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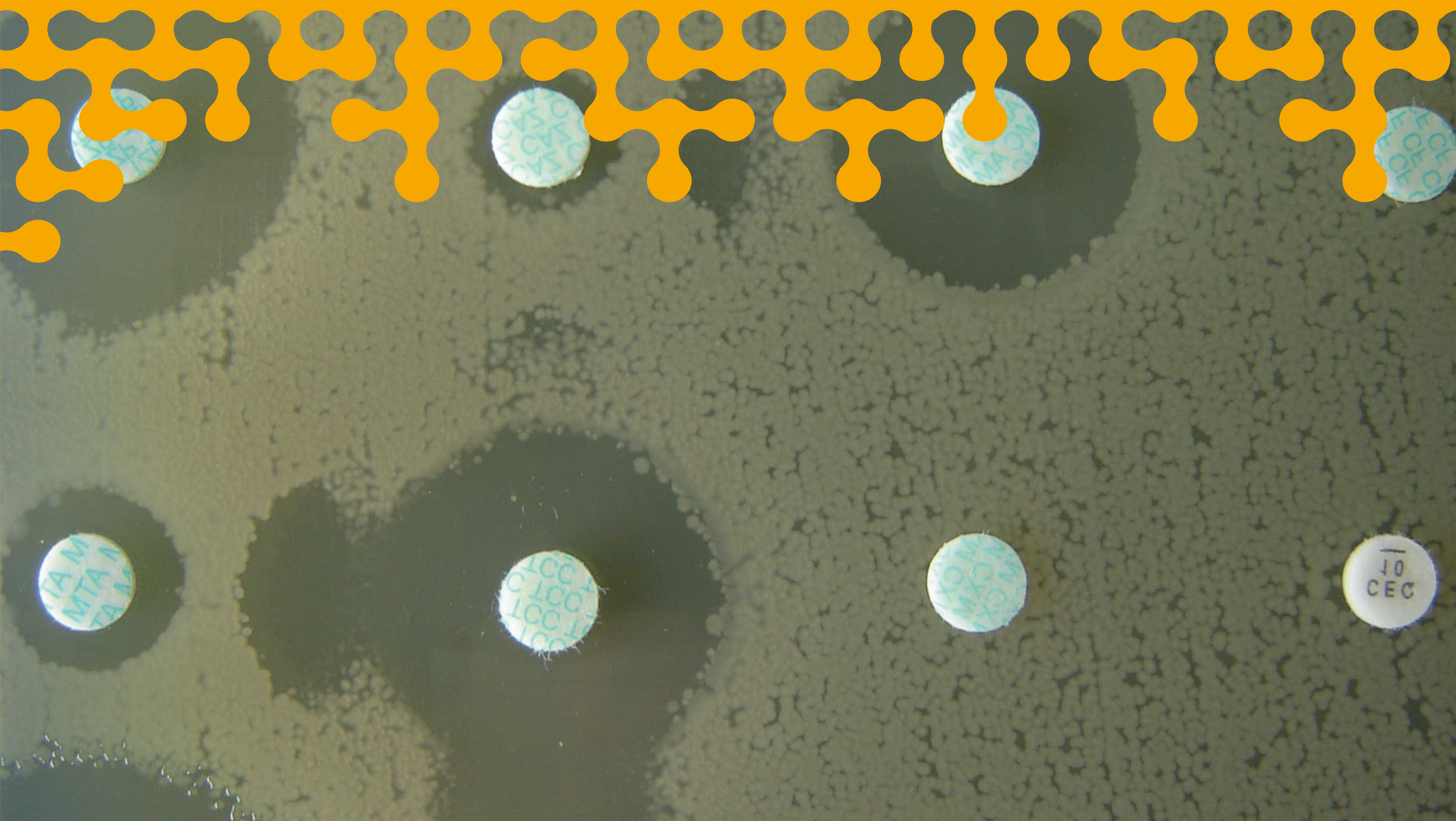
Resapath

French surveillance network for antimicrobial resistance in bacteria from diseased animals

2019 Annual report

April 2021 - Scientific Publication



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Contents

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INTRODUCTION

Monitoring of Antimicrobial Resistance in bacteria from diseased animals in France in 2019: Summary Report of the RESAPATH network

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: 2017-2022) 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, 2017-2021) 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

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.

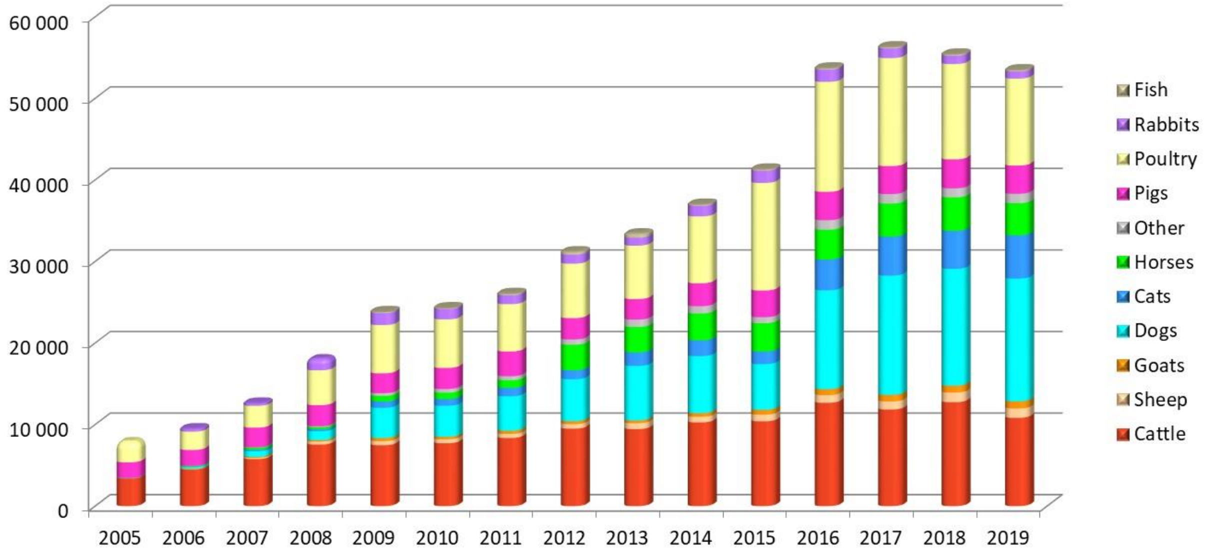
Bacteria recovered from diseased animals and sampled by veterinarians for diagnostic purposes as part of their routine activity are tested for antimicrobial susceptibility by private or public veterinary laboratories located throughout France. Antibiograms are performed by disk diffusion according to the guidelines of the veterinary section 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 above-mentionned recommendations. 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 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 2019, 71 laboratories were members of the RESAPATH and a total of 53,469 antibiograms results 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*



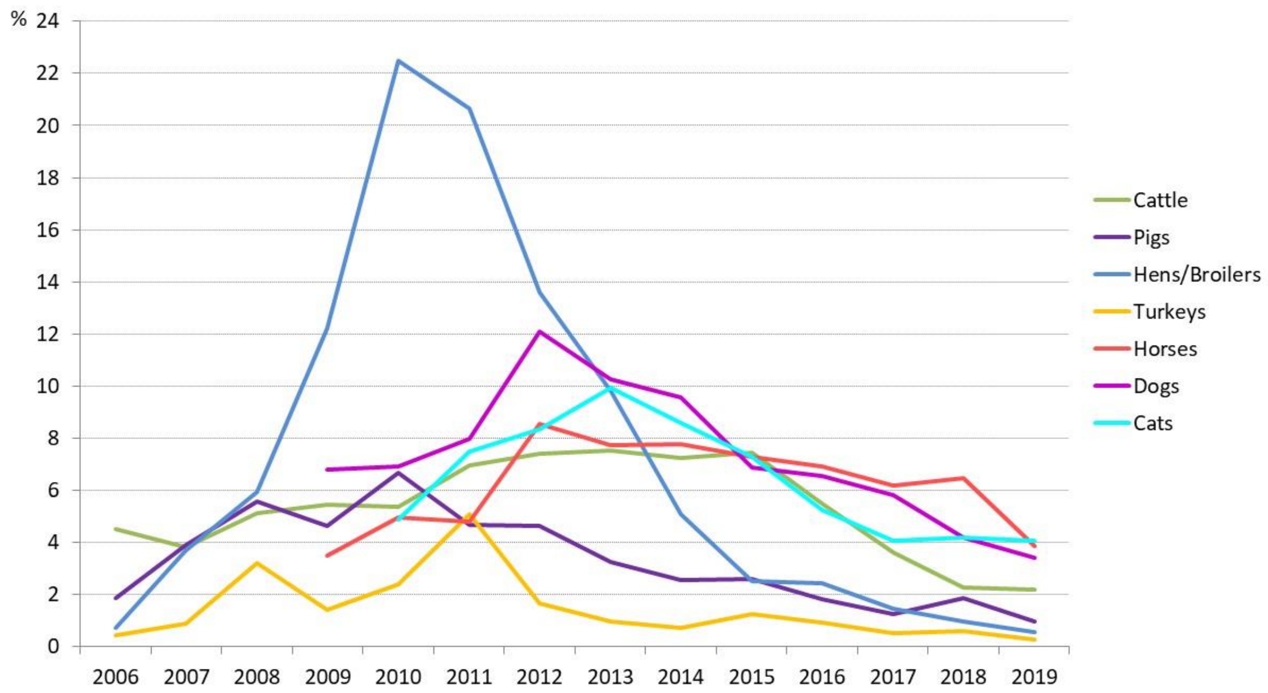
RESISTANCE DATA

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 antimicrobials 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

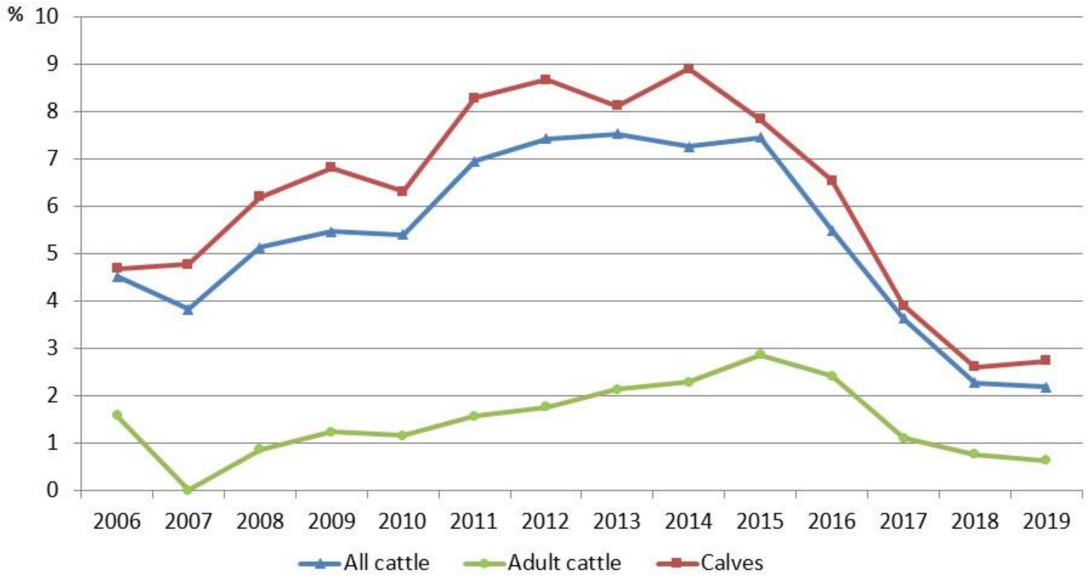
Isolates are routinely tested for their susceptibility to ceftiofur and cefquinome in food animals and horses, and to ceftiofur and cefovecin in companion animals. Resistance has been mainly observed in *Escherichia coli* and to a lesser extent in *Klebsiella pneumoniae* and *Enterobacter* spp. In 2019, ceftiofur resistance in *E. coli* reached a maximum proportion of 4% (cats, horses) or below in all other animal species, thereby confirming a strong decreasing trend observed over the years (Figure 2).

