(0.01)*	1 *(0.01)*	2 *(0.02)*		**64 *(0.55)***
Streptococcus	9 *(0.08)*	5 *(0.04)*	47 *(0.40)*			1 *(0.01)*						**62 *(0.53)***
Coagulase-negative Staphylococcus	32 *(0.27)*	7 *(0.06)*	5 *(0.04)*	6 *(0.05)*	4 *(0.03)*				1 *(0.01)*			**55 *(0.47)***
Mannheimia	37 *(0.32)*	3 *(0.03)*	4 *(0.03)*		6 *(0.05)*		3 *(0.03)*					**53 *(0.45)***

Table 1. part 2 - Poultry 2018 – Number of antibiograms by bacteria and animal

Bacteria N *(%)*	**Animal species N *(%)***											Total N *(%)*
	Hen-chicken	Turkey	Duck	Guinea-fowl	Poultry	Partridge	Pigeon	Goose	Pheasant	Quail	Ostrich	
Enterococcus hirae	40 *(0.34)*		2 *(0.02)*									**42 *(0.36)***
Klebsiella pneumoniae	6 *(0.05)*	14 *(0.12)*	4 *(0.03)*	6 *(0.05)*		3 *(0.03)*			6 *(0.05)*			**39 *(0.33)***
Erysipelothrix	10 *(0.09)*	17 *(0.15)*	6 *(0.05)*	5 *(0.04)*				1 *(0.01)*				**39 *(0.33)***
Other bacteria < 30 occurrences	94 *(0.80)*	27 *(0.23)*	45 *(0.38)*	9 *(0.08)*	15 *(0.13)*	3 *(0.03)*	6 *(0.05)*	5 *(0.04)*	4 *(0.03)*	1 *(0.01)*	1 *(0.01)*	**210 *(1.80)***
Total N (%)	**7,327 *(62.67)***	**1,879 *(16.07)***	**1,784 *(15.26)***	**280 *(2.39)***	**106 *(0.91)***	**90 *(0.77)***	**80 *(0.68)***	**65 *(0.56)***	**64 *(0.55)***	**11 *(0.09)***	**6 *(0.05)***	**11,692 *(100.00)***

Table 2 - Hens and broilers 2018 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N=6,208)

Antibiotic	*Total (N)*	**% S**
Ampicillin	*550*	**75**
Amoxicillin	*6,144*	**71**
Amoxicillin-Clavulanic ac.	*4,904*	**88**
Cephalexin	*2,044*	**93**
Cephalothin	*2,806*	**90**
Cefoxitin	*4,731*	**99**
Cefuroxime	*458*	**96**
Cefoperazone	*232*	**99**
Ceftiofur	*5,859*	**99**
Cefquinome 30 µg	*1,903*	**99**
Spectinomycin	*1,968*	**87**
Gentamicin 10 UI	*6,043*	**98**
Neomycin	*3,538*	**98**
Apramycin	*3,422*	**99**
Tetracycline	*5,086*	**62**
Doxycycline	*1,420*	**60**
Florfenicol	*4,707*	**99**
Nalidixic ac.	*5,184*	**61**
Oxolinic ac.	*1,224*	**63**
Flumequine	*4,925*	**64**
Enrofloxacin	*6,143*	**95**
Marbofloxacin	*434*	**94**
Danofloxacin	*243*	**89**
Sulfonamides	*222*	**69**
Trimethoprim	*2,983*	**82**
Trimethoprim-Sulfonamides	*6,144*	**80**

Table 3 – Laying hens (table eggs and hatching eggs) 2018 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N= 2,055)

Antibiotic	*Total (N)*	**% S**
Ampicillin	*121*	**80**
Amoxicillin	*1,999*	**79**
Amoxicillin-Clavulanic ac.	*1,741*	**91**
Cephalexin	*437*	**91**
Cephalothin	*1,261*	**92**
Cefoxitin	*1,624*	**99**
Ceftiofur	*1,945*	**99**
Cefquinome 30 µg	*436*	**99**
Spectinomycin	*436*	**87**
Gentamicin 10 UI	*1,992*	**98**
Neomycin	*1,370*	**98**
Apramycin	*1,310*	**99**
Tetracycline	*1,745*	**71**
Florfenicol	*1,651*	**99**
Nalidixic ac.	*1,861*	**72**
Oxolinic ac.	*132*	**68**
Flumequine	*1,756*	**74**
Enrofloxacin	*1,999*	**97**
Trimethoprim	*1,278*	**91**
Trimethoprim-Sulfonamides	*1,998*	**90**

Table 4 – Broilers 2018 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N= 3,726)

Antibiotic	*Total (N)*	**% S**
Ampicillin	*414*	**74**
Amoxicillin	*3,719*	**66**
Amoxicillin-Clavulanic ac.	*2,754*	**86**
Cephalexin	*1,291*	**94**
Cephalothin	*1,462*	**89**
Cefoxitin	*2,727*	**99**
Cefuroxime	*293*	**97**
Cefoperazone	*115*	**100**
Ceftiofur	*3,495*	**99**
Cefquinome 30 µg	*1,286*	**99**
Spectinomycin	*1,267*	**86**
Gentamicin 10 UI	*3,629*	**97**
Neomycin	*1,787*	**98**
Apramycin	*1,768*	**99.8**
Tetracycline	*2,960*	**56**
Doxycycline	*1,009*	**59**
Florfenicol	*2,703*	**99**
Nalidixic ac.	*3,165*	**55**
Oxolinic ac.	*850*	**63**
Flumequine	*2,964*	**58**
Enrofloxacin	*3,719*	**93**
Marbofloxacin	*137*	**91**
Danofloxacin	*121*	**89**
Sulfonamides	*180*	**68**
Trimethoprim	*1,629*	**75**
Trimethoprim-Sulfonamides	*3,719*	**75**

Table 5 - Turkeys 2018 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N= 1,303)

Antibiotic	*Total (N)*	**% S**
Ampicillin	*145*	**48**
Amoxicillin	*1,303*	**57**
Amoxicillin-Clavulanic ac.	*995*	**83**
Cephalexin	*585*	**94**
Cephalothin	*375*	**85**
Cefoxitin	*951*	**99**
Cefuroxime	*131*	**100**
Ceftiofur	*1,292*	**99**
Cefquinome 30 µg	*483*	**99**
Spectinomycin	*524*	**90**
Gentamicin 10 UI	*1,301*	**98**
Neomycin	*527*	**97**
Apramycin	*519*	**100**
Tetracycline	*996*	**58**
Doxycycline	*510*	**57**
Florfenicol	*949*	**99**
Nalidixic ac.	*1,106*	**79**
Oxolinic ac.	*186*	**70**
Flumequine	*982*	**79**
Enrofloxacin	*1,301*	**97**
Sulfonamides	*102*	**56**
Trimethoprim	*471*	**74**
Trimethoprim-Sulfonamides	*1,302*	**79**

Table 6 - Ducks 2018 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N= 1,185)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,179*	**62**
Amoxicillin-Clavulanic ac.	*1,135*	**78**
Cephalexin	*583*	**83**
Cephalothin	*561*	**70**
Cefoxitin	*1,114*	**98**
Ceftiofur	*1,176*	**99**
Cefquinome 30 µg	*579*	**98**
Spectinomycin	*564*	**95**
Gentamicin 10 UI	*1,153*	**99**
Neomycin	*672*	**97**
Apramycin	*648*	**100**
Tetracycline	*1,130*	**48**
Doxycycline	*461*	**45**
Florfenicol	*1,124*	**99**
Nalidixic ac.	*1,049*	**71**
Oxolinic ac.	*189*	**78**
Flumequine	*1,118*	**72**
Enrofloxacin	*1,179*	**98**
Trimethoprim	*640*	**60**
Trimethoprim-Sulfonamides	*1,179*	**63**

Table 7 - Guinea-fowls 2018 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N= 230)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*229*	**59**
Amoxicillin-Clavulanic ac.	*207*	**71**
Cephalexin	*112*	**90**
Cefoxitin	*175*	**98**
Ceftiofur	*210*	**99**
Cefquinome 30 µg	*108*	**99**
Spectinomycin	*128*	**85**
Gentamicin 10 UI	*224*	**97**
Tetracycline	*218*	**39**
Florfenicol	*171*	**97**
Nalidixic ac.	*168*	**77**
Flumequine	*215*	**76**
Enrofloxacin	*230*	**95**
Trimethoprim-Sulfonamides	*230*	**71**

Table 8 - Hens and broilers 2018 – All pathologies included - *Staphylococcus aureus*: susceptibility to antibiotics (proportion) (N= 342)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*313*	**91**
Cefoxitin	*287*	**91**
Erythromycin	*280*	**96**
Tylosin	*309*	**97**
Spiramycin	*261*	**96**
Lincomycin	*334*	**91**
Gentamicin 10 UI	*272*	**99**
Neomycin	*169*	**99**
Tetracycline	*279*	**93**
Doxycycline	*144*	**86**
Enrofloxacin	*338*	**99**
Trimethoprim-Sulfonamides	*340*	**99**

Table 9 - Hens and broilers 2018 – All pathologies included – *Enterococcus cecorum*: susceptibility to antibiotics (proportion) (N= 332)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*330*	**97**
Erythromycin	*220*	**68**
Tylosin	*209*	**65**
Spiramycin	*204*	**47**
Lincomycin	*319*	**63**
Gentamicin 500 µg	*208*	**98**
Tetracycline	*220*	**7**
Trimethoprim-Sulfonamides	*331*	**45**

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Annexe 7

Rabbits

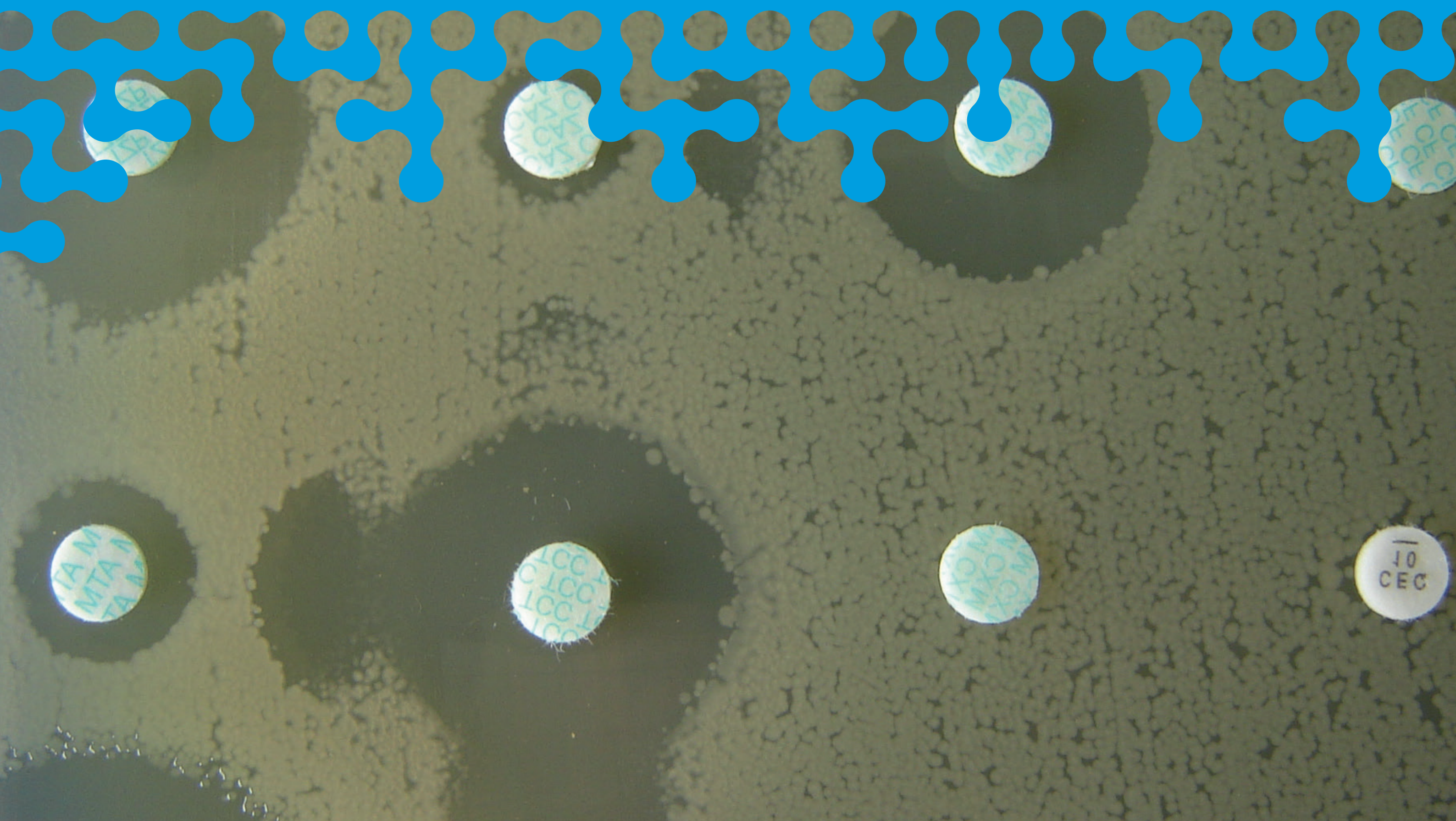
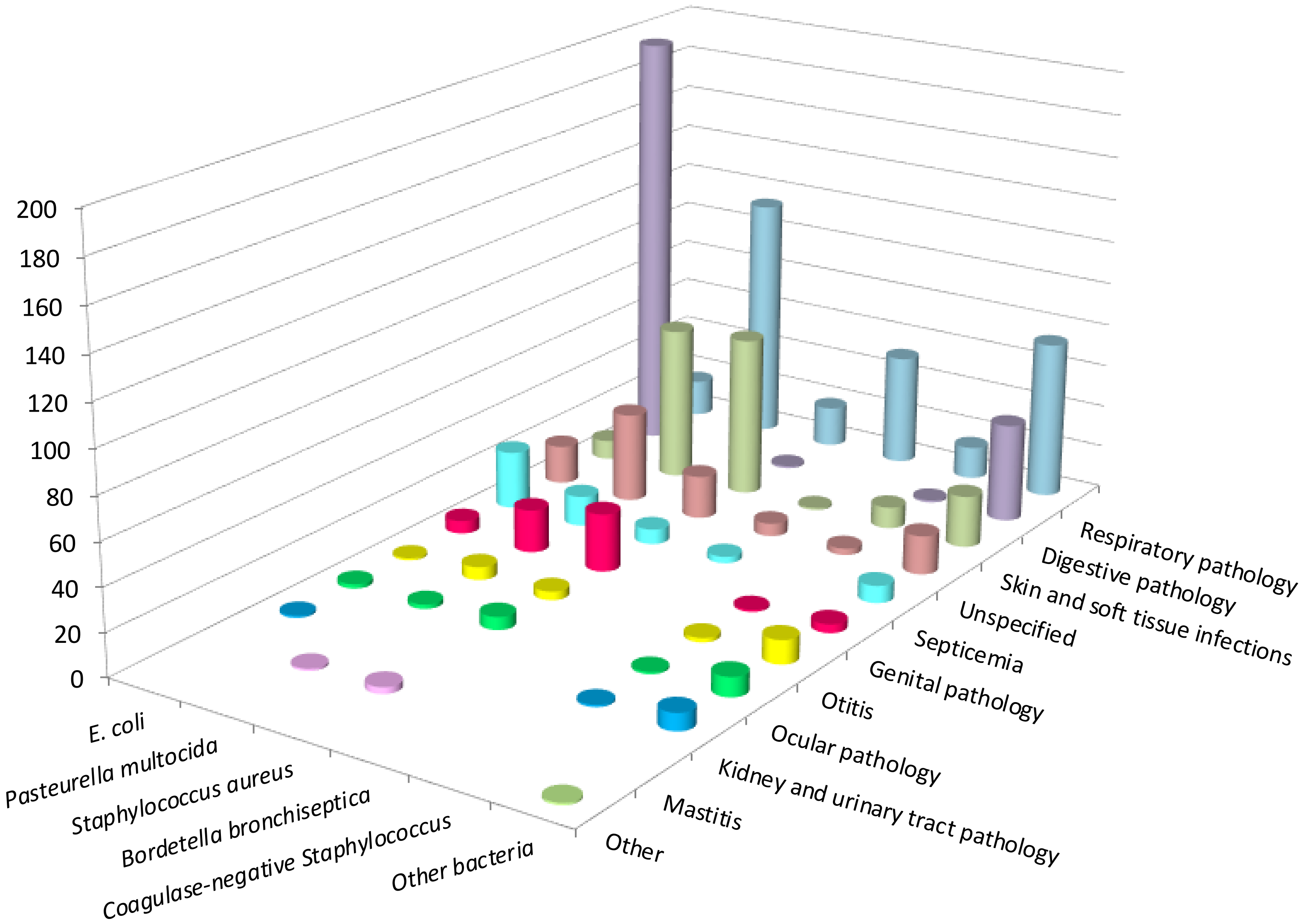