Figure 2*.* Evolution of proportions of *E. coli* isolates non-susceptible (R+I) to ceftiofur in cattle, pigs, poultry, turkeys, horses, cats and dogs (2006-2019)



The analysis of the trends 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 trend is identical (Figure 3).

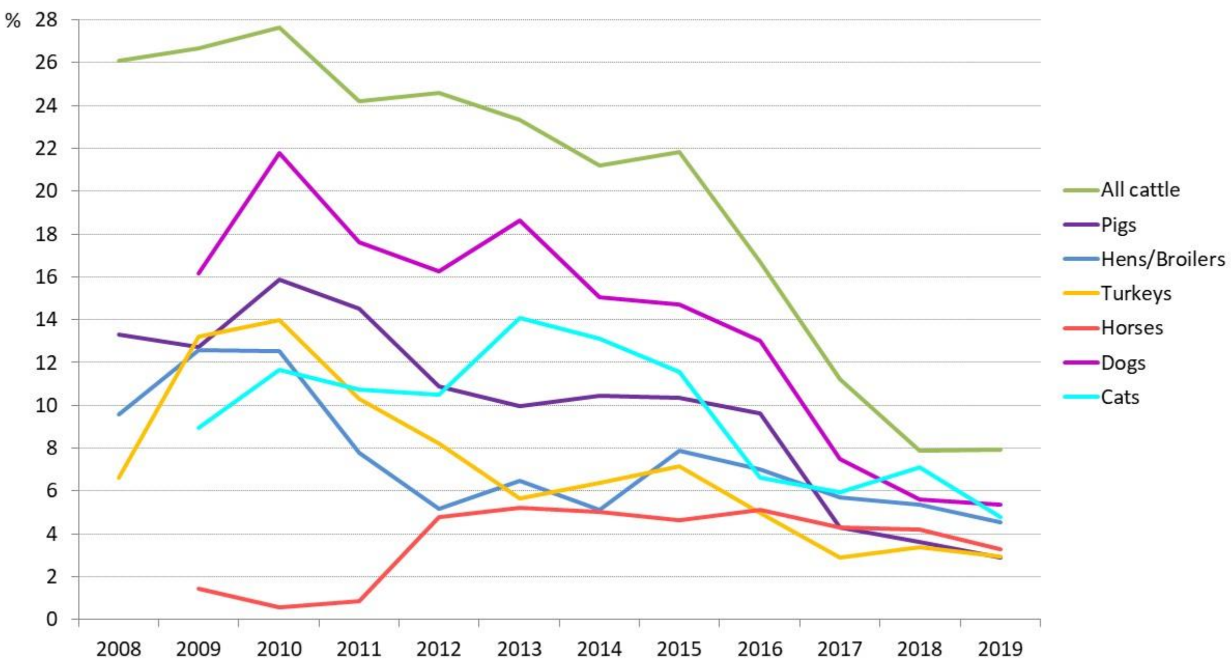
***Figure 3**. Evolution of proportions of* E. coli *isolates non-susceptible (R+I) to ceftiofur in cattle, adults and calves (2006-2019)*



Resistance to fluoroquinolones

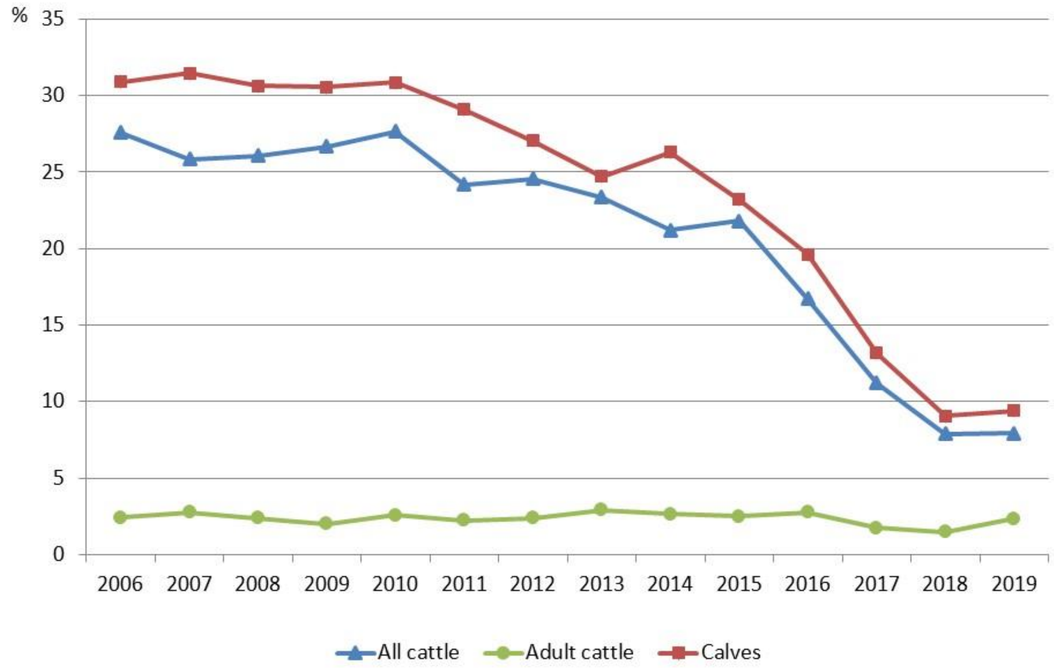
Isolates are routinely tested for their susceptibility to enrofloxacin, marbofloxacin or danofloxacin. Other fluoroquinolones (FQs), such as pradofloxacin in companion animals, are also tested depending on the animal species. In *Figure 4*, resistance to either enrofloxacin or marbofloxacin in *E. coli* 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 (2008-2019)*



In 2019, FQ resistance rates in *E. coli* isolates from diseased animals ranged from 3% to 8% in all animal species (*Figure 4*), with overall a steady situation compared to 2018. Similarly to ESC-R, FQ-R in bovines shows a clear difference in the level of resistance found in adults compared to calves (*Figure 5*).

Figure 5*. Evolution of proportions of* E. coli *isolates non-susceptible (R+I) to enrofloxacin or marbofloxacin in cattle, adult cattle and calves(2006-2019)*



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 2006-2019 period in cattle, pigs, hens/broilers and turkeys.

For a majority of the antibiotics being considered, and in almost all animal species, the overall downward trend identified in the recent years continued in 2019 or remained at the same level as 2018.

In cattle, the proportions of resistance observed in 2019 vary very little compared to 2018 for all the antibiotics studied *(Figure 6).* Considering the trend in resistance since 2006, the decrease is statistically significant for all the antibiotics being monitored.
In pigs, the proportions of *E. coli* strains resistant to amoxicillin - clavulanic acid continued to increase since 2015 *(Figure 7).* The proportions of resistance to quinolones and spectinomycin increased slightly compared to 2018. For the other antibiotics under monitoring, the proportions stabilized or continued to decline.
Regarding poultry, the decline that began in 2017 continued in 2019 for almost all the antibiotics being monitored *(Figure 8).* Only the proportions of resistance to amoxicillin-clavulanic acid and to spectinomycin (or streptomycin) increased in 2019 compared to 2018.
In turkeys, resistance to trimethoprim-sulfonamides and to amoxicillin continued to decrease since 2017 *(Figure 9).* After an increase in 2017, the proportion of resistance to spectinomycin (or streptomycin) continued to decrease in 2019 to reach its lowest level since 2006. For the second consecutive year, resistance to amoxicillin-clavulanic acid increased slightly. For the other antibiotics under monitoring, the proportions stabilized or continued to decline.

In conclusion, over the last ten years, the decrease in resistance to tetracycline in poultry, and to a lesser extent in pigs, is undoubtedly the most striking phenomenon. In cattle, where the levels of resistance to amoxicillin, tetracycline and aminoglycosides (excluding gentamicin) are very high, there has been very little change over the past ten years.
In 2018, in all sectors, the proportion of *E. coli* not sensitive (intermediate and resistant strains) to amoxicillin decreased compared to 2017, while increased for the combination of amoxicillin - clavulanic acid. In 2019, this trend seems to be continuing since in all sectors the proportion of resistance to the amoxicillin - clavulanic acid combination increases while the proportion of resistance to amoxicillin decreases or stabilizes. Additional analyses are ongoing in order to determine whether this discrepancy might be due to break-point issues.