Figure 1 - Rabbits 2018 – Number of antibiograms by bacteria and pathology



Note: *only values for bacterial groups having more than 30 occurrences are represented. Detailed values are presented in table 1 below.*

Table 1 - Rabbits 2018 – Number of antibiograms by bacteria and pathology

Bacteria N ***(%)***	**Pathology N *(%)***											**Total N** ***(%)***
	Respiratory pathology	Digestive pathology	Skin and soft tissue infections	Unspecified	Septicemia	Genital pathology	Otitis	Ocular pathology	Kidney and urinary tract pathology	Mastitis	Other	
E. coli	17 *(1.68)*	196 *(19.43)*	9 *(0.89)*	18 *(1.78)*	27 *(2.68)*	6 *(0.59)*	1 *(0.10)*	2 *(0.20)*	1 *(0.10)*			**277** ***(27.45)***
Pasteurella multocida	114 *(11.30)*		72 *(7.14)*	42 *(4.16)*	14 *(1.39)*	20 *(1.98)*	6 *(0.59)*	2 *(0.20)*		1 *(0.10)*		**271** ***(26.86)***
Staphylococcus aureus	19 *(1.88)*	1 *(0.10)*	75 *(7.43)*	20 *(1.98)*	7 *(0.69)*	27 *(2.68)*	4 *(0.40)*	6 *(0.59)*		3 *(0.30)*		**162** ***(16.06)***
Bordetella bronchiseptica	52 *(5.15)*		1 *(0.10)*	6 *(0.59)*	3 *(0.30)*							**62** ***(6.14)***
Coagulase-negative Staphylococcus	15 *(1.49)*	1 *(0.10)*	10 *(0.99)*	3 *(0.30)*		1 *(0.10)*	2 *(0.20)*	1 *(0.10)*	1 *(0.10)*			**34** ***(3.37)***
Other bacteria < 30 occurrences	74 *(7.33)*	46 *(4.56)*	24 *(2.38)*	18 *(1.78)*	8 *(0.79)*	4 *(0.40)*	11 *(1.09)*	9 *(0.89)*	8 *(0.79)*		1 *(0.10)*	**203** ***(20.12)***
Total N (%)	**291** ***(28.84)***	**244** ***(24.18)***	**191** ***(18.93)***	**107** ***(10.60)***	**59** ***(5.85)***	**58** ***(5.75)***	**24** ***(2.38)***	**20** ***(1.98)***	**10** ***(0.99)***	**4** ***(0.40)***	**1** ***(0.10)***	**1.009** ***(100.00)***

Table 2 - Rabbits 2018 - All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N = 277)

Antibiotic	*Total (N)*	% S
Amoxicillin	*222*	**70**
Amoxicillin-Clavulanic ac.	*223*	**83**
Cephalexin	*200*	**87**
Cefoxitin	*212*	**95**
Ceftiofur	*246*	**99**
Cefquinome 30 µg	*178*	**100**
Streptomycin 10 UI	*117*	**60**
Spectinomycin	*200*	**87**
Gentamicin 10 UI	*277*	**91**
Neomycin	*269*	**82**
Apramycin	*249*	**90**
Tetracycline	*276*	**20**
Florfenicol	*137*	**95**
Nalidixic ac.	*175*	**80**
Flumequine	*125*	**76**
Enrofloxacin	*275*	**97**
Marbofloxacin	*119*	**97**
Danofloxacin	*103*	**96**
Trimethoprim-Sulfonamides	*277*	**34**

Table 3 - Rabbits 2018 – All pathologies included - *Pasteurella multocida*: susceptibility to antibiotics (proportion) (N= 271)

Antibiotic	*Total (N)*	% S
Ceftiofur	*137*	**99**
Tilmicosin	*223*	**96**
Spectinomycin	*133*	**97**
Gentamicin 10 UI	*247*	**98**
Tetracycline	*261*	**98**
Doxycycline	*197*	**98**
Florfenicol	*114*	**99**
Nalidixic ac.	*202*	**75**
Flumequine	*173*	**95**
Enrofloxacin	*243*	**99**
Marbofloxacin	*107*	**100**
Danofloxacin	*136*	**100**
Trimethoprim-Sulfonamides	*269*	**91**

Table 4 - Rabbits 2018 – All pathologies included - *Staphylococcus aureus*: susceptibility to antibiotics (proportion) (N= 162)

Antibiotic	*Total (N)*	% S
Penicillin G	*102*	**87**
Cefoxitin	*129*	**96**
Erythromycin	*147*	**46**
Spiramycin	*136*	**51**
Lincomycin	*128*	**46**
Gentamicin 10 UI	*156*	**71**
Tetracycline	*154*	**49**
Doxycycline	*136*	**68**
Enrofloxacin	*140*	**94**
Trimethoprim-Sulfonamides	*162*	**72**

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Annex 8
Fish

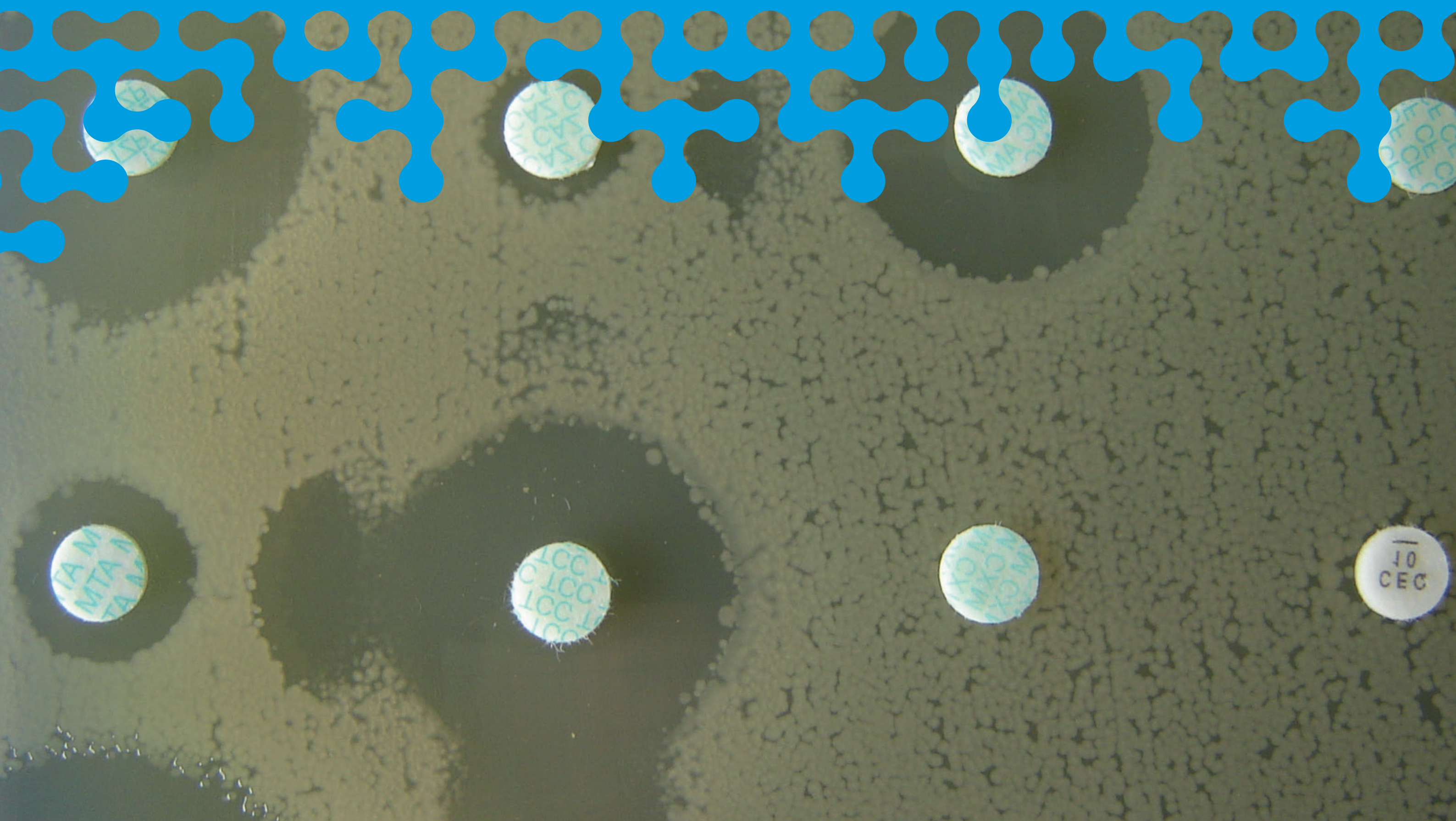

Figure 1 - Fish 2018 – Antibiogram proportions by animal species

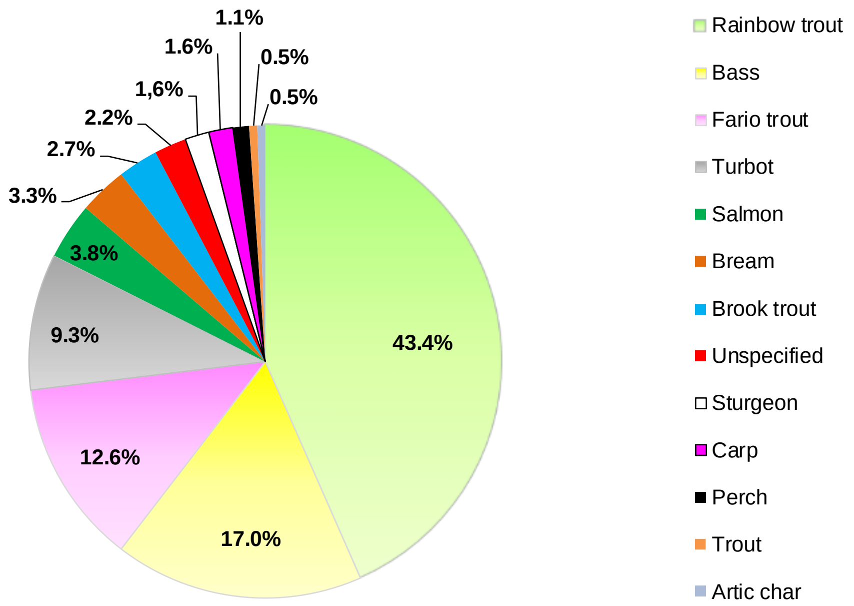

Table 1 - Fish 2018 – Number of antibiograms by bacteria and pathology

Bacteria N ***(%)***	**Pathology N *(%)***				**Total N** ***(%)***
	Unspecified	Septicemia	Skin and soft tissue infections	Other	
Aeromonas salmonicida	88 *(48.35)*	17 *(9.34)*		1 *(0.55)*	**106** ***(58.24)***
Vibrio	20 *(10.99)*	8 *(4.40)*	1 *(0.55)*		**29** ***(15.93)***
Yersinia ruckeri	13 *(7.14)*	6 *(3.30)*			**19** ***(10.44)***
Aeromonas	9 *(4.95)*		1 *(0.55)*		**10** ***(5.49)***
Carnobacterium	4 *(2.20)*	1 *(0.55)*			**5** ***(2.75)***
Pseudomonas	2 *(1.10)*		2 *(1.10)*		**4** ***(2.20)***
Edwardsiella tarda	4 *(2.20)*				**4** ***(2.20)***
Acinetobacter			2 *(1.10)*		**2** ***(1.10)***
E. coli				1 *(0.55)*	**1** ***(0.55)***
Lactococcus		1 *(0.55)*			**1** ***(0.55)***
Chryseobacterium	1 *(0.55)*				**1** ***(0.55)***
Total N (%)	**141** ***(77.47)***	**33** ***(18.13)***	**6** ***(3.30)***	**2** ***(1.10)***	**182** ***(100.00)***

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Annex 9

Horses

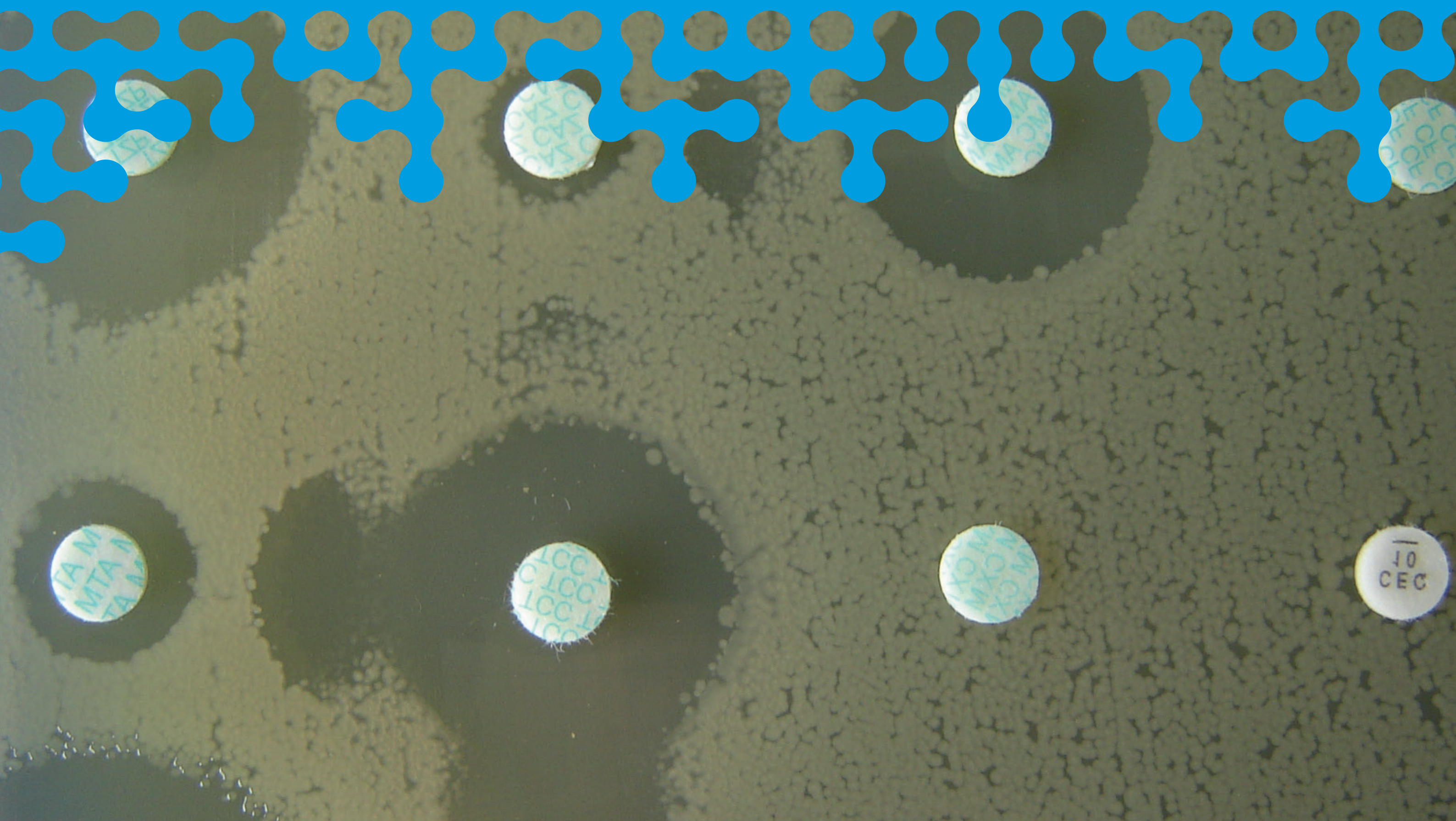
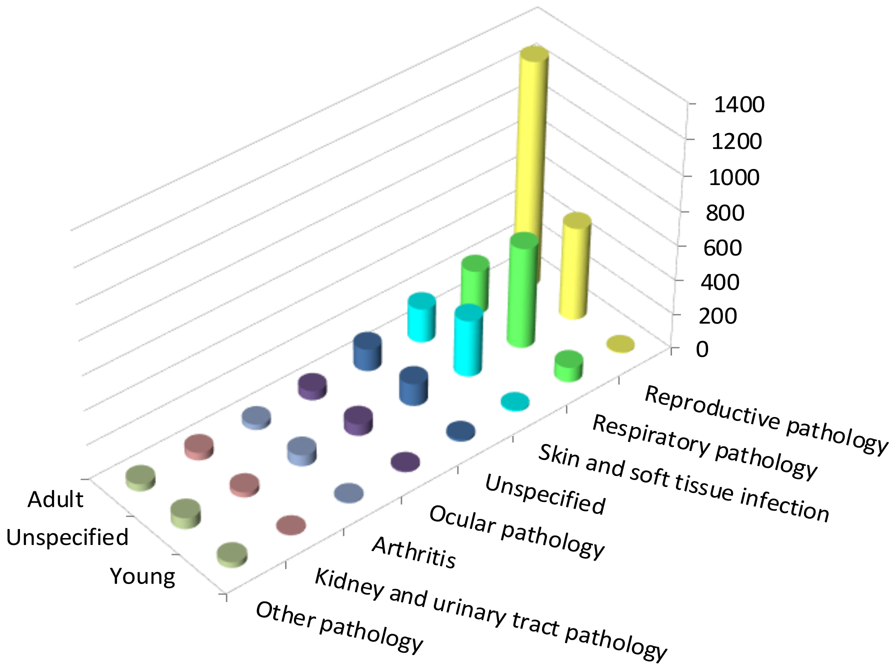


Figure 1 - Horses 2018 – Number of antibiograms by age group and pathology

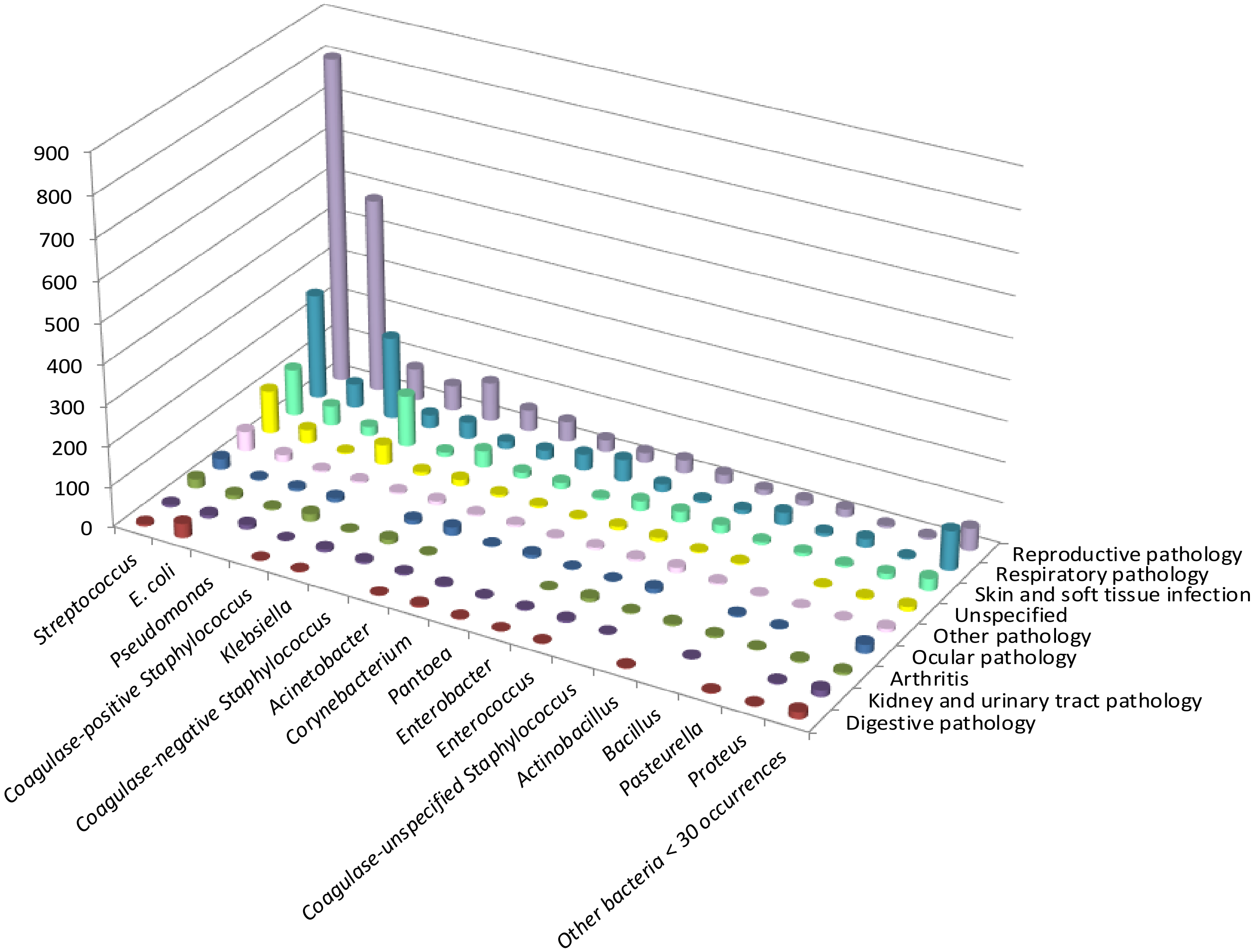


Note: *all values are detailed in table 1 (including other pathologies representing less than 1% grouped together)*

Table 1 - Horses 2018 – Number of antibiograms by age group and pathology

Pathology N (%)	Age group N (%)			Total N (%)
	Adult	Unspecified	Young	
Reproductive pathology	1,300 *(31.65)*	539 *(13.12)*	5 *(0.12)*	**1,844** ***(44.90)***
Respiratory pathology	256 *(6.23)*	584 *(14.22)*	86 *(2.09)*	**926** ***(22.55)***
Skin and soft tissue infections	198 *(4.82)*	329 *(8.01)*	8 *(0.19)*	**535** ***(13.03)***
Unspecified	129 *(3.14)*	130 *(3.17)*	13 *(0.32)*	**272** ***(6.62)***
Ocular pathology	55 *(1.34)*	69 *(1.68)*	8 *(0.19)*	**132** ***(3.21)***
Arthritis	33 *(0.80)*	65 *(1.58)*	6 *(0.15)*	**104** ***(2.53)***
Kidney and urinary tract pathology	45 *(1.10)*	30 *(0.73)*	2 *(0.05)*	**77** ***(1.87)***
Digestive pathology	34 *(0.83)*	38 *(0.93)*	4 *(0.10)*	**76** ***(1.85)***
Systemic pathology	11 *(0.27)*	22 *(0.54)*	4 *(0.10)*	**37** ***(0.90)***
Bone pathology	7 *(0.17)*	18 *(0.44)*	1 *(0.02)*	**26** ***(0.63)***
Omphalitis			24 *(0.58)*	**24** ***(0.58)***
Mastitis	23 *(0.56)*			**23** ***(0.56)***
Cardiovascular disease	1 *(0.02)*	20 *(0.49)*		**21** ***(0.51)***
Septicemia	1 *(0.02)*		3 *(0.07)*	**4** ***(0.10)***
Otitis		3 *(0.07)*		**3** ***(0.07)***
Nervous system pathology		1 *(0.02)*	1 *(0.02)*	**2** ***(0.05)***
Oral pathology		1 *(0.02)*		**1** ***(0.02)***
Total N ***(%)***	**2,093** ***(50.96)***	**1,849** ***(45.02)***	**165** ***(4.02)***	**4,107** ***(100.00)***

Figure 2 - Horses 2018 – Number of antibiograms by bacterial group and pathology



Note: *only values for pathologies >1% and bacterial groups having more than 30 occurrences are represented. Detailed values are presented in table 2 below.*

Table 2. part 1 - Horses 2018 – Number of antibiograms by bacterial group and pathology