Figure 6. *Evolution of proportions (%) of* E. coli *isolates non-susceptible (R+I) to seven antimicrobials in cattle (2006-2019)*

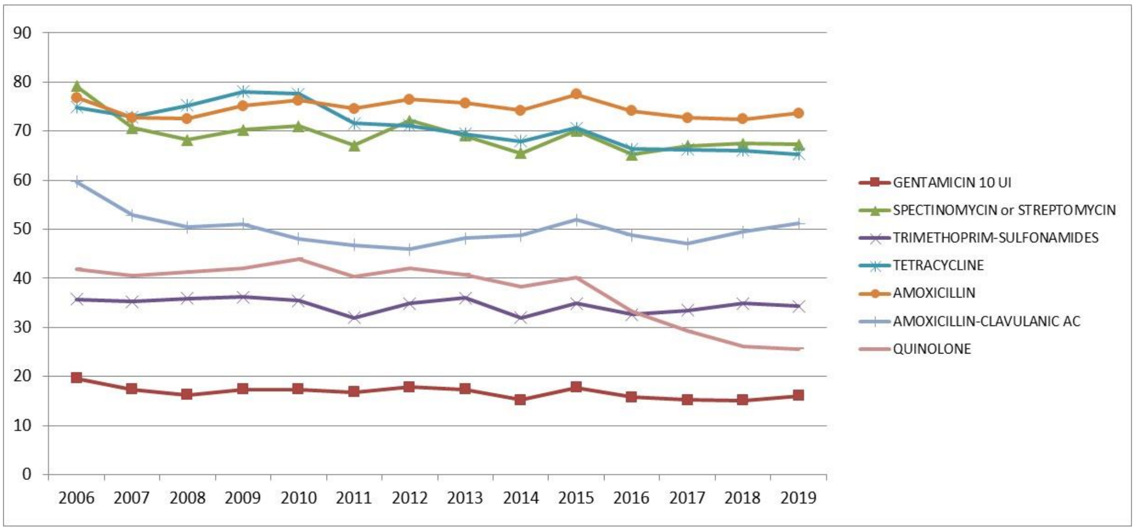


Figure 7. *Evolution of proportions (%) of* E. coli *isolates non-susceptible (R+I) to seven antimicrobial in pigs (2006-2019)*

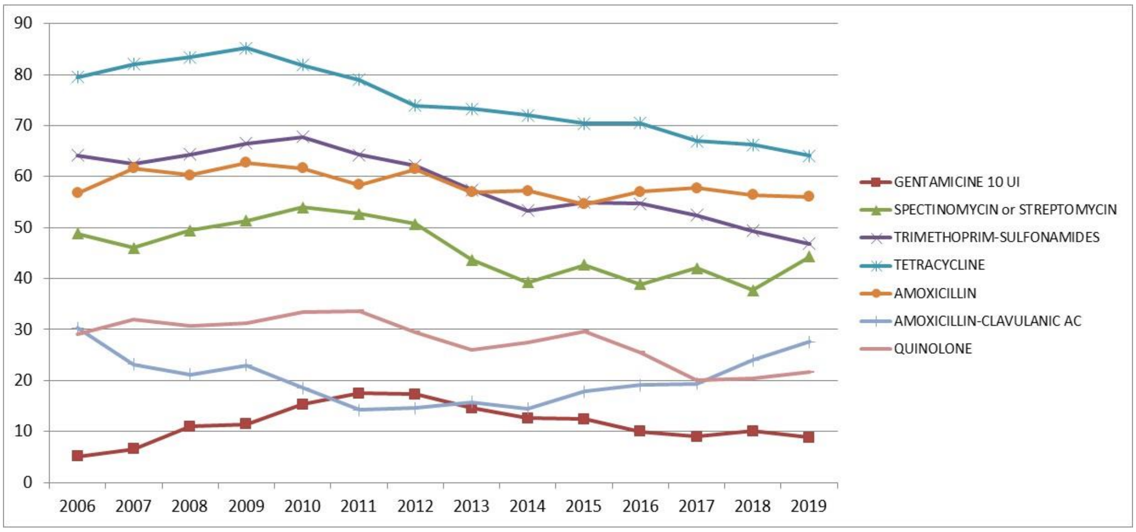


Figure 8. *Evolution of proportions (%) of* E. coli *isolates non-susceptible (R+I) to seven antimicrobials in hens and broilers (2006-2019)*

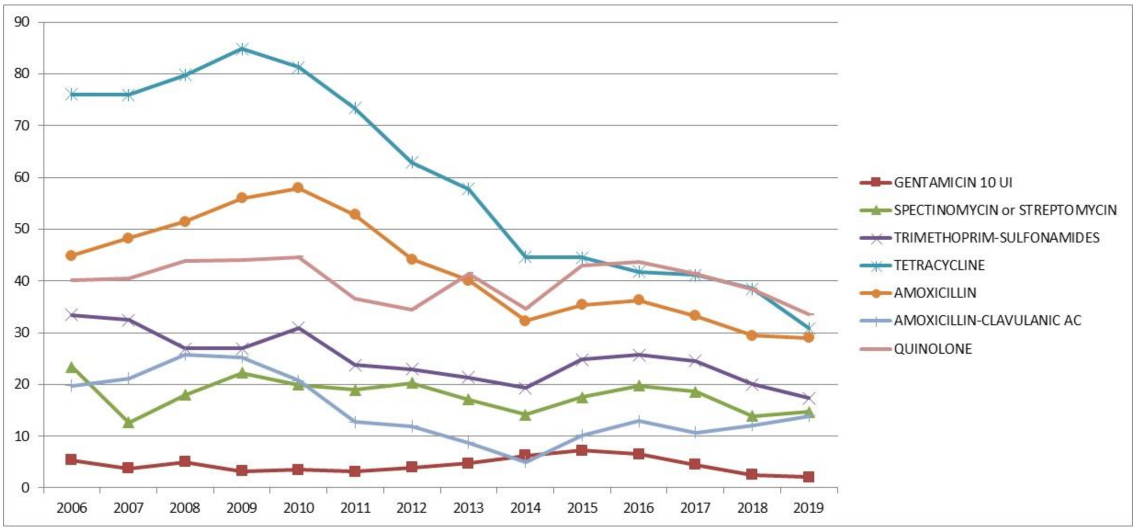
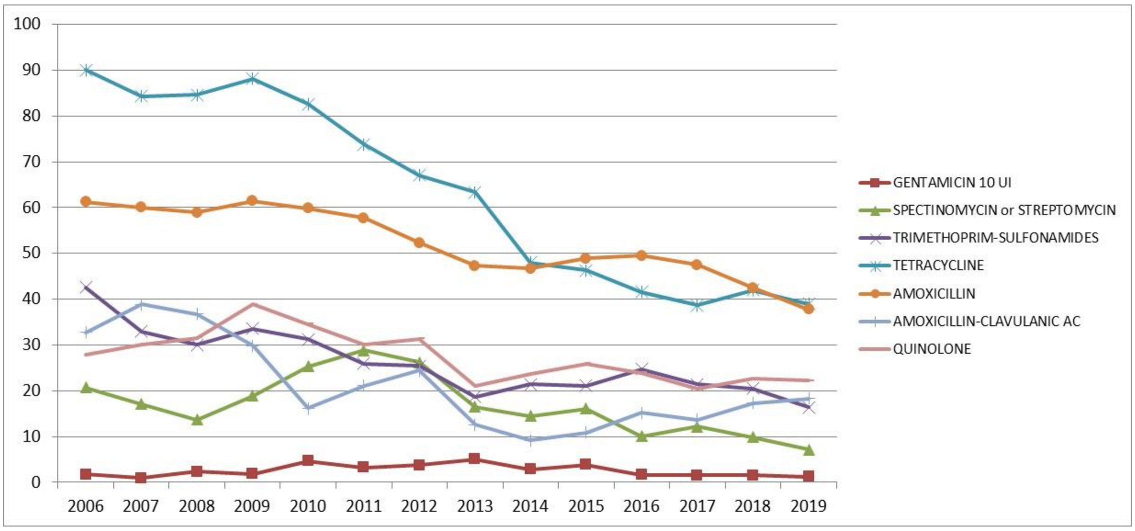


Figure 9. *Evolution of proportions (%) of* E. coli *isolates non-susceptible (R+I) to seven antimicrobials in turkeys (2006-2019)*



Multidrug resistance

The RESAPATH network investigates Multidrug resistance (MDR) *E. coli* phenotypes. MDR was considered 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)* selection of 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 susceptible to the five antimicrobials tested is very variable among the different production species. Pigs have the lowest proportion (22.3%) while it reaches more than half of the strains in poultry (61.6% in hens/chickens and 57.8% in turkeys) *(Table 1).* Between 2011 and 2019, the proportion of isolates susceptible to the five antimicrobials increased slightly but significantly in cattle and doubled for pigs and poultry (Chi² trend, p <0, 0001 for the four species*) (Figure 10).*
Cattle have the highest proportion of MDR isolates (15.5%), with a significant disparity according to pathologies and age groups (i.e. 2.5% in *E. coli* isolated from mastitis and 18.0% in digestive diseases that mainly concern young animals). The proportion of MDR is 7.9% for pigs, while being much lower in poultry (2.5% in hens/chickens, 2.0% in turkeys). Over the 2012-2019 period, the proportion of MDR isolates decreased significantly in all food-producing animal species (trend Chi², p <0.0001) *(Figure 11).*

Horses

For horses, the proportion of isolates susceptible to all the antimicrobials tested remains high (60.0%). However, contrary to all other species, this proportion significantly decreased over the 2012-2018 period (Chi² trend, p=0.001) *(Table 1, Figure 10).* In equines, it should be noted that the proportion of MDR isolates, whose tendency was to increase over the last three years (8.6% in 2015 to 10.4% in 2018), is decreasing in 2019. The proportion of MDR isolates in equines in 2019 (6.8%) is the lowest obtained over the last 8 years *(Figure 10).*

Dogs

In 2018, the proportion of pan-susceptible isolates in dogs is 69.2% and follows a significantly increasing trend over the 2013-2019 period (Chi², p<0.0001). The proportion of MDR isolates is significantly decreasing over the same period and represents 4.4% of the strains in 2019, half as much as in 2013 (Chi², p <0.0001) *(Table 1, Figure 10).*

Table 1. *Proportions (in %) of resistant* E. coli *isolates (R + I) according to the number of resistances in 2019*

Number of resistance(s) (R+I)	Proportion of isolates (%)					
	Cattle (n=5,596)	Pigs (n=1,309)	Hens/Broilers (n=3,903)	Turkeys (n=1,153)	Horses (n=565)	Dogs (n=1,694)
0	28.5	26.4	61.6	57.8	60.0	69.2
1	36.7	31.4	24.6	26.5	20.4	18.9
2	19.4	34.4	11.3	13.7	12.7	7.4
3	11.9	7.6	2.5	2.0	3.5	2.8
4	3.2	0.2	0.0	0.0	2.1	1.4
5	0.4	0.1	0.0	0.0	1.2	0.3
MDR	15.5	7.9	2.5	2.0	6.8	4.4

The results are encouraging as they show a decreasing trend of MDR over the 2011-2019 period for all animal species. However, the situation remains complex concerning resistance associations such as co-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, 84% of ceftiofur-resistant isolates were also resistant to tetracyclines and 25% to fluoroquinolones in 2019, whereas these proportions were of 65% and 8% when all isolates were taken into account. These differences were found in all species.