Bacteria N (%)	Pathology N (%)																	Total N (%)
	Reproductive pathology	Respiratory pathology	Skin and soft tissue infections	Unspecified	Ocular pathology	Arthritis	Kidney and urinary tract pathology	Digestive pathology	Systemic pathology	Bone pathology	Omphalitis	Mastitis	Cardiovascular disease	Septicemia	Otitis	Nervous system pathology	Oral pathology	
Streptococcus	805 *(19.60)*	260 *(6.33)*	115 *(2.8)*	106 *(2.58)*	27 *(0.66)*	23 *(0.56)*	6 *(0.15)*	6 *(0.15)*	11 *(0.27)*	11 *(0.27)*	6 *(0.15)*	18 *(0.44)*	1 *(0.02)*			1 *(0.02)*	1 *(0.02)*	**1,397** ***(34.02)***
E. coli	480 *(11.69)*	59 *(1.44)*	48 *(1.17)*	34 *(0.83)*	3 *(0.07)*	10 *(0.24)*	8 *(0.19)*	35 *(0.85)*	5 *(0.12)*	2 *(0.05)*	5 *(0.12)*	1 *(0.02)*	2 *(0.05)*	2 *(0.05)*				**694** ***(16.90)***
Pseudomonas	79 *(1.92)*	202 *(4.92)*	22 *(0.54)*	3 *(0.07)*	7 *(0.17)*	4 *(0.10)*	11 *(0.27)*		3 *(0.07)*	1 *(0.02)*								**332** ***(8.08)***
Coagulase-positive Staphylococcus	62 *(1.51)*	33 *(0.80)*	127 *(3.09)*	49 *(1.19)*	10 *(0.24)*	18 *(0.44)*	1 *(0.02)*	1 *(0.02)*	1 *(0.02)*	1 *(0.02)*	3 *(0.07)*							**306** ***(7.45)***
Klebsiella	95 *(2.31)*	40 *(0.97)*	11 *(0.27)*	8 *(0.19)*		2 *(0.05)*	7 *(0.17)*	2 *(0.05)*	1 *(0.02)*		1 *(0.02)*	1 *(0.02)*		1 *(0.02)*				**169** ***(4.11)***
Coagulase-negative Staphylococcus	52 *(1.27)*	18 *(0.44)*	41 *(1.00)*	16 *(0.39)*	11 *(0.27)*	11 *(0.27)*	5 *(0.12)*		1 *(0.02)*	2 *(0.05)*	3 *(0.07)*		2 *(0.05)*		2 *(0.05)*			**164** ***(3.99)***
Acinetobacter	49 *(1.19)*	23 *(0.56)*	14 *(0.34)*	6 *(0.15)*	20 *(0.49)*	1 *(0.02)*	4 *(0.10)*	1 *(0.02)*	4 *(0.10)*									**122** ***(2.97)***
Corynebacterium	30 *(0.73)*	40 *(0.97)*	16 *(0.39)*	5 *(0.12)*	3 *(0.07)*		4 *(0.10)*	5 *(0.12)*	4 *(0.10)*	1 *(0.02)*		1 *(0.02)*						**109** ***(2.65)***
Pantoea	24 *(0.58)*	54 *(1.31)*	5 *(0.12)*	2 *(0.05)*	9 *(0.22)*		2 *(0.05)*	2 *(0.05)*	1 *(0.02)*	1 *(0.02)*								**100** ***(2.43)***
Enterobacter	33 *(0.80)*	19 *(0.46)*	25 *(0.61)*	9 *(0.22)*	2 *(0.05)*	1 *(0.02)*	3 *(0.07)*	1 *(0.02)*		2 *(0.05)*	2 *(0.05)*		2 *(0.05)*					**99** ***(2.41)***
Enterococcus	23 *(0.56)*	6 *(0.15)*	26 *(0.63)*	10 *(0.24)*	1 *(0.02)*	9 *(0.22)*	5 *(0.12)*	1 *(0.02)*	1 *(0.02)*	2 *(0.05)*	2 *(0.05)*		1 *(0.02)*					**87** ***(2.12)***
Coagulase-unspecified Staphylococcus	13 *(0.32)*	10 *(0.24)*	20 *(0.49)*	3 *(0.07)*	11 *(0.27)*	3 *(0.07)*	1 *(0.02)*		1 *(0.02)*	1 *(0.02)*	1 *(0.02)*		10 *(0.24)*					**74** ***(1.80)***
Actinobacillus	14 *(0.34)*	31 *(0.75)*	7 *(0.17)*	3 *(0.07)*		5 *(0.12)*		2 *(0.05)*	1 *(0.02)*	1 *(0.02)*				**1** *(0.02)*	**1** *(0.02)*			**66** ***(1.61)***
Bacillus	19 *(0.46)*	8 *(0.19)*	8 *(0.19)*		4 *(0.10)*	5 *(0.12)*	1 *(0.02)*		1 *(0.02)*									**46** ***(1.12)***

Table 2. part 2 - Horses 2018 – Number of antibiograms by bacterial group and pathology

Bacteria N *(%)*	**Pathology N (%)**																	**Total N** *(%)*
	Reproductive pathology	Respiratory pathology	Skin and soft tissue infections	Unspecified	Ocular pathology	Arthritis	Kidney and urinary tract pathology	Digestive pathology	Systemic pathology	Bone pathology	Omphalitis	Mastitis	Cardiovascular disease	Septicemia	Otitis	Nervous system pathology	Oral pathology	
Pasteurella	6 *(0.15)*	22 *(0.54)*	6 *(0.15)*	2 *(0.05)*	2 *(0.05)*	2 *(0.05)*		2 *(0.05)*	1 *(0.02)*									**43** ***(1.05)***
Proteus	5 *(0.12)*	3 *(0.07)*	14 *(0.34)*	4 *(0.10)*		4 *(0.10)*	3 *(0.07)*	1 *(0.02)*										**34** ***(0.83)***
Other bacteria < 30 occurrences	55 *(1.34)*	98 *(2.39)*	30 *(0.73)*	12 *(0.29)*	22 *(0.54)*	6 *(0.15)*	16 *(0.39)*	17 *(0.41)*	1 *(0.02)*	1 *(0.02)*	1 *(0.02)*	2 *(0.05)*	3 *(0.07)*			1 *(0.02)*		**265** ***(6.45)***
Total N *(%)*	**1,844** ***(44.90)***	**926** ***(22.55)***	**535** ***(13.03)***	**272** ***(6.62)***	**132** ***(3.21)***	**104** ***(2.53)***	**77** ***(1.87)***	**76** ***(1.85)***	**37** ***(0.90)***	**26** ***(0.63)***	**24** ***(0.58)***	**23** ***(0.56)***	**21** ***(0.51)***	**4** ***(0.10)***	**3** ***(0.07)***	**2** ***(0.05)***	**1** ***(0.02)***	**4,107** ***(100.00)***

Table 3 - Horses 2018 – Reproductive pathology – All ages groups included – *E. coli*: susceptibility to antibiotics (proportion) (N= 480)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*477*	**75**
Amoxicillin-Clavulanic ac.	*480*	**81**
Cephalexin	*344*	**88**
Cefoxitin	*342*	**97**
Cefuroxime	*34*	**88**
Cefoperazone	*46*	**93**
Ceftiofur	*480*	**96**
Cefquinome 30 µg	*477*	**97**
Streptomycin 10 UI	*337*	**77**
Kanamycin 30 UI	*449*	**93**
Gentamicin 10 UI	*480*	**95**
Neomycin	*209*	**88**
Amikacine	*133*	**100**
Apramycin	*42*	**98**
Tetracycline	*347*	**81**
Florfenicol	*314*	**98**
Nalidixic ac.	*323*	**98**
Oxolinic ac.	*132*	**97**
Flumequine	*156*	**98**
Enrofloxacin	*460*	**99**
Marbofloxacin	*474*	**99**
Danofloxacin	*54*	**98**
Trimethoprim-Sulfonamides	*480*	**76**

Table 4 - Horses 2018 – Respiratory pathology – All ages groups included – *E. coli*: susceptibility to antibiotics (proportion) (N= 59)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*59*	**64**
Amoxicillin-Clavulanic ac.	*59*	**80**
Cephalexin	*57*	**89**
Cefoxitin	*58*	**93**
Ceftiofur	*59*	**90**
Cefquinome 30 µg	*58*	**91**
Streptomycin 10 UI	*57*	**54**
Kanamycin 30 UI	*57*	**89**
Gentamicin 10 UI	*59*	**83**
Tetracycline	*56*	**68**
Florfenicol	*56*	**93**
Nalidixic ac.	*52*	**83**
Enrofloxacin	*58*	**93**
Marbofloxacin	*57*	**95**
Trimethoprim-Sulfonamides	*59*	**58**

Table 5 - Horses 2018 – Skin and soft tissue infections – All ages groups included – *E. coli*: susceptibility to antibiotics (proportion) (N= 48)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*48*	**60**
Amoxicillin-Clavulanic ac.	*48*	**71**
Cephalexin	*48*	**69**
Cefoxitin	*46*	**96**
Ceftiofur	*47*	**89**
Cefquinome 30 µg	*45*	**91**
Streptomycin 10 UI	*48*	**71**
Kanamycin 30 UI	*44*	**77**
Gentamicin 10 UI	*48*	**81**
Tetracycline	*47*	**64**
Florfenicol	*45*	**98**
Nalidixic ac.	*47*	**83**
Enrofloxacin	*47*	**94**
Marbofloxacin	*45*	**96**
Trimethoprim-Sulfonamides	*48*	**71**

Table 6 - Horses 2018 – All pathologies and ages groups included – *Klebsiella*: susceptibility to antibiotics (proportion) (N= 169)

Antibiotic	*Total (N)*	**% S**
Amoxicillin-Clavulanic ac.	*169*	**81**
Cefoxitin	*140*	**94**
Ceftiofur	*169*	**93**
Cefquinome 30 µg	*163*	**96**
Streptomycin 10 UI	*137*	**77**
Kanamycin 30 UI	*143*	**91**
Gentamicin 10 UI	*169*	**91**
Neomycin	*66*	**97**
Tetracycline	*143*	**79**
Florfenicol	*125*	**95**
Nalidixic ac.	*134*	**91**
Flumequine	*36*	**83**
Enrofloxacin	*160*	**96**
Marbofloxacin	*160*	**96**
Trimethoprim-Sulfonamides	*168*	**76**

Table 7 - Horses 2018 – All pathologies and ages groups included – *Enterobacter:* susceptibility to antibiotics (proportion) (N= 99)

Antibiotic	*Total (N)*	**% S**
Amoxicillin-Clavulanic ac.	*99*	**9**
Cephalexin	*85*	**13**
Cefoxitin	*87*	**8**
Ceftiofur	*99*	**75**
Cefquinome 30 µg	*97*	**86**
Streptomycin 10 UI	*83*	**64**
Kanamycin 30 UI	*93*	**72**
Gentamicin 10 UI	*99*	**71**
Tetracycline	*87*	**66**
Florfenicol	*80*	**80**
Nalidixic ac.	*82*	**79**
Enrofloxacin	*99*	**91**
Marbofloxacin	*95*	**93**
Trimethoprim-Sulfonamides	*99*	**70**

Table 8 - Horses 2018 – Skin and soft tissue infections – All age groups included – *Staphylococcus aureus*: susceptibility to antibiotics (proportion) (N= 101)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*101*	**60**
Cefoxitin	*90*	**80**
Oxacillin	*78*	**86**
Erythromycin	*98*	**99**
Streptomycin 10 UI	*91*	**96**
Kanamycin 30 UI	*86*	**84**
Gentamicin 10 UI	*101*	**84**
Tetracycline	*97*	**81**
Enrofloxacin	*89*	**97**
Marbofloxacin	*97*	**98**
Trimethoprim-Sulfonamides	*97*	**94**
Rifampicin	*71*	**92**

Table 9 - Horses 2018 – Reproductive pathology – All age groups included – *Streptococcus groupe C and Streptococcus zooepidemicus:* susceptibility to antibiotics (proportion) (N= 486)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*455*	**97**
Erythromycin	*460*	**97**
Tulathromycin	*71*	**79**
Tylosin	*81*	**100**
Spiramycin	*213*	**98**
Lincomycin	*137*	**89**
Streptomycin 500 µg	*399*	**99**
Kanamycin 1000 µg	*360*	**99**
Gentamicin 500 µg	*400*	**99**
Tetracycline	*391*	**33**
Florfenicol	*58*	**98**
Enrofloxacin	*484*	**20**
Marbofloxacin	*463*	**70**
Trimethoprim-Sulfonamides	*417*	**67**
Rifampicin	*359*	**72**

Table 10 - Horses 2018 – Respiratory pathology – All age groups included – *Streptococcus:* susceptibility to antibiotics (proportion) (N= 260)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*258*	**95**
Erythromycin	*259*	**93**
Spiramycin	*66*	**97**
Lincomycin	*113*	**83**
Streptomycin 500 µg	*241*	**99**
Kanamycin 1000 µg	*231*	**100**
Gentamicin 500 µg	*246*	**99**
Tetracycline	*234*	**57**
Florfenicol	*67*	**97**
Enrofloxacin	*258*	**24**
Marbofloxacin	*226*	**66**
Trimethoprim-Sulfonamides	*259*	**68**
Rifampicin	*180*	**71**

Table 11 - Horses 2018 – Skin and soft tissue infections – All age groups included – *Streptococcus:* susceptibility to antibiotics (proportion) (N= 115)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*115*	**94**
Erythromycin	*112*	**93**
Streptomycin 500 µg	*106*	**99**
Kanamycin 1000 µg	*104*	**96**
Gentamicin 500 µg	*112*	**100**
Tetracycline	*112*	**50**
Enrofloxacin	*113*	**14**
Marbofloxacin	*111*	**59**
Trimethoprim-Sulfonamides	*112*	**77**
Rifampicin	*87*	**60**

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Annex 10

Dogs

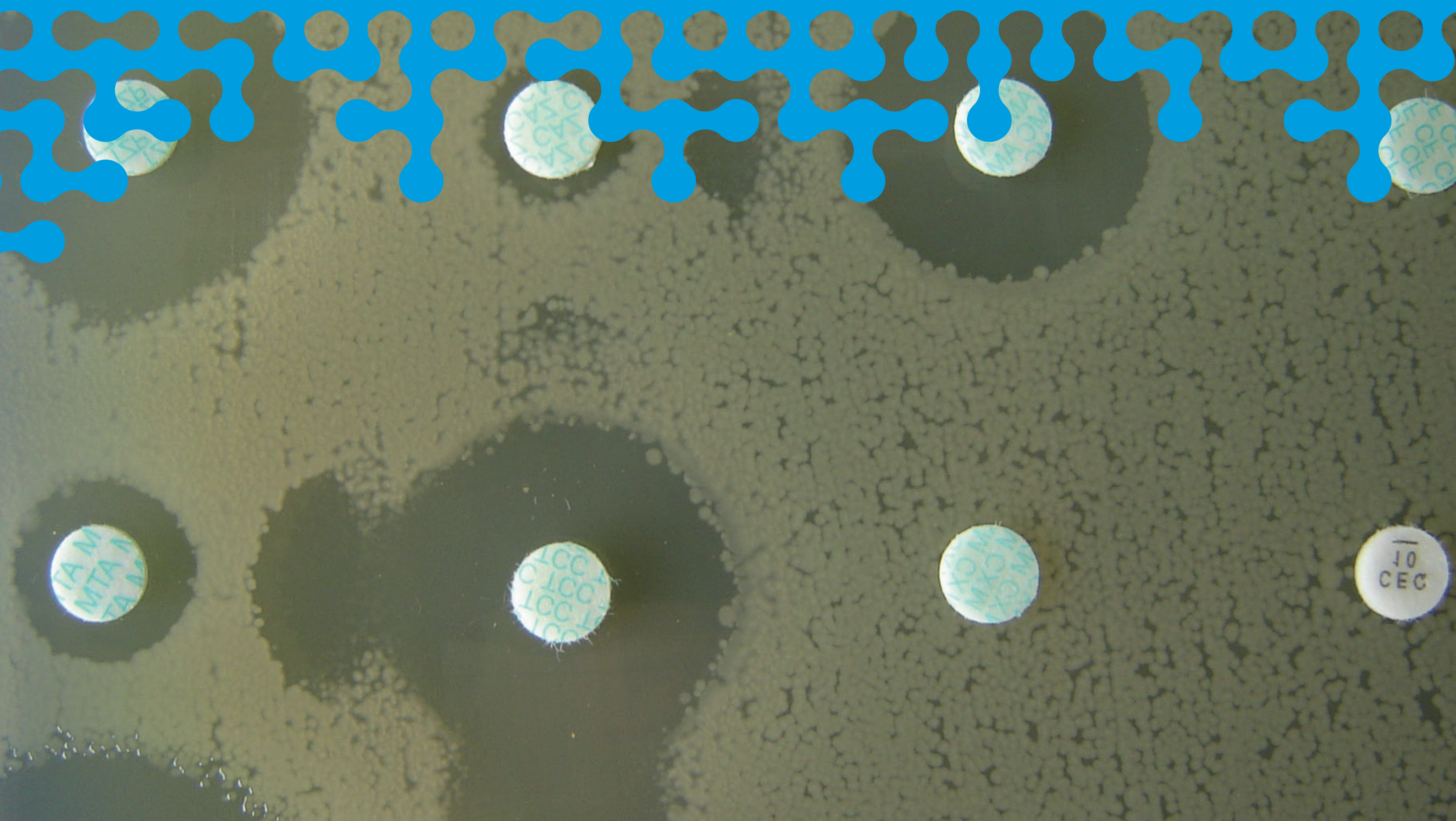
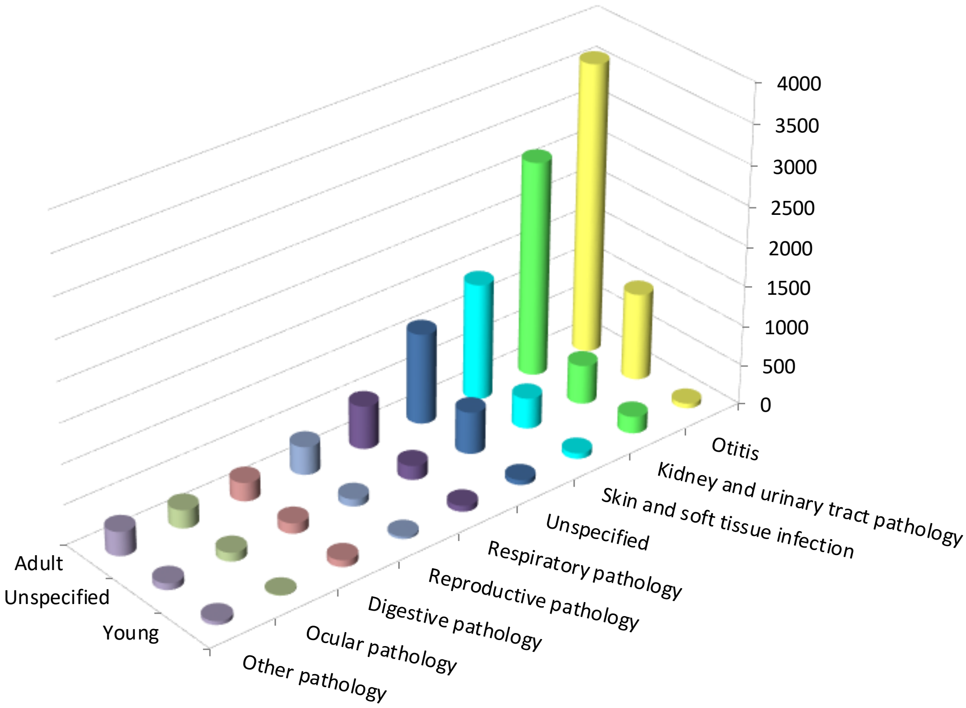


Figure 1 - Dogs 2018 – Number of antibiograms by age group and pathology

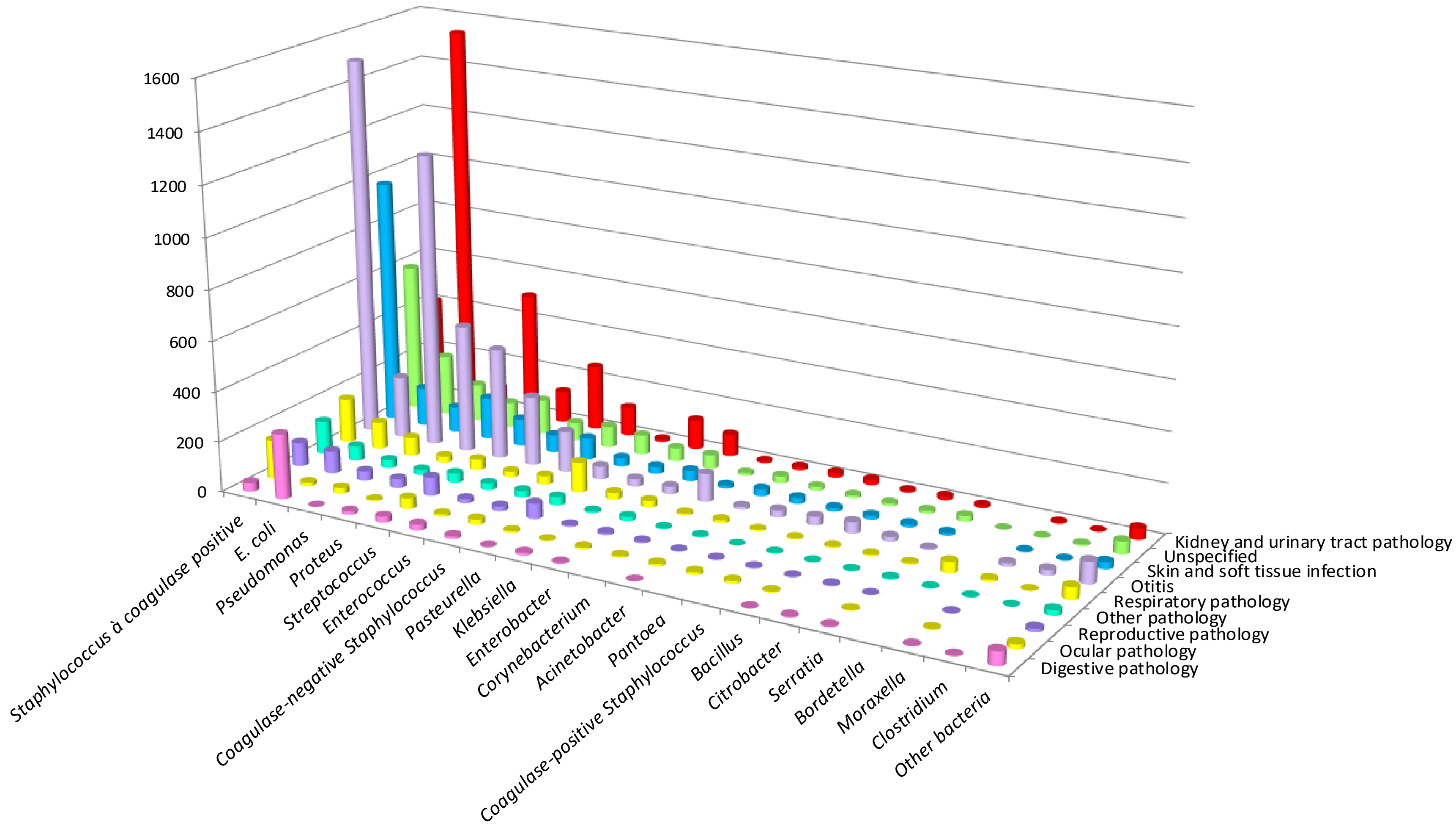


Note: *all values are detailed in table 1 (including other pathologies, representing less than 1%, grouped together)*

Table 1 - Dogs 2018 – Number of antibiograms by age group and pathology

Pathology N (%)	Age group N (%)			Total N (%)
	Adult	Unspecified	Young	
Otitis	3,642 *(25.43)*	1,094 *(7.64)*	61 *(0.43)*	**4,797** ***(33.49)***
Kidney and urinary tract pathology	2,699 *(18.84)*	487 *(3.40)*	211 *(1.47)*	**3,397** ***(23.72)***
Skin and soft tissue infections	1.458 *(10.18)*	383 *(2.67)*	70 *(0.49)*	**1,911** ***(13.34)***
Unspecified	1 138 *(7.94)*	526 *(3.67)*	62 *(0.43)*	**1,726** ***(12.05)***
Respiratory pathology	543 *(3.79)*	177 *(1.24)*	74 *(0.52)*	**794** ***(5.54)***
Reproductive pathology	353 *(2.46)*	92 *(0.64)*	30 *(0.21)*	**475** ***(3.32)***
Digestive pathology	233 *(1.63)*	130 *(0.91)*	84 *(0.59)*	**447** ***(3.12)***
Ocular pathology	229 *(1.60)*	110 *(0.77)*	7 *(0.05)*	**346** ***(2.42)***
Arthritis	104 *(0.73)*	28 *(0.20)*	6 *(0.04)*	**138** ***(0.96)***
Oral pathology	86 *(0.60)*	23 *(0.16)*	5 *(0.03)*	**114** ***(0.80)***
Bone pathology	58 *(0.40)*	19 *(0.13)*	11 *(0.08)*	**88** ***(0.61)***
Systemic pathology	18 *(0.13)*	11 *(0.08)*	15 *(0.10)*	**44** ***(0.31)***
Mastitis	24 *(0.17)*			**24** ***(0.17)***
Nervous system pathology	6 *(0.04)*		3 *(0.02)*	**9** ***(0.06)***
Septicemia	1 *(0.01)*	1 *(0.01)*	6 *(0.04)*	**8** ***(0.06)***
Muscle pathology	3 *(0.02)*			**3** ***(0.02)***
Cardiac pathology	2 *(0.01)*	1 *(0.01)*		**3** ***(0.02)***
Total N *(%)*	**10,597** ***(73.98)***	**3,082** ***(21.52)***	**645** ***(4.50)***	**14,324** ***(100.00)***

Figure 2 - Dogs 2018 – Number of antibiograms by bacteria and pathology



Note: *only values for pathologies >1% and bacterial groups having more than 30 occurrences are represented. Detailed values are presented in table 2 below.*

Table 2, part 1 - Dogs 2018 – Number of antibiograms by bacteria and pathology

Bacteria N (%)	Pathology N (%)																	Total N *(%)*
	Otitis	Kidney and urinary tract pathology	Skin and soft tissue infections	Unspecified	Respiratory pathology	Reproductive pathology	Digestive pathology	Ocular pathology	Arthritis	Oral pathology	Bone pathology	Systemic pathology	Mastitis	Nervous system pathology	Septicemia	Muscle pathology	Cardiac pathology	
Coagulase-positive Staphylococcus	1,503 *(10.49)*	409 *(2.86)*	977 *(6.82)*	592 *(4.13)*	176 *(1.23)*	94 *(0.66)*	35 *(0.24)*	156 *(1.09)*	62 *(0.43)*	21 *(0.15)*	33 *(0.23)*	6 *(0.04)*	7 *(0.05)*	3 *(0.02)*				**4,074 *(28.44)***
E. coli	246 *(1.72)*	1,539 *(10.74)*	153 *(1.07)*	241 *(1.68)*	107 *(0.75)*	88 *(0.61)*	260 *(1.82)*	14 *(0.10)*	5 *(0.03)*	18 *(0.13)*	4 *(0.03)*	20 *(0.14)*	4 *(0.03)*	1 *(0.01)*	5 *(0.03)*	1 *(0.01)*		**2,706 *(18.89)***
Pseudomonas	1,172 *(8.18)*	89 *(0.62)*	101 *(0.71)*	148 *(1.03)*	72 *(0.50)*	37 *(0.26)*	1 *(0.01)*	22 *(0.15)*	10 *(0.07)*	12 *(0.08)*	7 *(0.05)*	2 *(0.01)*						**1,673 *(11.68)***
Proteus	509 *(3.55)*	504 *(3.52)*	167 *(1.17)*	100 *(0.70)*	25 *(0.17)*	36 *(0.25)*	13 *(0.09)*	5 *(0.03)*	3 *(0.02)*	9 *(0.06)*	5 *(0.03)*	2 *(0.01)*	1 *(0.01)*			1 *(0.01)*		**1,380 *(9.63)***
Streptococcus	442 *(3.09)*	126 *(0.88)*	107 *(0.75)*	138 *(0.96)*	42 *(0.29)*	73 *(0.51)*	23 *(0.16)*	42 *(0.29)*	14 *(0.10)*	9 *(0.06)*	6 *(0.04)*	3 *(0.02)*	1 *(0.01)*	2 *(0.01)*	1 *(0.01)*		1 *(0.01)*	**1,030 *(7.19)***
Enterococcus	276 *(1.93)*	258 *(1.8)*	70 *(0.49)*	71 *(0.50)*	22 *(0.15)*	17 *(0.12)*	24 *(0.17)*	10 *(0.07)*	6 *(0.04)*	5 *(0.03)*	8 *(0.06)*	4 *(0.03)*	2 *(0.01)*	1 *(0.01)*				**774 *(5.40)***
Coagulase-negative Staphylococcus	164 *(1.14)*	115 *(0.80)*	86 *(0.60)*	85 *(0.59)*	34 *(0.24)*	18 *(0.13)*	10 *(0.07)*	21 *(0.15)*	8 *(0.06)*	2 *(0.01)*	10 *(0.07)*		6 *(0.04)*	1 *(0.01)*				**560 *(3.91)***
Pasteurella	51 *(0.36)*	10 *(0.07)*	34 *(0.24)*	77 *(0.54)*	119 *(0.83)*	61 *(0.43)*	1 *(0.01)*	6 *(0.04)*	7 *(0.05)*	21 *(0.15)*	1 *(0.01)*	2 *(0.01)*		1 *(0.01)*				**391 *(2.73)***
Klebsiella	30 *(0.21)*	119 *(0.83)*	28 *(0.20)*	53 *(0.37)*	27 *(0.19)*	6 *(0.04)*	10 *(0.07)*	2 *(0.01)*		2 *(0.01)*	1 *(0.01)*	2 *(0.01)*	1 *(0.01)*			1 *(0.01)*		**282 *(1.97)***
Enterobacter	30 *(0.21)*	88 *(0.61)*	42 *(0.29)*	54 *(0.38)*	26 *(0.18)*	8 *(0.06)*	4 *(0.03)*	7 *(0.05)*	7 *(0.05)*	4 *(0.03)*	4 *(0.03)*		1 *(0.01)*					**275 *(1.92)***
Corynebacterium	112 *(0.78)*	7 *(0.05)*	12 *(0.08)*	11 *(0.08)*	7 *(0.05)*	6 *(0.04)*		6 *(0.04)*	2 *(0.01)*	2 *(0.01)*								**165 *(1.15)***
Acinetobacter	11 *(0.08)*	13 *(0.09)*	27 *(0.19)*	27 *(0.19)*	12 *(0.08)*	3 *(0.02)*	1 *(0.01)*	9 *(0.06)*	2 *(0.01)*				1 *(0.01)*					**106 *(0.74)***
Pantoea	28 *(0.20)*	19 *(0.13)*	23 *(0.16)*	15 *(0.10)*	5 *(0.03)*	3 *(0.02)*		10 *(0.07)*										**103 *(0.72)***
Coagulase-unspecified Staphylococcus	34 *(0.24)*	20 *(0.14)*	14 *(0.10)*	11 *(0.08)*	4 *(0.03)*	4 *(0.03)*		10 *(0.07)*	1 *(0.01)*	1 *(0.01)*	2 *(0.01)*							**101 *(0.71)***