Figure 10: *Evolution of proportions (%) of* E. coli *isolates a) susceptible to all five antimicrobials, b) resistant to at least three out of the five antimicrobials considered in the different animal species*

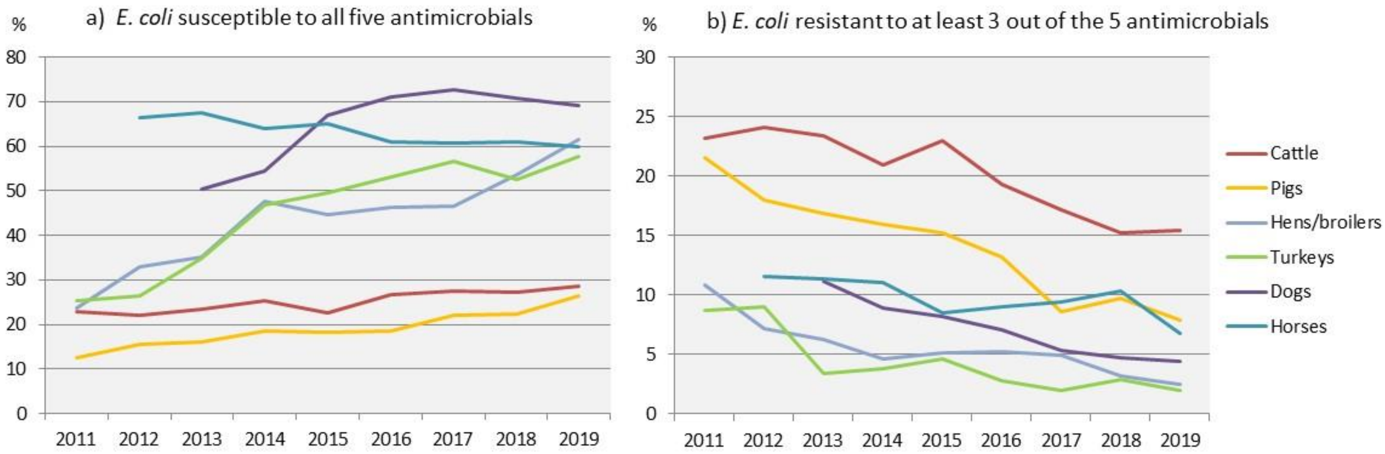
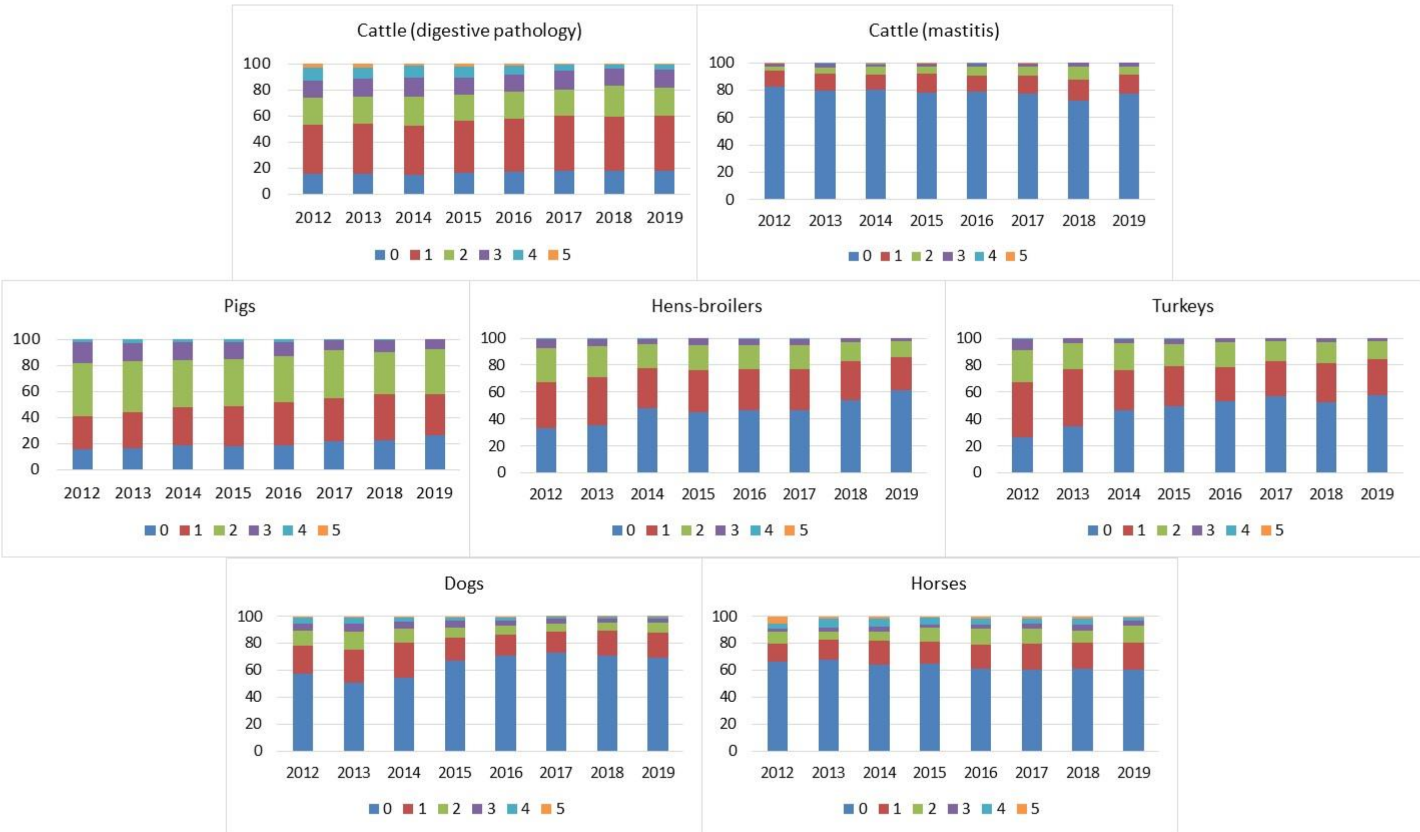


Figure 11: *Evolution in the proportions of E. coli strains resistant to any, 1, 2, 3, 4 or 5 of the antimicrobials tested, for different animal species and pathologies*



Colistin resistance in veterinary medicine

Colistin use in veterinary medicine has been seriously challenged since the description of the first plasmid-mediated colistin-resistance gene *mcr-1* in China in 2015. Today, the *mcr* family has expanded and is now counting ten members, some of which encompassing several variants. In France, only *mcr-1* and *mcr-3* have been identified, beside non-transmissible mechanisms such as *mgrB* mutations in *Klebsiella pneumoniae* or PmrAB/PhoPQ mutations in *E. coli*.[1] 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.[2] This method is not well-adapted to the routine work of French veterinary laboratories that are still using disk 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 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 disk (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 a MIC. However, the probability for a MIC to be >2 mg/L (resistant) is decreasing in parallel with an increase in diameters.

During 2018, some diagnostic laboratories involved in RESAPATH performed, in parallel to the disk diffusion method, an alternative test called "Colispot".[3] This liquid diffusion method developed in ANSES laboratories is in perfect agreement with MICs obtained using the microdilution method for 197 *E. coli*.[4] Data provided by diagnostic laboratories in routine conditions confirmed the very good correlation between an inhibition zone diameter ≥18 mm and the susceptibility to colistin. Indeed, among 3,677 *E. coli* susceptible to colistin using disk diffusion, only five (0.1%) were resistant by liquid diffusion. Among 96 not interpretable *E. coli* (inhibition zone diameters of 15, 16 or 17 mm), the liquid diffusion results indicated a susceptibility for 43 strains and a resistance for the 53 others. Finally, among 26 *E. coli* with an inhibition zone diameter <15 mm, 25 were also classified resistant using liquid diffusion method and only one was found susceptible.

The evolution of the proportions of the different diameters was observed between 2003 and 2019 (*Figures 12 to 16*) and a Chi² test for trend statistical significance 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.

1 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

2 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

3 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.

4 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 12. *Relative proportion of diameters < 15 mm, 15 mm, 16 mm, 17 mm and ≥ 18 mm around the colistin disk (50 µg) for* E. coli *isolated from* ***digestive pathologies in piglets*** *(n min.: 296 (2005) ; n max.: 887 (2019))*

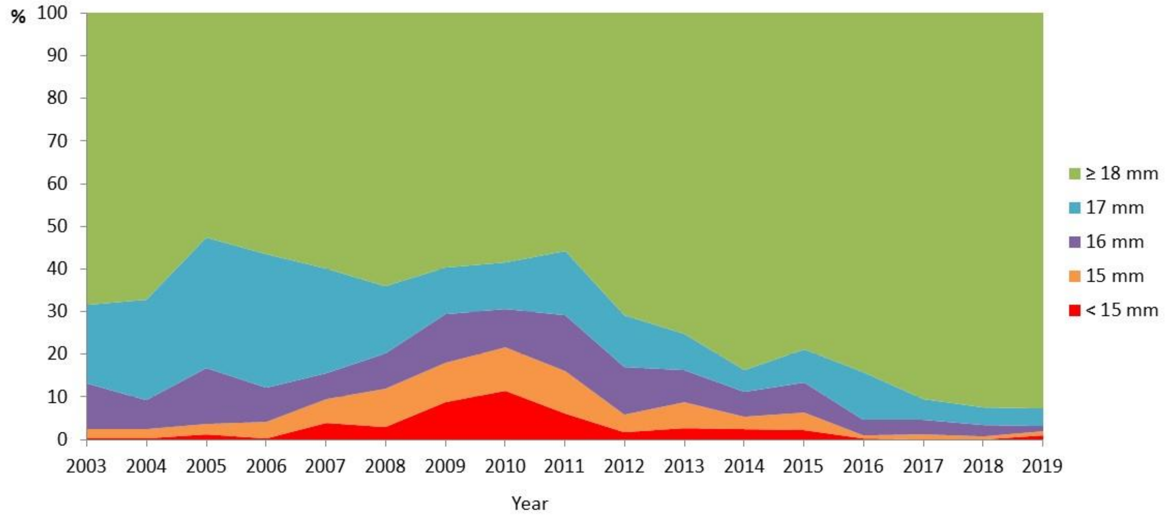


Figure 13. *Relative proportion of diameters < 15 mm, 15 mm, 16 mm, 17 mm and ≥ 18 mm around the colistin disk (50 µg) for* E. coli *isolated from* ***digestive pathologies in veal calves*** *(n min.: 1,139 (2003) ; n max.: 4,219 (2016))*

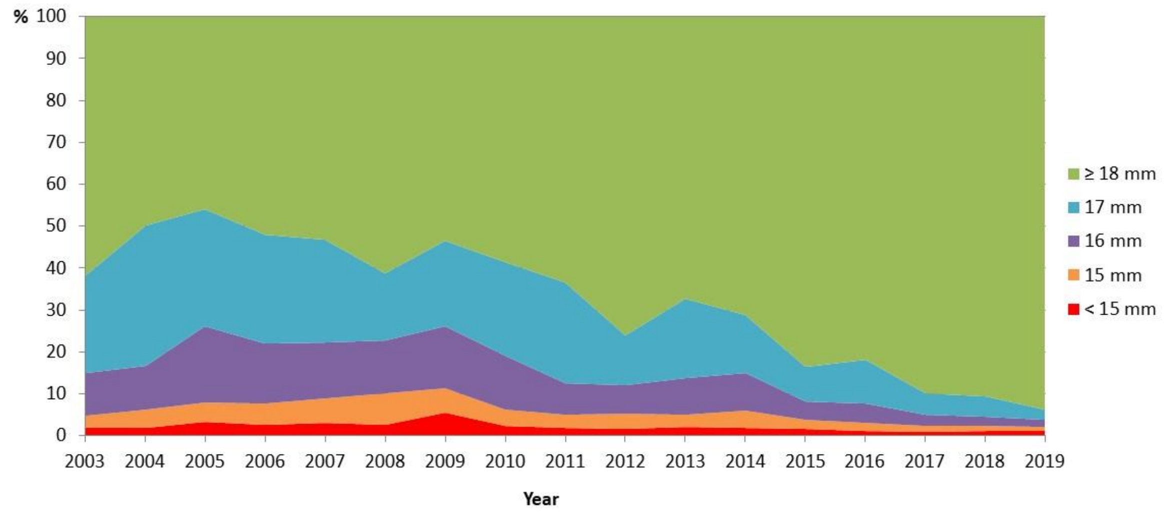


Figure 14. *Relative proportion of diameters < 15 mm, 15 mm, 16 mm, 17 mm and ≥ 18 mm around the colistin disk (50 µg) for* E. coli *isolated from* ***bovine mastitis*** *(n min.: 188 (2004) ; n max.: 1,212 (2018))*