Table 2, part 2 - Dogs 2018 – Number of antibiograms by bacteria and pathology

	Pathology N (%)																	
Bacteria N (%)	Otitis	Kidney and urinary tract pathology	Skin and soft tissue infections	Unspecified	Respiratory pathology	Reproductive pathology	Digestive pathology	Ocular pathology	Arthritis	Oral pathology	Bone pathology	Systemic pathology	Mastitis	Nervous system pathology	Septicemia	Muscle pathology	Cardiac pathology	**Total N *(%)***
Bacillus	44 *(0.31)*	7 *(0.05)*	15 *(0.10)*	10 *(0.07)*	4 *(0.03)*	2 *(0.01)*	1 *(0.01)*	4 *(0.03)*			2 *(0.01)*							**89 *(0.62)***
Citrobacter	18 *(0.13)*	15 *(0.10)*	13 *(0.09)*	12 *(0.08)*	5 *(0.03)*	4 *(0.03)*	4 *(0.03)*		1 *(0.01)*	1 *(0.01)*								**73 *(0.51)***
Serratia	4 *(0.03)*	9 *(0.06)*	10 *(0.07)*	22 *(0.15)*	5 *(0.03)*	1 *(0.01)*	3 *(0.02)*	3 *(0.02)*	4 *(0.03)*		1 *(0.01)*							**62 *(0.43)***
Bordetella				1 *(0.01)*	44 *(0.31)*							2 *(0.01)*						**47 *(0.33)***
Moraxella	14 *(0.10)*	4 *(0.03)*	3 *(0.02)*	2 *(0.01)*	9 *(0.06)*	1 *(0.01)*	2 *(0.01)*	2 *(0.01)*		1 *(0.01)*								**38 *(0.27)***
Clostridium	22 *(0.15)*	1 *(0.01)*	2 *(0.01)*	6 *(0.04)*	1 *(0.01)*		1 *(0.01)*											**33 *(0.23)***
Other bacteria < 30 occurrences	87 *(0.61)*	45 *(0.31)*	27 *(0.19)*	50 *(0.35)*	48 *(0.34)*	13 *(0.09)*	54 *(0.38)*	17 *(0.12)*	6 *(0.04)*	6 *(0.04)*	4 *(0.03)*	1 *(0.01)*			2 *(0.01)*		2 *(0.01)*	**362 *(2.53)***
Total N *(%)*	**4,797 *(33.49)***	**3,397 *(23.72)***	**1,911 *(13.34)***	**1,726 *(12.05)***	**794 *(5.54)***	**475 *(3.32)***	**447 *(3.12)***	**346 *(2.42)***	**138 *(0.96)***	**114 *(0.80)***	**88 *(0.61)***	**44 *(0.31)***	**24 *(0.17)***	**9 *(0.06)***	**8 *(0.06)***	**3 *(0.02)***	**3 *(0.02)***	**14,324 *(100.00)***

Table 3 - Dogs 2018 – Kidney and urinary tract pathology – All age groups included – *E. coli:* susceptibility to antibiotics (proportion) (N= 1,539)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,535*	**70**
Amoxicillin-Clavulanic ac.	*1,539*	**74**
Cephalexin	*1,517*	**71**
Cephalothin	*69*	**72**
Cefoxitin	*631*	**89**
Cefuroxime	*110*	**75**
Cefoperazone	*83*	**92**
Cefovecin	*227*	**93**
Ceftiofur	*1,532*	**96**
Cefquinome 30 µg	*559*	**97**
Streptomycin 10 UI	*700*	**76**
Kanamycin 30 UI	*470*	**92**
Tobramycin	*746*	**99**
Gentamicin 10 UI	*1,537*	**97**
Neomycin	*294*	**93**
Apramycin	*40*	**100**
Tetracycline	*1,442*	**79**
Doxycycline	*219*	**49**
Chloramphenicol	*903*	**87**
Florfenicol	*515*	**94**
Nalidixic ac.	*1,265*	**90**
Oxolinic ac.	*50*	**92**
Flumequine	*215*	**92**
Enrofloxacin	*1,426*	**96**
Marbofloxacin	*1,363*	**95**
Danofloxacin	*71*	**94**
Sulfonamides	*33*	**85**
Trimethoprim-Sulfonamides	*1,537*	**90**

Table 4 - Dogs 2018 – Skin and soft tissue infections – All age groups included – *E. coli:* susceptibility to antibiotics (proportion) (N= 153)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*150*	**61**
Amoxicillin-Clavulanic ac.	*153*	**66**
Cephalexin	*150*	**68**
Cefoxitin	*69*	**81**
Cefovecin	*32*	**88**
Ceftiofur	*152*	**93**
Cefquinome 30 µg	*48*	**92**
Streptomycin 10 UI	*74*	**66**
Kanamycin 30 UI	*38*	**89**
Tobramycin	*70*	**100**
Gentamicin 10 UI	*152*	**99**
Neomycin	*39*	**82**
Tetracycline	*146*	**68**
Chloramphenicol	*99*	**82**
Florfenicol	*48*	**92**
Nalidixic ac.	*140*	**84**
Enrofloxacin	*144*	**91**
Marbofloxacin	*120*	**93**
Trimethoprim-Sulfonamides	*152*	**86**

Table 5 - Dogs 2018 – Otitis – All age groups included – *E. coli*: susceptibility to antibiotics (proportion) (N= 246)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*246*	**73**
Amoxicillin-Clavulanic ac.	*246*	**78**
Cephalexin	*232*	**76**
Cefoxitin	*152*	**94**
Cefovecin	*38*	**95**
Ceftiofur	*246*	**98**
Cefquinome 30 µg	*132*	**99**
Streptomycin 10 UI	*122*	**81**
Kanamycin 30 UI	*88*	**97**
Tobramycin	*83*	**92**
Gentamicin 10 UI	*245*	**97**
Neomycin	*77*	**90**
Tetracycline	*234*	**79**
Doxycycline	*32*	**53**
Chloramphenicol	*113*	**87**
Florfenicol	*126*	**94**
Nalidixic ac.	*233*	**88**
Enrofloxacin	*242*	**95**
Marbofloxacin	*211*	**95**
Trimethoprim-Sulfonamides	*241*	**91**

Table 6 - Dogs 2018 – All pathologies and age groups included – *Pasteurella*: susceptibility to antibiotics (proportion) (N= 391)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*388*	**96**
Amoxicillin-Clavulanic ac.	*388*	**97**
Cephalexin	*383*	**94**
Cefoxitin	*38*	**95**
Cefovecin	*32*	**88**
Ceftiofur	*369*	**96**
Cefquinome 30 µg	*158*	**92**
Streptomycin 10 UI	*200*	**74**
Kanamycin 30 UI	*137*	**87**
Tobramycin	*159*	**99**
Gentamicin 10 UI	*385*	**98**
Neomycin	*83*	**80**
Tetracycline	*336*	**97**
Doxycycline	*73*	**96**
Chloramphenicol	*197*	**95**
Florfenicol	*166*	**99**
Nalidixic ac.	*295*	**93**
Flumequine	*52*	**77**
Enrofloxacin	*387*	**98**
Marbofloxacin	*351*	**99**
Trimethoprim	*30*	**83**
Trimethoprim-Sulfonamides	*379*	**90**

Table 7 - Dogs 2018 – Otitis – All age groups included – *Staphylococcus pseudintermedius:* susceptibility to antibiotics (proportion) (N= 1,145)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*1,132*	**21**
Oxacillin	*810*	**95**
Cefovecin	*657*	**92**
Erythromycin	*1,139*	**73**
Tylosin	*187*	**82**
Spiramycin	*529*	**74**
Lincomycin	*1,088*	**76**
Streptomycin 10 UI	*717*	**74**
Kanamycin 30 UI	*483*	**76**
Gentamicin 10 UI	*1,138*	**90**
Neomycin	*438*	**78**
Tetracycline	*1,118*	**64**
Doxycycline	*62*	**76**
Chloramphenicol	*525*	**73**
Florfenicol	*554*	**100**
Enrofloxacin	*809*	**92**
Marbofloxacin	*1,016*	**94**
Sulfonamides	*100*	**45**
Trimethoprim-Sulfonamides	*1,128*	**88**
Fusidic ac.	*807*	**96**
Rifampicin	*133*	**97**

Table 8 - Dogs 2018 – Skin and soft tissue infections – All age groups included – *Staphylococcus pseudintermedius:* susceptibility to antibiotics (proportion) (N= 802)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*797*	**14**
Oxacillin	*529*	**87**
Cefovecin	*605*	**86**
Erythromycin	*796*	**66**
Tylosin	*119*	**76**
Spiramycin	*309*	**69**
Lincomycin	*781*	**72**
Streptomycin 10 UI	*401*	**66**
Kanamycin 30 UI	*277*	**72**
Tobramycin	*38*	**82**
Gentamicin 10 UI	*800*	**88**
Neomycin	*251*	**73**
Tetracycline	*743*	**64**
Doxycycline	*62*	**60**
Chloramphenicol	*484*	**73**
Florfenicol	*223*	**100**
Enrofloxacin	*654*	**87**
Marbofloxacin	*693*	**87**
Sulfonamides	*110*	**45**
Trimethoprim-Sulfonamides	*790*	**83**
Fusidic ac.	*577*	**97**

Table 9 - Dogs 2018 – Kidney and urinary tract pathology – All age groups included – *Staphylococcus pseudintermedius:* susceptibility to antibiotics (proportion) (N= 294)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*293*	**17**
Oxacillin	*227*	**96**
Cefovecin	*171*	**93**
Erythromycin	*287*	**74**
Spiramycin	*68*	**74**
Lincomycin	*289*	**80**
Streptomycin 10 UI	*156*	**74**
Kanamycin 30 UI	*140*	**73**
Gentamicin 10 UI	*293*	**91**
Neomycin	*56*	**70**
Tetracycline	*262*	**64**
Doxycycline	*32*	**59**
Chloramphenicol	*135*	**78**
Florfenicol	*130*	**98**
Enrofloxacin	*198*	**91**
Marbofloxacin	*276*	**92**
Trimethoprim-Sulfonamides	*292*	**86**
Fusidic ac.	*218*	**96**

Table 10 - Dogs 2018 – All pathologies and age groups included – All age groups included – *Staphylococcus aureus:* susceptibility to antibiotics (proportion) (N= 489)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*482*	**24**
Cefoxitin	*453*	**80**
Oxacillin	*246*	**90**
Erythromycin	*484*	**68**
Tylosin	*41*	**90**
Spiramycin	*207*	**70**
Lincomycin	*476*	**77**
Streptomycin 10 UI	*239*	**73**
Kanamycin 30 UI	*132*	**87**
Gentamicin 10 UI	*488*	**89**
Neomycin	*154*	**71**
Tetracycline	*478*	**73**
Chloramphenicol	*313*	**76**
Florfenicol	*130*	**100**
Enrofloxacin	*408*	**88**
Marbofloxacin	*392*	**89**
Sulfonamides	*82*	**33**
Trimethoprim-Sulfonamides	*486*	**88**
Fusidic ac.	*369*	**95**
Rifampicin	*30*	**90**

Table 11 - Dogs 2018 – Otitis – All age groups included – *Staphylococcus aureus:* susceptibility to antibiotics (proportion) (N= 137)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*133*	**29**
Cefoxitin	*131*	**90**
Oxacillin	*64*	**94**
Erythromycin	*134*	**66**
Spiramycin	*66*	**70**
Lincomycin	*132*	**74**
Streptomycin 10 UI	*66*	**68**
Kanamycin 30 UI	*34*	**79**
Gentamicin 10 UI	*136*	**86**
Neomycin	*42*	**60**
Tetracycline	*134*	**66**
Chloramphenicol	*89*	**78**
Enrofloxacin	*121*	**87**
Marbofloxacin	*108*	**87**
Trimethoprim-Sulfonamides	*136*	**84**
Fusidic ac.	*98*	**96**

Table 12 - Dogs 2018 – Skin and soft tissue infections – All age groups included – *Staphylococcus aureus:* susceptibility to antibiotics (proportion) (N= 92)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*91*	**30**
Cefoxitin	*77*	**83**
Oxacillin	*47*	**96**
Erythromycin	*92*	**71**
Spiramycin	*53*	**72**
Lincomycin	*90*	**77**
Streptomycin 10 UI	*51*	**71**
Gentamicin 10 UI	*92*	**92**
Neomycin	*41*	**76**
Tetracycline	*86*	**79**
Chloramphenicol	*66*	**70**
Enrofloxacin	*86*	**88**
Marbofloxacin	*65*	**89**
Trimethoprim-Sulfonamides	*91*	**90**
Fusidic ac.	*60*	**93**