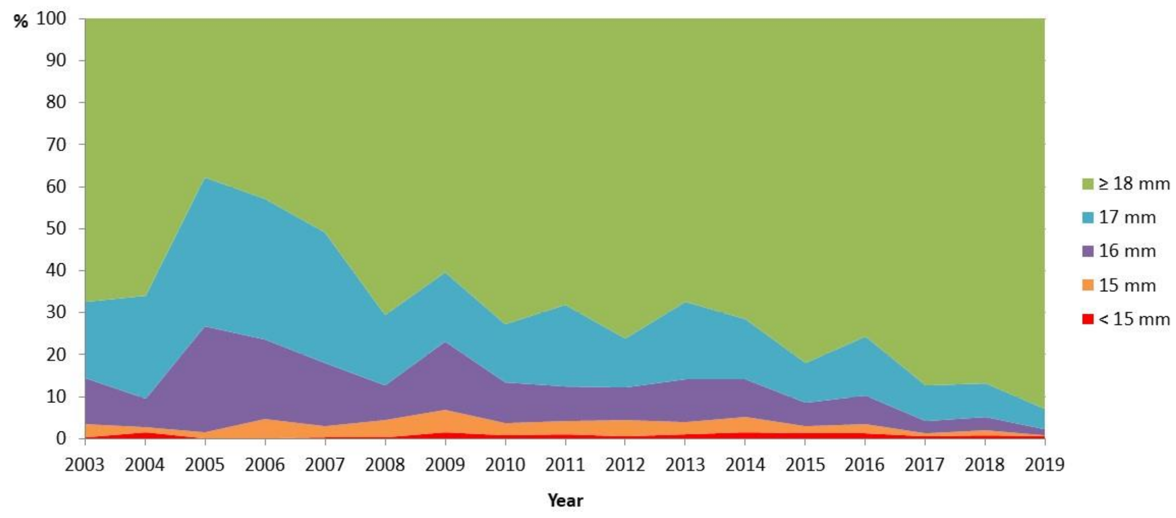


Figure 15. *Relative proportion of diameters < 15 mm, 15 mm, 16 mm, 17 mm and ≥ 18 mm around the colistin disk (50 µg) for* E. coli *isolated from* ***turkey*** *(n min.: 862 (2013) ; n max.: 2,220 (2015))*

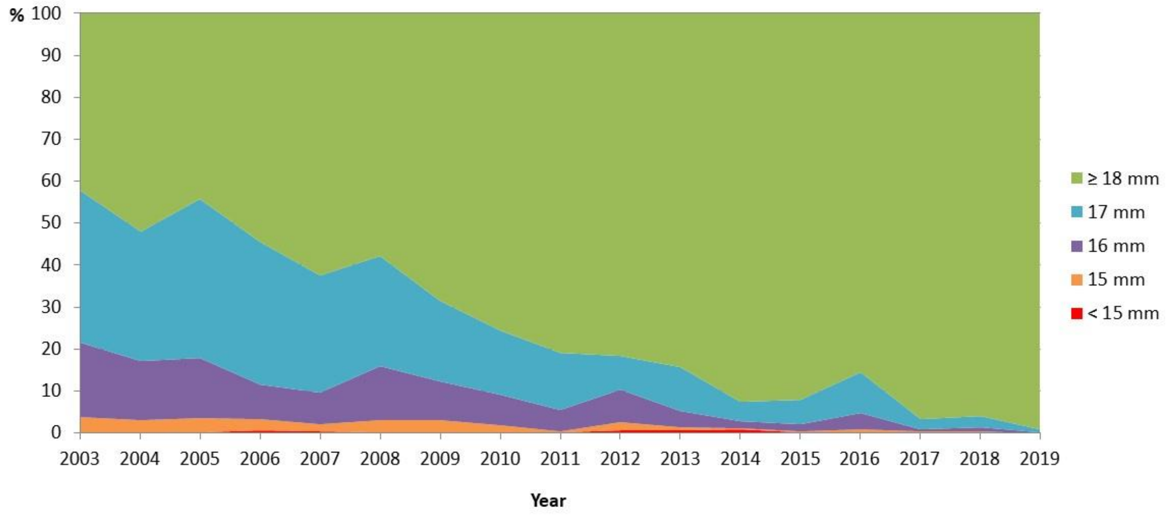
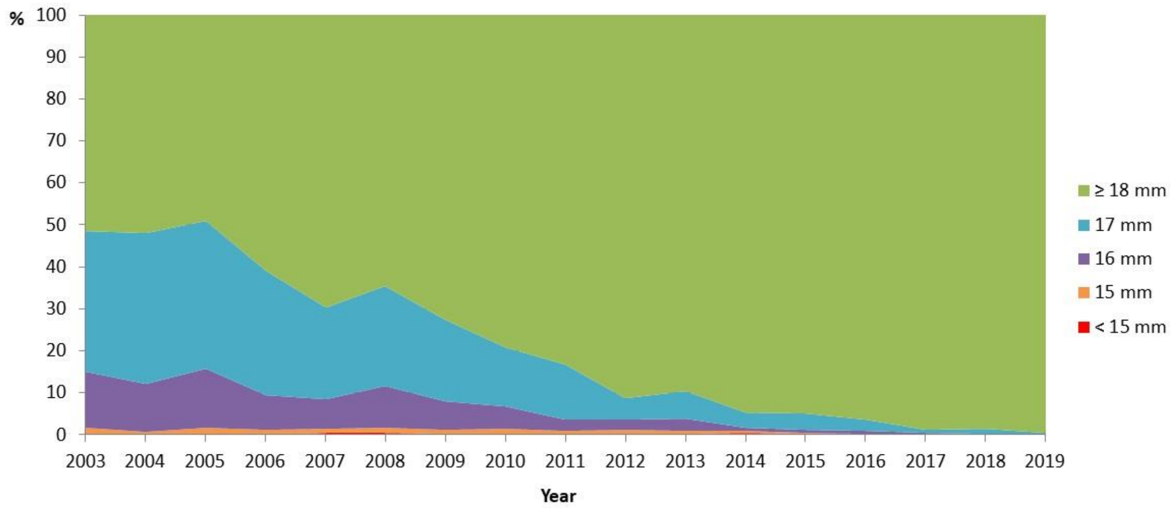


Figure 16. *Relative proportion of diameters < 15 mm, 15 mm, 16 mm, 17 mm and ≥ 18 mm around the colistin disk (50 µg) for* E. coli *isolated from* ***hens and broilers*** *(n min.: 559 (2004) ; n max.: 7,008 (2017))*



Resistance of bacteria isolated from canine otitis

Dogs are considered to be one of the potential reservoirs of antimicrobial resistance (AMR) determinants that can be transmitted to humans through direct or indirect contact. In France, the estimated dog population is stable at around 7.3 million, and about 20% of households in the country accommodate pets. Canine otitis is one of the most common diseases in dogs. Otitis is usually treated empirically at point of diagnosis, with cleaning, administration of antibiotics, and topical anti-inflammatory drugs. In France, nine antibiotic classes are recommended and are available on the market for the treatment of canine otitis: penicillins, cephalosporins, aminoglycosides, folate pathway inhibitors, macrolides, phenicol, fusidanin and polymyxins are first-line treatment, whereas fluoroquinolones are recommended as second-line treatment. Even if guidelines recommend prescribing these antibiotic classes, no distinction is made according to the pathogens involved. A total of 7,021 antibiograms results collected by the RESAPATH from 2012 to 2016 were analysed in order to characterize the phenotypic resistance of the most frequent bacterial causative agents of canine otitis isolated in France[5].

The four major causative agents of canine otitis in France were coagulase-positive staphylococci, *Pseudomonas aeruginosa*, *Proteus mirabilis* and streptococci *(Table 2).* Over the studied period (2012-2016), resistance to penicillin was high for staphylococci (68.5% [66.6; 70.3] for *S. pseudintermedius*, 70.9% [65.1; 76.3] for *S. aureus*), whereas it was lower for *P. mirabilis* (28.9% [26.1; 31.9]) and streptococci (14.4% [12.0; 17.1]). Concerning resistance to cephalosporins in gram-positive isolates, 9.4% [7.8; 11.2] of *S. pseudintermedius* were resistant to cefovecin (MRSP) and 10.6% [7.0; 15.1] of *S. aureus* were resistant to cefoxitin (MRSA). The levels of resistance to erythromycin and chloramphenicol were between 25% and 40% and were similar for *S. pseudintermedius*, *S. aureus* and streptococci. The level of resistance to gentamicin was low for *Streptococcus* spp. (3.3% [2.2; 4.8]), higher for *P. mirabilis* (10.3% [8.5; 12.3]), *S. aureus* (12.9% [9.2; 17.5]), and *S. pseudintermedius* (13.5% [12.2; 14.9]), and reached 17.9% [16.3; 19.6] for *P. aeruginosa*. Finally, the level of resistance to fluoroquinolones was below 15% for *P. mirabilis* and staphylococci isolates, but higher for *Streptococcus* spp. (62.9% [59.8; 65.9]) and *P. aeruginosa* (67.7% [65.6; 69.8]). When streptococci or staphylococci are isolated, broad-spectrum antibiotics such as gentamicin might be administered, while awaiting the outcome of antibiograms.

Time series analyses were performed for *S. pseudintermedius* and *P. aeruginosa* isolates *(Table 2 and Figure 17)* Based on graphical analyses, the seasonal component in the model was never significant. For *S. pseudintermedius*, resistance trends to erythromycin, gentamicin and trimethoprim-sulfamethoxazole were stationary from 2012 to 2016. The resistance trend to penicillin G was primarily stable, and then the resistance level increased from 62.5% [57.4; 67.5] in March 2013 to 77.7% [70.4; 85.0] in December 2016. By contrast, the resistance proportion to enrofloxacin increased at the beginning of the period, then decreased from 17.0% [13.5; 20.4] in September 2013 to 7.8% [4.8; 10.8] in December 2016. For *P. aeruginosa*, the resistance trend to gentamicin was stationary from 2012 to 2016 at 17.9% resistance. Since 2013, resistance to fluoroquinolones has been on the decrease in both *P. aeruginosa* and *S. pseudintermedius* isolates. These decreases match with the implementation of the EcoAntibio plan, a National action plan to fight AMR in animal health, intended to promote the responsible use of antibiotics. These results are essential to guide prudent use of antibiotics in veterinary medicine and to support and supplement French guidelines.

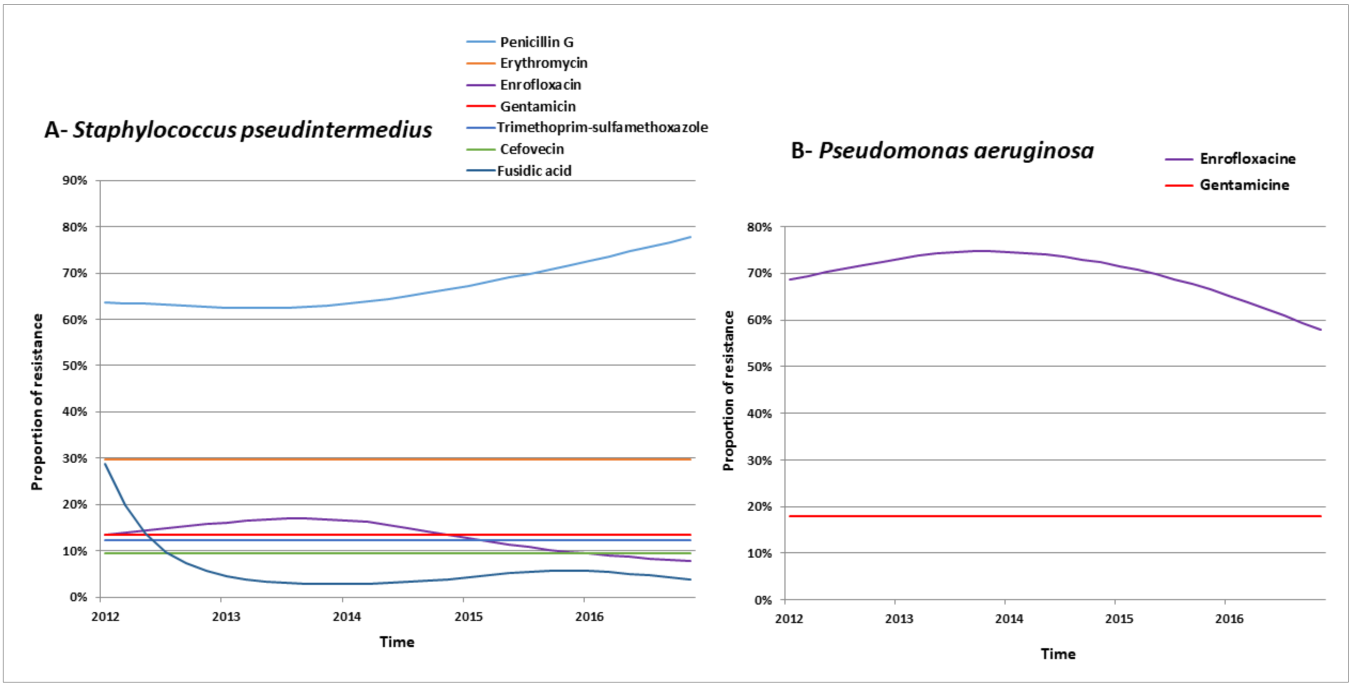
[5] Bourély C., Cazeau G., Jarrige N., Leblond A., Madec J-Y., Haenni M., Gay E. (2019). Antimicrobial resistance patterns of bacteria isolated from dogs with otitis. *Epidémiology & Infection*. 147:e121. doi: 10.1017/S0950268818003278

***Table 1**: Resistance of the major* causative agents of canine otitis in France *over the period 2012-2016*

Bacterium (Number of isolates)	**Antibiotic**	**Level of resistance (%) with 95%CI**	**Resistance trend**
Staphylococcus pseudintermedius (2,513)	Penicillin G	68.5 [66.6; 70.3]	Non-linear
	Cefovecin	9.4 [7.8; 11.2]	-
	Erythromycin	29.8 [28.0; 31.7]	Stationary[3]
	Gentamicin	13.5 [12.2; 14.9]	Stationary[3]
	Enrofloxacin	13.0 [11.6; 14.5]	Non-linear[2]
	Fusidic acid	6.1 [5.2; 7.4]	-
	Chloramphenicol	38.9 [34.6; 43.3]	-
	SXT [1]	12.2 [10.9; 13.6]	Stationary[3]
Staphylococcus aureus (294)	Penicillin G	70.9 [65.1; 76.3]	-
	Cefoxitin	10.6 [7.0; 15.1]	-
	Erythromycin	30.2 [24.7; 36.1]	-
	Gentamicin	12.9 [9.2; 17.5]	-
	Enrofloxacin	12.0 [8.3; 16.5]	-
	Fusidic acid	11.5 [6.8; 17.8]	-
	Chloramphenicol	31.1 [22.9; 40.2]	-
	SXT [1]	10.2 [6.9; 14.4]	-
Streptococcus spp. (1,072)	Oxacillin	14.4 [12.0; 17.1]	-
	Erythromycin	24.8 [22.2; 27.5]	-
	Gentamicin	3.3 [2.2; 4.8]	-
	Enrofloxacin	62.9 [59.8; 65.9]	-
	Chloramphenicol	35.3 [29.4; 41.6]	-
	SXT [1]	20.7 [18.3; 23.4]	-
Pseudomonas aeruginosa (2,103)	Gentamicin	17.9 [16.3; 19.6]	Stationary[3]
	Enrofloxacin	67.7 [65.6; 69.8]	Non-linear[2]
Proteus mirabilis (1,039)	Amoxicillin	28.9 [26.1; 31.9]	-
	Ceftiofur	2.4 [1.6; 3.6]	-
	Gentamicin	10.3 [8.5; 12.3]	-
	Enrofloxacin	13.2 [11.2; 15.5]	-
	SXT [1]	22.9 [20.3; 25.6]	-

[1] Trimethoprim-sulfamethoxazole; - no analysis performed (less than 25 isolates per time step); [2] Significant variations in the level of resistance over the period; [3] Resistance level stable over the period.

***Figure 1**: Resistance trends in* Staphylococcus pseudintermedius *isolates (A) and* Pseudomonas aeruginosa *isolates (B) from* canine otitis in France *over the period 2012-2016*



Dominance of *Escherichia coli* ST372 responsible for infections in dogs in France

Escherichia coli is an opportunistic pathogen in humans and animals. Though naturally susceptible to antimicrobials, *E. coli* often presents acquired resistances, including to extended-spectrum cephalosporins (ESBLs and AmpCs). In dogs, ESBL/AmpC-producing isolates mainly belong to ST131 (which is the dominant ST in humans), ST410 or ST648. In 2017, four RESAPATH laboratories collected 618 non-duplicated *E. coli* isolated from canine infections (mainly UTIs) to explore the population structure of *E. coli* independently of their antibiotic resistance phenotype. The vast majority of these isolates belonged to phylogroup B2, with the predominance of ST372 (20.7%), ST73 (20.1%) and ST141 (7.5%). Of the 618 isolates, 59.7% carried virulence genes typical of extraintestinal pathogenic *E. coli* (ExPEC). Conversely, isolates with a multidrug or ESBL/AmpC phenotype mostly belonged to multiple non-B2 STs. This collection also revealed the presence of one OXA-48-producing carbapenem-resistant *E. coli* isolate while, on the other hand, the overall proportion of resistant isolates was low (5.7%) and consistent with the proportions observed nationally by the RESAPATH.
This study demonstrated that ST372 is clearly associated with the canine host, independently of the resistance phenotype. Our results also indicated a clear discrepancy between the antibiotic-resistant *E. coli* isolates, which are few in number and host few virulence genes, and the antibiotic-susceptible isolates, which are numerous and present a larger pool of virulence genes. This study shows the value of working on collections that are unbiased for their resistance profile, in order to better understand (i) the genetic and clonal diversity of a bacterial population in a given host, and (ii) the risk of transmission of antibiotic-resistant isolates between humans and animals (here, dogs).

Recurrent infections with *Serratia marcescens* in a veterinary clinic in France

Nosocomial infections occur in veterinary clinics just as in human clinical settings, and are frequently associated with *Acinetobacter* spp, *Klebsiella* spp or *Staphylococcus* spp. Consequences are major since it is often difficult and costly to get rid of these bacteria that can spread between hospitalized animals and even to the nursing staff. In a French canine veterinary clinic with high surgical activity, recurrent identifications of *Serratia marcescens* were observed since 2009, both on control swabs and post-surgical infections. *S. marcescens* being a rare but known cause of nosocomial infections in humans, a retrospective study was conducted on 66 isolates collected from cats and dogs between 2009 and 2018. None of the isolates showed acquired antibiotic resistance. Based on clinical and bacteriological evidence, 32 isolates were considered to be responsible for clinically acquired infection and 22 for colonization (absence of infection). Genetic analyses classified the vast majority of the isolates into two groups, one group comprising all 2009 isolates and the other comprising those from 2014 to 2018. In order to clarify the origin of these bacteria, numerous swabs from the indoor environment of the clinic were taken, and only gauze swabs stored in a chlorhexidine vial were found to be contaminated with *S. marcescens*. Whole genome sequencing demonstrated that bacteria from wound and environmental swabs were identical.
For the first time in veterinary medicine, this study highlighted a long-lasting (10 years) nosocomial infection related to *S. marcescens*. A first clone was established until the relocation of the clinic late 2009. Five years were then necessary for a second clone to establish and persist for a further five years in the new premises. This study also proves the usefulness of constant vigilance in the implementation of hygiene measures in veterinary medicine. In the clinic, the chlorhexidine-impregnated gauze was replaced by extemporaneous preparations and, to date, no infection or colonization with *S. marcescens* has been observed.

Carbapenem-resistant clone of Proteus mirabilis in humans, cattle and dogs in France

Proteus mirabilis is commonly identified in UTIs in both humans and animals. *P. mirabilis* is usually susceptible to beta-lactams but resistance to broad-spectrum cephalosporins are regularly encountered because of the acquisition of genes encoding for extended spectrum beta-lactamases (ESBLs). More rarely, genes encoding for carbapenemases in *Acinetobacter* spp (OXA-23, OXA-24/-40, OXA-58) have also been reported. Three such carbapenem-resistant *P. mirabilis* isolates were collected from one bovine (sepsis) and two unrelated dogs (ear infections) through the RESAPATH. Whole genome sequencing analysis of these strains was performed, revealing the presence of the carbapenemase OXA-23 gene. The phylogenetic comparison of *P. mirabilis* isolated from humans (n=58) and animals (n=3) in France and Belgium between 1996 and 2017 concluded on the dissemination of a unique clone. These results confirm the circulation - albeit sporadic - of genes conferring resistance to carbapenems in Enterobacterales responsible for animal infections in France, but also raise questions about the intersectoral dynamics of transfer and acquisition of these genes, and the factors that govern them.