Table 13 - Dogs 2018 – Kidney and urinary tract pathology – All age groups included – *Staphylococcus aureus:* susceptibility to antibiotics (proportion) (N=65)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*65*	**18**
Cefoxitin	*64*	**88**
Oxacillin	*43*	**93**
Erythromycin	*64*	**61**
Lincomycin	*64*	**78**
Gentamicin 10 UI	*65*	**91**
Tetracycline	*64*	**64**
Chloramphenicol	*47*	**70**
Enrofloxacin	*56*	**88**
Marbofloxacin	*60*	**92**
Trimethoprim-Sulfonamides	*65*	**92**
Fusidic ac.	*57*	**100**

Table 14 - Dogs 2018 – Otitis – All age groups included – *Streptococcus*: susceptibility to antibiotics (proportion) (N= 442)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*409*	**88**
Cefovecin	*67*	**78**
Erythromycin	*428*	**78**
Tylosin	*93*	**84**
Spiramycin	*222*	**85**
Lincomycin	*414*	**81**
Streptomycin 500 µg	*373*	**90**
Kanamycin 1000 µg	*344*	**99**
Gentamicin 500 µg	*421*	**98**
Tetracycline	*409*	**33**
Doxycycline	*33*	**55**
Chloramphenicol	*77*	**44**
Florfenicol	*282*	**98**
Enrofloxacin	*431*	**55**
Marbofloxacin	*411*	**83**
Trimethoprim-Sulfonamides	*421*	**63**
Rifampicin	*44*	**39**

Table 15 - Dogs 2018 – Skin and soft tissue infections – All age groups included – *Streptococcus*: susceptibility to antibiotics (proportion) (N= 107)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*103*	**91**
Erythromycin	*107*	**78**
Spiramycin	*57*	**82**
Lincomycin	*103*	**82**
Streptomycin 500 µg	*96*	**91**
Kanamycin 1000 µg	*91*	**98**
Gentamicin 500 µg	*106*	**98**
Tetracycline	*86*	**27**
Florfenicol	*48*	**96**
Enrofloxacin	*100*	**49**
Marbofloxacin	*96*	**82**
Trimethoprim-Sulfonamides	*101*	**63**

Table 16 - Dogs 2018 – All pathologies and age groups included – *Proteus mirabilis*: susceptibility to antibiotics (proportion) (N= 1,273)

Antibiotic	*Total (N)*	**% S**
Amoxicillin-Clavulanic ac.	*1,271*	**89**
Cephalexin	*1,229*	**79**
Cephalothin	*77*	**97**
Cefoxitin	*472*	**91**
Cefuroxime	*86*	**98**
Cefovecin	*129*	**98**
Ceftiofur	*1,263*	**99**
Cefquinome 30 µg	*449*	**99**
Streptomycin 10 UI	*472*	**75**
Spectinomycin	*32*	**78**
Kanamycin 30 UI	*354*	**88**
Tobramycin	*704*	**93**
Gentamicin 10 UI	*1,273*	**91**
Neomycin	*221*	**88**
Apramycin	*54*	**96**
Chloramphenicol	*792*	**62**
Florfenicol	*429*	**99**
Nalidixic ac.	*1,119*	**84**
Oxolinic ac.	*32*	**94**
Flumequine	*134*	**93**
Enrofloxacin	*1,211*	**93**
Marbofloxacin	*1,167*	**97**
Danofloxacin	*70*	**99**
Trimethoprim-Sulfonamides	*1,269*	**79**

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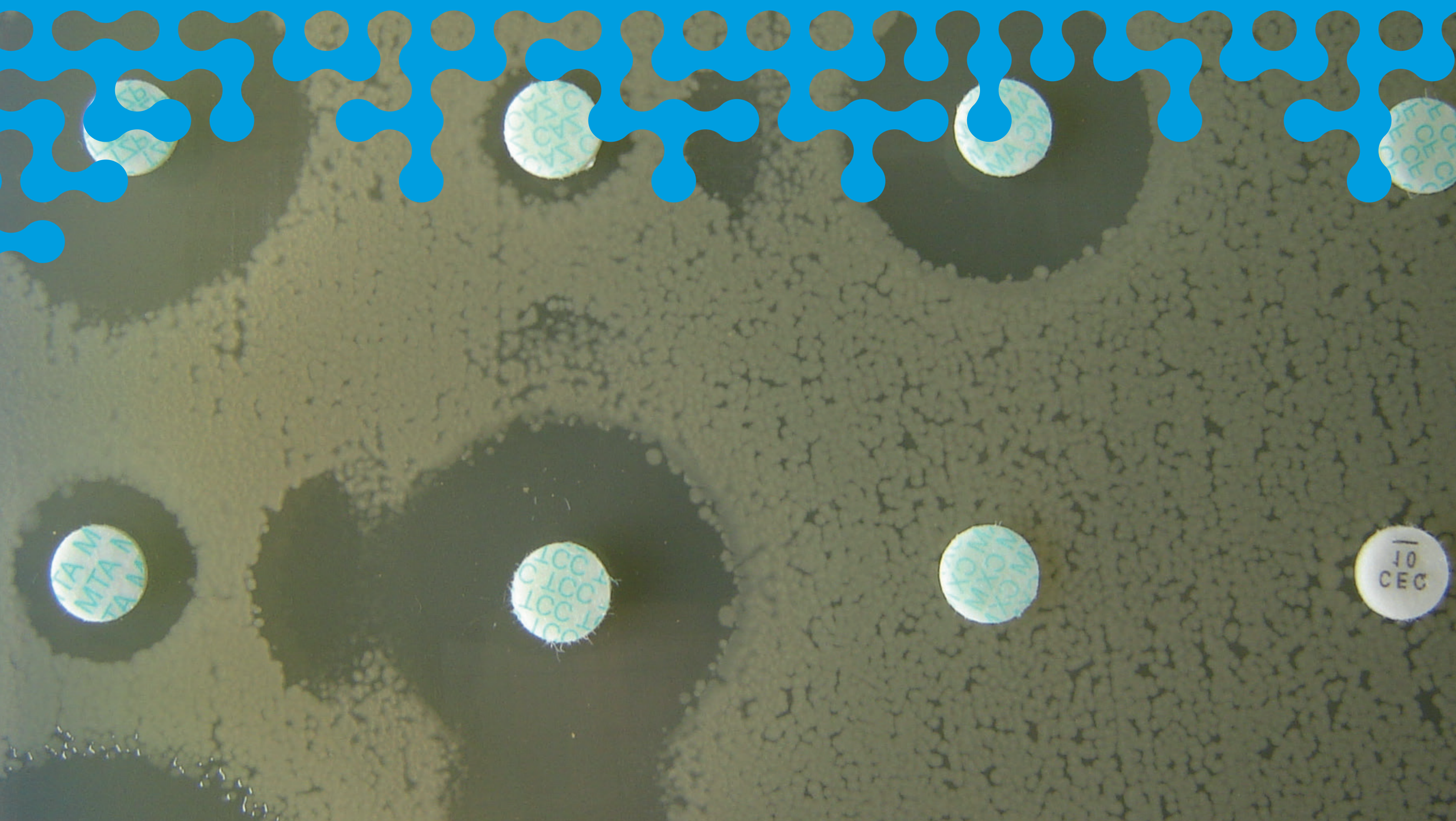
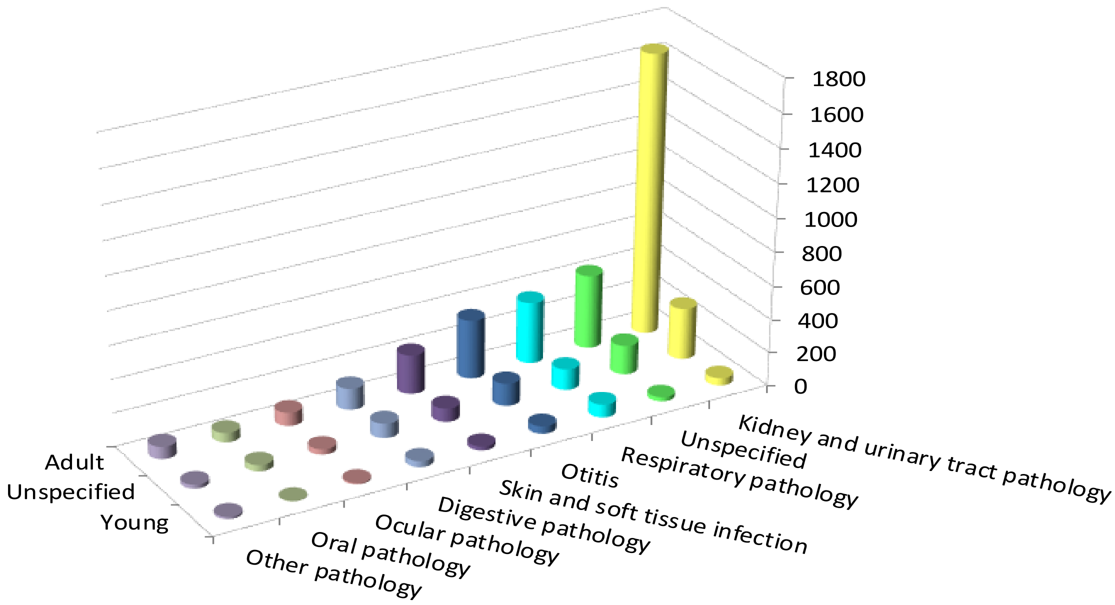


Figure 1 - Cats 2018 – Number of antibiograms by age group and pathology

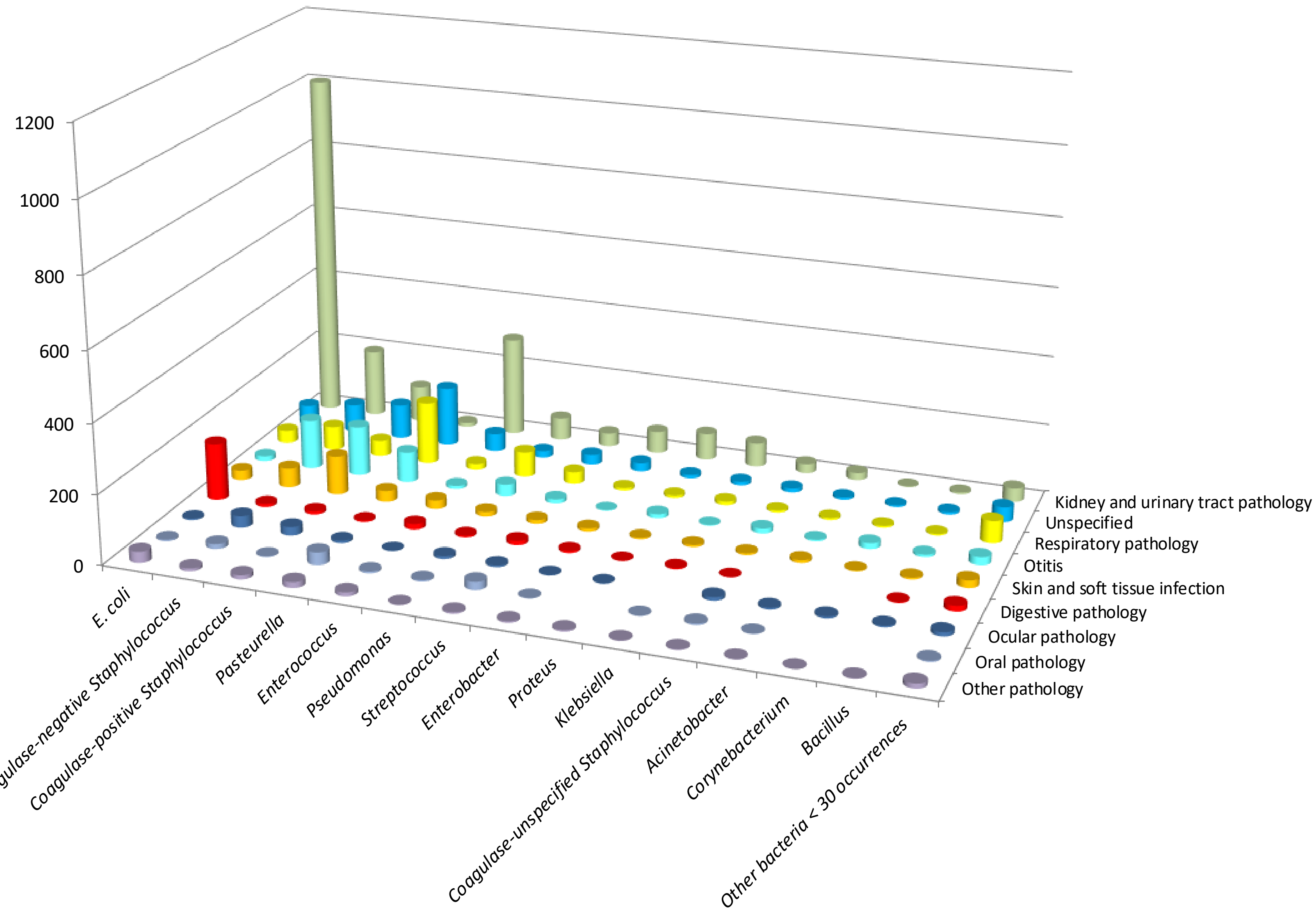


Note: *all values are detailed in table 1 (including other pathologies, representing less than 1%, grouped together)*