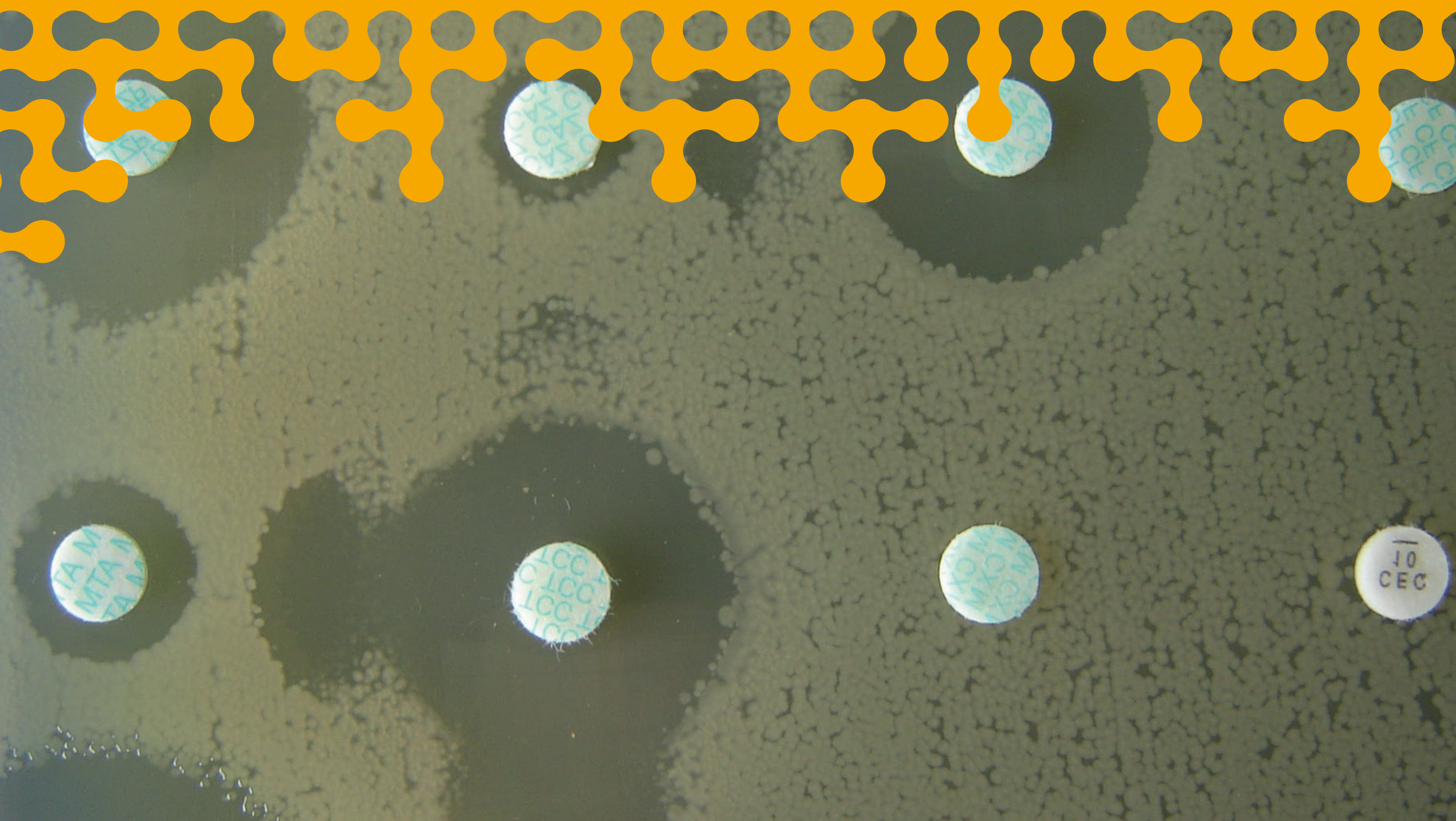
The identification of carbapenemase-producing strains of Enterobacterales remains rare in the animal sector, particularly in Europe, due to the absence of use of this antibiotic that is totally reserved for human medicine. To date, the most widely described carbapenemase in animals - also in Europe - is OXA-48 in *Escherichia coli* and *Klebsiella pneumoniae*. OXA-23-producing isolates of *Acinetobacter baumannii* were also reported, again in dogs. Beyond domestic carnivores in Europe, the description of such strains is even rarer, with the exception of the persistence over years and sectors (pork, poultry, retail meat ...) of *E. coli* strains producing VIM-1 in Germany.

Developing the European Antimicrobial Resistance Surveillance network in Veterinary medicine (EARS-VET)

As part of the EU - Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI 2018-2021), ANSES is coordinating the development of a European network for AMR surveillance in bacterial pathogens of animals (i.e. in diseased animals), called the European Antimicrobial Resistance Surveillance Network in Veterinary Medicine (EARS-Vet). EARS-Vet aims to strengthen the One Health approach for AMR surveillance in Europe and to supplement existing surveillance programmes of AMR, including AMR surveillance in food-producing animals coordinated by the European Food Safety Authority (EFSA) and AMR surveillance in hospitalized patients coordinated by the European Centre for Disease Prevention and Control (ECDC). The EARS-Vet network has been growing rapidly and currently includes approx. 30 experts from 14 European countries. Eleven of these 14 countries already have a surveillance system in animal pathogens (including France with the RESAPATH), while three others are currently developing their system. A country visit was organized in each participating country in order to describe and assess the strengths and weaknesses of existing systems, support the development of new systems, understand the expectations of participating countries about EARS-Vet and anticipate opportunities and challenges for further EARS-Vet development. Subsequently, the participating experts were invited to jointly define the EARS-Vet objectives, scope (i.e. combinations of animal species, production types, specimen, bacteria and antimicrobials of interest), as well as the antimicrobial susceptibility testing (AST) techniques and interpretation criteria to be retained as EARS-Vet standards. The results of this work will soon be published in peer-reviewed scientific journals. Of note, the EFSA recently received a mandate from the European Commission to provide, by March 2022, a scientific opinion on the listing and categorization of transmissible animal diseases caused by bacteria resistant to antimicrobials, to be included in Annex II of the Animal Health Law (Regulation 2016/429). Once listed in this annex, the AMR bacteria could become under mandatory surveillance and control in the EU. In this context, EARS-Vet is closely collaborating with EFSA.

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 TERANA Cantal - AURILLAC (15)
Laboratoire Départemental d'Analyses de la Charente - ANGOULEME (16)
Laboratoire TERANA Cher - BOURGES (18)
Laboratoire Départemental de la Côte d'Or - DIJON (21)
LABOCEA Ploufragan - PLOUFRAGAN (22)
LABOFARM - LOUDEAC (22)
Laboratoire Départemental d'Analyse - (23) AJAIN
Laboratoire Départemental d'Analyse et de Recherche - COULOUNIEIX CHAMIERS (24)
Laboratoire Vétérinaire Départemental - BESANCON (25)
LBAA - BOURG DE PEAGE (26)
ALCYON - LANDERNEAU (29)
LABOCEA Quimper - QUIMPER (29)
Laboratoire Départemental d'Analyses - NIMES (30)
SOCSA Analyse - L'UNION (31)
Laboratoire Départemental Vétérinaire et des Eaux - AUCH (32)
Laboratoire Départemental Vétérinaire - MONTPELLIER (34)
BIOCHENE-VERT - CHATEAUBOURG (35)
Biovilaine - REDON (35)
LABOCEA- FOUGERES (35)
INOVALYS Tours- TOURS (37)
Laboratoire Vétérinaire Départemental - GRENOBLE (38)
Laboratoire Départemental d'Analyses - POLIGNY (39)
Laboratoire des Pyrénées et des Landes - MONT-DE-MARSAN (40)
Laboratoire TERANA LOIRE- MONTBRISON (42)
INOVALYS Nantes - NANTES (44)
Laboratoire Départemental d'Analyses - MENDE (48)
INOVALYS Angers - ANGERS (49)
Laboratoire HGRTS Pays de Loire - MAUGES SUR LOIRE (49)
LABEO Manche - SAINT LO (50)
Laboratoire Départemental d'Analyses - CHAUMONT (52)
Laboratoire Vétérinaire Départemental - LAVAL (53)
Laboratoire Vétérinaire et Alimentaire - MALZEVILLE (54)
Laboratoire Départemental d’Analyses - SAINT AVE (56)
Laboratoire RESALAB-Bretagne - GUENIN (56)
Service du Laboratoire Départemental - NEVERS (58)
Laboratoire Départemental Public - VILLENEUVE D'ASCQ (59)
LABEO Orne - ALENCON (61)
Laboratoire Départemental d'Analyses - ARRAS (62)

AABIOVET - SAINT-OMER (62)
Laboratoire TERANA Puy-de -Dôme- LEMPDES (63)
Laboratoire Départemental d'Analyses - STRASBOURG (67)
Laboratoire Vétérinaire Départemental - COLMAR (68)
ORBIO LABORATOIE - BRON (69)
Laboratoire Départemental Vétérinaire - MARCY L'ETOILE (69)
Laboratoire AGRIVALYS 71 - MACON (71)
INOVALYS Le Mans - LE MANS (72)
Laboratoire Départemental d'Analyses Vétérinaires - CHAMBERY (73)
Lidal - Laboratoire Vétérinaire Départemental - SEYNOD (74)
Laboratoire Agro Vétérinaire Départemental - ROUEN (76)
Laboratoire QUALYSE - CHAMPDENIERS (79)
Laboratoire Vétérinaire Départemental - DURY (80)
Laboratoire Vétérinaire Départemental - MONTAUBAN (82)
Laboratoire Vétérinaire d'Analyses du Var - DRAGUIGNAN (83)
Laboratoire Départemental d'Analyses - AVIGNON (84)
ANI-MEDIC - LA TADIERE (85)
Labovet - LES HERBIERS (85)
Laboratoire de l'Environnement et de l'Alimentation de la Vendée - LA ROCHE SUR YON (85)
Laboratoire Vétérinaire Départemental - LIMOGES (87)
Laboratoire Vétérinaire Départemental - EPINAL (88)
Laboratoire de bactériologie – Biopôle ALFORT - MAISONS-ALFORT (94)
VEBIO - ARCUEIL (94)