Table 1 - Cats 2018 – Number of antibiograms by age group and pathology

Pathology N (%)	Age group N (%)			Total N (%)
	Adult	Unspecified	Young	
Kidney and urinary tract pathology	1,666 *(35.76)*	306 *(6.57)*	45 *(0.97)*	**2,017** ***(43.29)***
Unspecified	438 *(9.40)*	174 *(3.73)*	24 *(0.52)*	**636** ***(13.65)***
Respiratory pathology	366 *(7.86)*	124 *(2.66)*	78 *(1.67)*	**568** ***(12.19)***
Otitis	350 *(7.51)*	132 *(2.83)*	43 *(0.92)*	**525** ***(11.27)***
Skin and soft tissue infections	234 *(5.02)*	80 *(1.72)*	22 *(0.47)*	**336** ***(7.21)***
Digestive pathology	128 *(2.75)*	86 *(1.85)*	35 *(0.75)*	**249** ***(5.34)***
Ocular pathology	80 *(1.72)*	33 *(0.71)*	7 *(0.15)*	**120** ***(2.58)***
Oral pathology	57 *(1.22)*	39 *(0.84)*	2 *(0.04)*	**98** ***(2.10)***
Bone pathology	30 *(0.64)*	9 *(0.19)*	1 *(0.02)*	**40** ***(0.86)***
Reproductive pathology	13 *(0.28)*	7 *(0.15)*		**20** ***(0.43)***
Systemic pathology	10 *(0.21)*	1 *(0.02)*	5 *(0.11)*	**16** ***(0.34)***
Arthritis	11 *(0.24)*	3 *(0.06)*	2 *(0.04)*	**16** ***(0.34)***
Nervous system pathology	4 *(0.09)*	1 *(0.02)*	3 *(0.06)*	**8** ***(0.17)***
Septicemia	3 *(0.06)*	3 *(0.06)*	1 *(0.02)*	**7** ***(0.15)***
Mastitis	2 *(0.04)*			**2** ***(0.04)***
Cardiac pathology	1 *(0.02)*			**1** ***(0.02)***
Total N *(%)*	**3,393 *(72.83)***	**998 *(21.42)***	**268 *(5.75)***	**4,659 *(100.00)***

Figure 2 - Cats 2018 – Number of antibiograms by bacteria and pathology



***Note:** only values for pathologies >1% and bacterial groups having more than 30 occurrences are represented. Detailed values are presented in table 2 below.*

Table 2 - Cats 2018 – Number of antibiograms by bacteria and pathology

	Pathology N (%)																
Bacteria N (%)	Kidney and urinary tract pathology	Unspecified	Respiratory pathology	Otitis	Skin and soft tissue infections	Digestive pathology	Ocular pathology	Oral pathology	Bone pathology	Reproductive pathology	Systemic pathology	Arthritis	Nervous system pathology	Septicemia	Mastitis	Cardiac pathology	**Total N *(%)***
E. coli	1,007 *(21.61)*	60 *(1.29)*	37 *(0.79)*	14 *(0.30)*	28 *(0.60)*	165 *(3.54)*	4 *(0.09)*	4 *(0.09)*	3 *(0.06)*	12 *(0.26)*	10 *(0.21)*	2 *(0.04)*	1 *(0.02)*	3 *(0.06)*	1 *(0.02)*		**1,351 *(29.00)***
Coagulase-negative Staphylococcus	196 *(4.21)*	82 *(1.76)*	69 *(1.48)*	143 *(3.07)*	56 *(1.20)*	9 *(0.19)*	34 *(0.73)*	14 *(0.30)*	2 *(0.04)*	1 *(0.02)*	1 *(0.02)*	1 *(0.02)*	3 *(0.06)*				**611 *(13.11)***
Coagulase-positive Staphylococcus	104 *(2.23)*	101 *(2.17)*	46 *(0.99)*	144 *(3.09)*	112 *(2.4)*	9 *(0.19)*	24 *(0.52)*	2 *(0.04)*	8 *(0.17)*	1 *(0.02)*		2 *(0.04)*			1 *(0.02)*		**554 *(11.89)***
Pasteurella	11 *(0.24)*	172 *(3.69)*	181 *(3.88)*	88 *(1.89)*	31 *(0.67)*	4 *(0.09)*	7 *(0.15)*	36 *(0.77)*	8 *(0.17)*		1 *(0.02)*	6 *(0.13)*		1 *(0.02)*			**546 *(11.72)***
Enterococcus	289 *(6.20)*	52 *(1.12)*	17 *(0.36)*	9 *(0.19)*	25 *(0.54)*	16 *(0.34)*	1 *(0.02)*	5 *(0.11)*	6 *(0.13)*	1 *(0.02)*	2 *(0.04)*	1 *(0.02)*		1 *(0.02)*			**425 *(9.12)***
Pseudomonas	65 *(1.40)*	20 *(0.43)*	73 *(1.57)*	34 *(0.73)*	13 *(0.28)*	5 *(0.11)*	8 *(0.17)*	4 *(0.09)*	1 *(0.02)*								**223 *(4.79)***
Streptococcus	39 *(0.84)*	29 *(0.62)*	34 *(0.73)*	12 *(0.26)*	11 *(0.24)*	12 *(0.26)*	5 *(0.11)*	23 *(0.49)*		1 *(0.02)*	1 *(0.02)*	2 *(0.04)*					**169 *(3.63)***
Enterobacter	64 *(1.37)*	25 *(0.54)*	8 *(0.17)*	2 *(0.04)*	9 *(0.19)*	6 *(0.13)*	1 *(0.02)*	1 *(0.02)*	3 *(0.06)*					1 *(0.02)*			**120 *(2.58)***
Proteus	78 *(1.67)*	10 *(0.21)*	7 *(0.15)*	12 *(0.26)*	4 *(0.09)*	1 *(0.02)*	1 *(0.02)*			3 *(0.06)*	1 *(0.02)*						**117 *(2.51)***
Klebsiella	70 *(1.50)*	11 *(0.24)*	11 *(0.24)*	2 *(0.04)*	6 *(0.13)*	3 *(0.06)*		1 *(0.02)*	1 *(0.02)*								**105 *(2.25)***
Coagulase-unspecified Staphylococcus	27 *(0.58)*	12 *(0.26)*	6 *(0.13)*	14 *(0.30)*	5 *(0.11)*	1 *(0.02)*	10 *(0.21)*	4 *(0.09)*					1 *(0.02)*			1 *(0.02)*	**81 *(1.74)***
Acinetobacter	21 *(0.45)*	7 *(0.15)*	6 *(0.13)*	4 *(0.09)*	8 *(0.17)*		5 *(0.11)*	1 *(0.02)*					1 *(0.02)*				**53 *(1.14)***
Corynebacterium	2 *(0.04)*	5 *(0.11)*	5 *(0.11)*	17 *(0.36)*	2 *(0.04)*		5 *(0.11)*										**36 *(0.77)***
Bacillus	5 *(0.11)*	7 *(0.15)*	4 *(0.09)*	7 *(0.15)*	5 *(0.11)*	2 *(0.04)*	4 *(0.09)*		1 *(0.02)*								**35 *(0.75)***
Other bacteria < 30 occurrences	39 *(0.84)*	43 *(0.92)*	64 *(1.37)*	23 *(0.49)*	21 *(0.45)*	16 *(0.34)*	11 *(0.24)*	3 *(0.06)*	7 *(0.15)*	1 *(0.02)*		2 *(0.04)*	2 *(0.04)*	1 *(0.02)*			**233 *(5.00)***
Total N *(%)*	**2,017 *(43.29)***	**636 *(13.65)***	**568 *(12.19)***	**525 *(11.27)***	**336 *(7.21)***	**249 *(5.34)***	**120 *(2.58)***	**98 *(2.10)***	**40 *(0.86)***	**20 *(0.43)***	**16 *(0.34)***	**16 *(0.34)***	**8 *(0.17)***	**7 *(0.15)***	**2 *(0.04)***	**1 *(0.02)***	**4,659 *(100.00)***

Table 3 - Cats 2018 – All pathologies and age groups included – *E. coli:* susceptibility to antibiotics (proportion) (N= 1,351)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,344*	**70**
Amoxicillin-Clavulanic ac.	*1,350*	**74**
Cephalexin	*1327*	**78**
Cephalothin	*57*	**79**
Cefoxitin	*546*	**93**
Cefuroxime	*129*	**85**
Cefoperazone	*85*	**99**
Cefovecin	*155*	**93**
Ceftiofur	*1,343*	**96**
Cefquinome 30 µg	*525*	**98**
Streptomycin 10 UI	*568*	**76**
Spectinomycin	*37*	**95**
Kanamycin 30 UI	*391*	**93**
Tobramycin	*668*	**98**
Gentamicin 10 UI	*1,348*	**98**
Neomycin	*268*	**91**
Apramycin	*74*	**100**
Tetracycline	*1,268*	**81**
Doxycycline	*143*	**52**
Chloramphenicol	*759*	**91**
Florfenicol	*460*	**95**
Nalidixic ac.	*1,128*	**87**
Oxolinic ac.	*42*	**90**
Flumequine	*164*	**88**
Enrofloxacin	*1,266*	**93**
Marbofloxacin	*1,195*	**93**
Danofloxacin	*78*	**100**
Trimethoprim-Sulfonamides	*1,348*	**90**

Table 4 - Cats 2018 – Kidney and urinary tract pathology – All age groups included – *E. coli:* susceptibility to antibiotics (proportion) (N= 1,007)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,003*	**71**
Amoxicillin-Clavulanic ac.	*1,006*	**75**
Cephalexin	*989*	**76**
Cephalothin	*38*	**82**
Cefoxitin	*348*	**94**
Cefuroxime	*55*	**80**
Cefoperazone	*43*	**100**
Cefovecin	*112*	**92**
Ceftiofur	*1,001*	**95**
Cefquinome 30 µg	*325*	**98**
Streptomycin 10 UI	*400*	**79**
Kanamycin 30 UI	*285*	**93**
Tobramycin	*561*	**98**
Gentamicin 10 UI	*1,004*	**98**
Neomycin	*157*	**93**
Tetracycline	*944*	**82**
Doxycycline	*117*	**50**
Chloramphenicol	*632*	**91**
Florfenicol	*297*	**96**
Nalidixic ac.	*853*	**87**
Flumequine	*107*	**93**
Enrofloxacin	*949*	**93**
Marbofloxacin	*913*	**92**
Danofloxacin	*36*	**100**
Trimethoprim-Sulfonamides	*1,004*	**91**

Table 5 - Cats 2018 – Respiratory pathology – All age groups included – *Pasteurella:* susceptibility to antibiotics (proportion) (N= 181)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*177*	**93**
Amoxicillin-Clavulanic ac.	*181*	**92**
Cephalexin	*177*	**94**
Ceftiofur	*167*	**97**
Cefquinome 30 µg	*69*	**91**
Streptomycin 10 UI	*75*	**47**
Kanamycin 30 UI	*51*	**61**
Tobramycin	*92*	**100**
Gentamicin 10 UI	*179*	**93**
Neomycin	*35*	**74**
Tetracycline	*179*	**96**
Chloramphenicol	*106*	**98**
Florfenicol	*74*	**100**
Nalidixic ac.	*157*	**94**
Enrofloxacin	*181*	**97**
Marbofloxacin	*176*	**99**
Trimethoprim-Sulfonamides	*181*	**82**

Table 6 - Cats 2018 – All pathologies and age groups included – Coagulase-positive *Staphylococcus*: susceptibility to antibiotics (proportion) (N= 554)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*548*	**40**
Cefoxitin	*408*	**81**
Oxacillin	*326*	**88**
Cefovecin	*294*	**88**
Erythromycin	*550*	**72**
Tylosin	*86*	**84**
Spiramycin	*229*	**82**
Lincomycin	*547*	**82**
Streptomycin 10 UI	*346*	**86**
Kanamycin 30 UI	*271*	**87**
Gentamicin 10 UI	*551*	**91**
Neomycin	*167*	**90**
Tetracycline	*530*	**82**
Chloramphenicol	*220*	**86**
Florfenicol	*251*	**99**
Enrofloxacin	*376*	**89**
Marbofloxacin	*506*	**89**
Sulfonamides	*37*	**76**
Trimethoprim-Sulfonamides	*548*	**88**
Fusidic ac.	*367*	**97**
Rifampicin	*65*	**98**

Tableau 7 - Cats 2018 – Otitis – All pathologies and age groups included – Coagulase-positive *Staphylococcus*: susceptibility to antibiotics (proportion) (N= 144)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*143*	**60**
Cefoxitin	*97*	**93**
Oxacillin	*89*	**98**
Cefovecin	*71*	**94**
Erythromycin	*143*	**80**
Spiramycin	*63*	**86**
Lincomycin	*141*	**86**
Streptomycin 10 UI	*95*	**93**
Kanamycin 30 UI	*78*	**92**
Gentamicin 10 UI	*143*	**94**
Neomycin	*48*	**94**
Tetracycline	*140*	**89**
Chloramphenicol	*49*	**86**
Florfenicol	*70*	**100**
Enrofloxacin	*91*	**97**
Marbofloxacin	*135*	**96**
Trimethoprim-Sulfonamides	*143*	**92**
Fusidic ac.	*95*	**97**

Tableau 8 - Cats 2018 – Skin and soft tissue infections – All pathologies and age groups included – Coagulase-positive *Staphylococcus*: susceptibility to antibiotics (proportion) (N= 112)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*112*	**39**
Cefoxitin	*88*	**76**
Oxacillin	*57*	**91**
Cefovecin	*64*	**92**
Erythromycin	*112*	**73**
Spiramycin	*51*	**84**
Lincomycin	*111*	**86**
Streptomycin 10 UI	*74*	**88**
Kanamycin 30 UI	*47*	**81**
Gentamicin 10 UI	*111*	**93**
Neomycin	*38*	**95**
Tetracycline	*108*	**90**
Chloramphenicol	*48*	**85**
Florfenicol	*42*	**98**
Enrofloxacin	*85*	**92**
Marbofloxacin	*102*	**91**
Trimethoprim-Sulfonamides	*108*	**92**
Fusidic ac.	*70*	**94**

Tableau 9 - Cats 2018 – Kidney and urinary tract pathology – All pathologies and age groups included – Coagulase-positive *Staphylococcus*: susceptibility to antibiotics (proportion) (N= 104)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*102*	**38**
Cefoxitin	*66*	**89**
Oxacillin	*71*	**83**
Cefovecin	*55*	**89**
Erythromycin	*103*	**73**
Spiramycin	*34*	**79**
Lincomycin	*103*	**79**
Streptomycin 10 UI	*69*	**86**
Kanamycin 30 UI	*57*	**84**
Gentamicin 10 UI	*103*	**88**
Tetracycline	*96*	**76**
Chloramphenicol	*37*	**89**
Florfenicol	*49*	**98**
Enrofloxacin	*62*	**81**
Marbofloxacin	*102*	**80**
Trimethoprim-Sulfonamides	*104*	**84**
Fusidic ac.	*68*	**100**

Agence nationale de sécurité sanitaire
de l'alimentation, de l'environnement et du travail
14 rue Pierre et Marie Curie
F94701 Maisons-Alfort cedex
www.anses.fr
@Anses_fr

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