Annex 2
Cattle

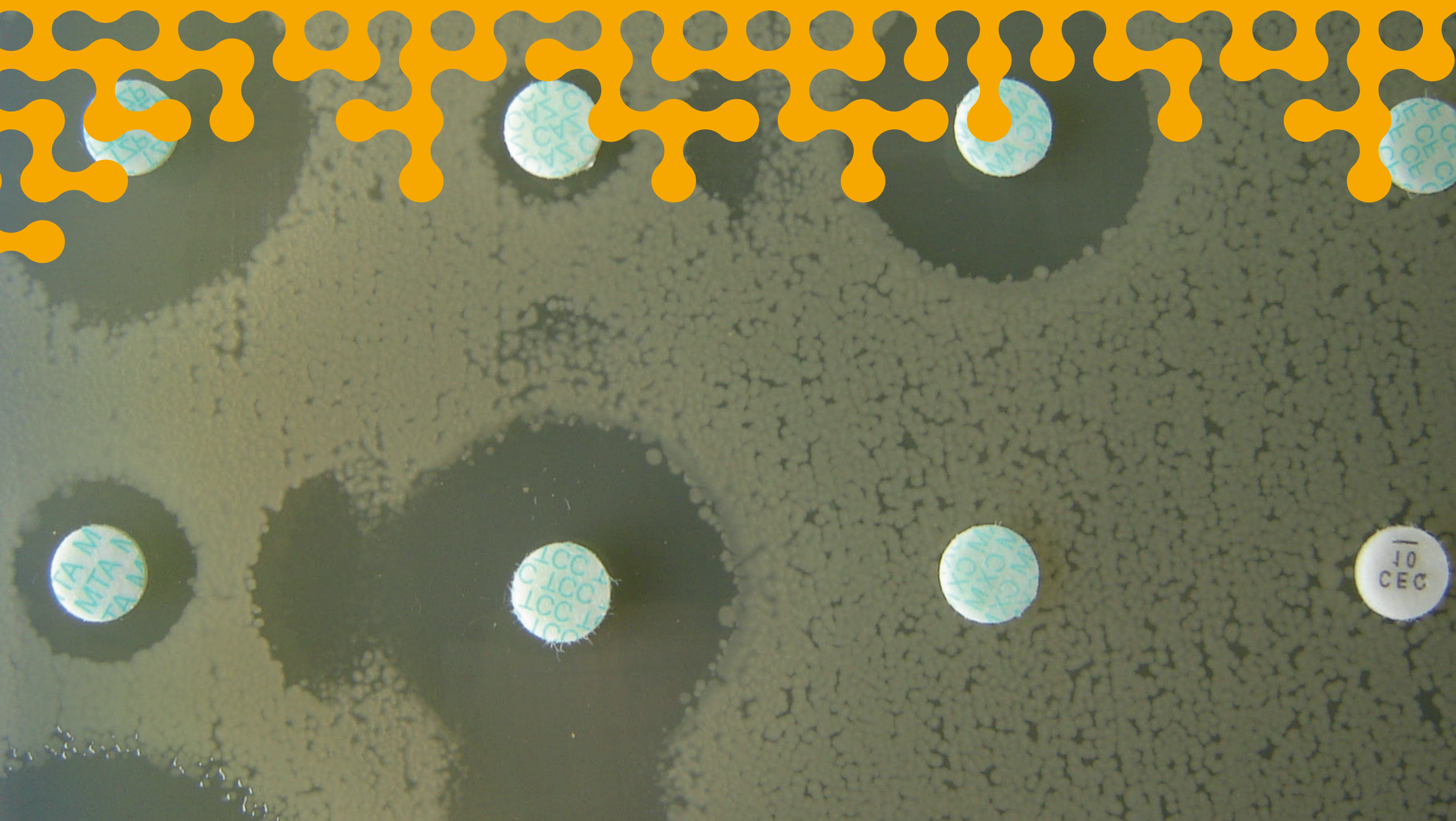
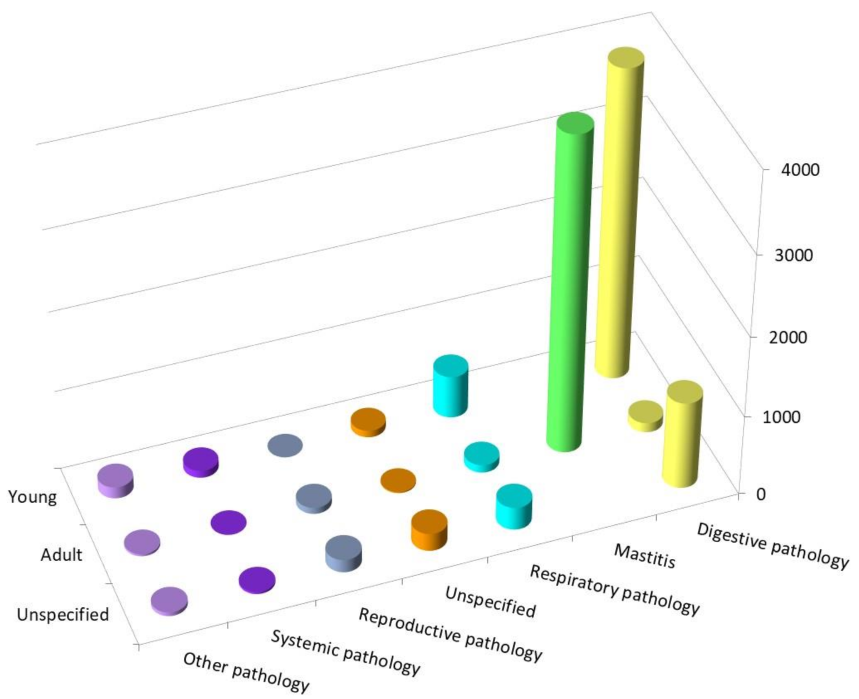


Figure 1 - Cattle 2019 – Number of antibiograms by age group and pathology

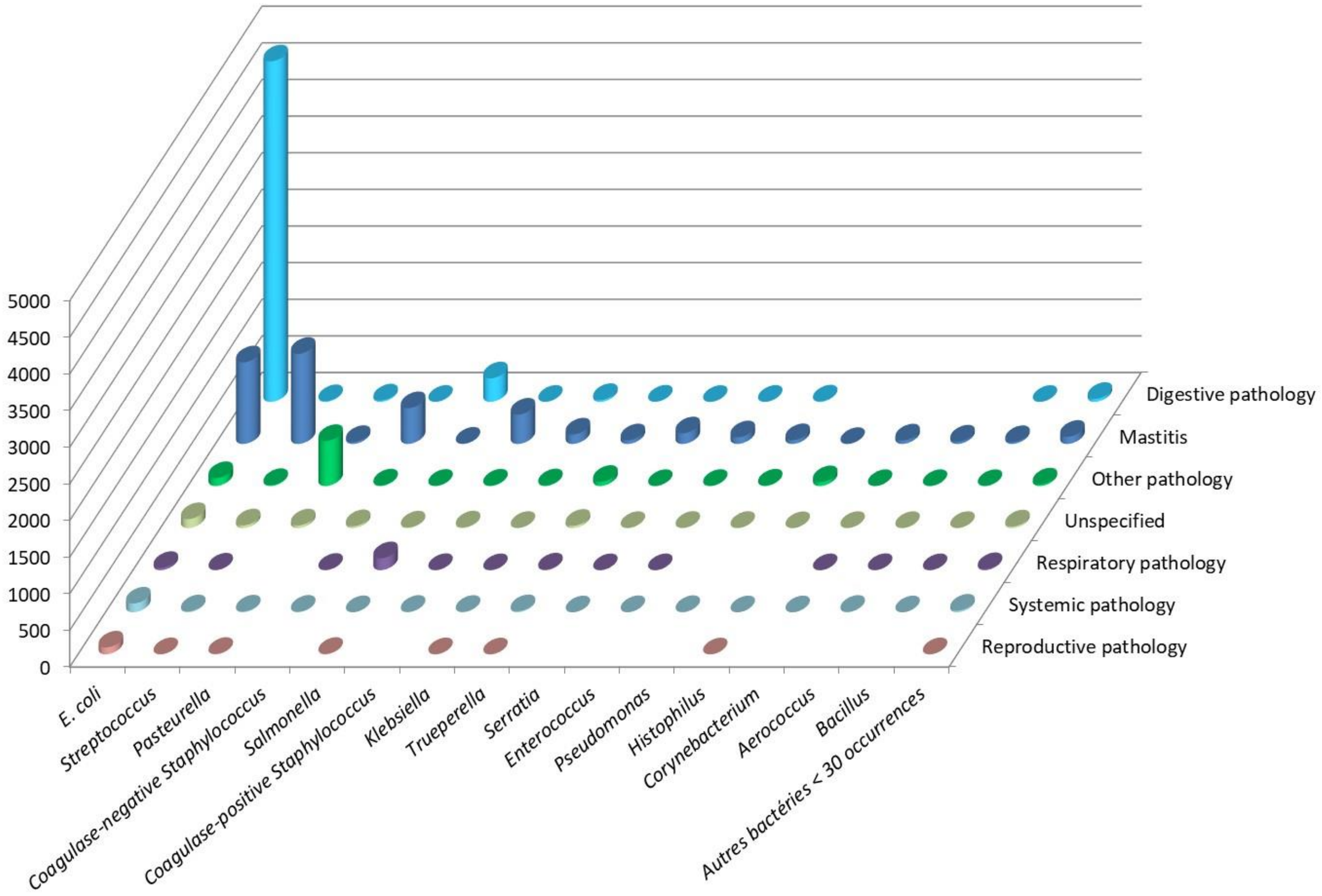


Note: *all values are detailed in table 1 (including other pathologies, representing less than 1%, grouped together).*

Table 1 - Cattle 2019 – Number of antibiograms by age group and pathology

Pathology N (%)	**Age group N (%)**			**Total N (%)**
	Young	Adult	Unspecified	
Digestive pathology	3,871 *(35.77)*	119 *(1.10)*	1,093 *(10.10)*	**5,083 *(46.96)***
Mastitis		3,937 *(36.38)*		**3,937 *(36.38)***
Respiratory pathology	529 *(4.89)*	97 *(0.9)*	283 *(2.61)*	**909 *(8.40)***
Unspecified	85 *(0.79)*	13 *(0.12)*	220 *(2.03)*	**318 *(2.94)***
Reproductive pathology	2 *(0.02)*	79 *(0.73)*	161 *(1.49)*	**242 *(2.24)***
Systemic pathology	89 *(0.82)*	2 *(0.02)*	26 *(0.24)*	**117 *(1.08)***
Septicemia	51 *(0.47)*	1 *(0.01)*	4 *(0.04)*	**56 *(0.52)***
Kidney and urinary tract pathology	27 *(0.25)*	7 *(0.06)*	14 *(0.13)*	**48 *(0.44)***
Omphalitis	35 *(0.32)*			**35 *(0.32)***
Arthritis	6 *(0.06)*	4 *(0.04)*	9 *(0.08)*	**19 *(0.18)***
Skin and soft tissue infections		9 *(0.08)*	9 *(0.08)*	**18 *(0.17)***
Nervous system pathology	11 *(0.10)*	3 *(0.03)*	2 *(0.02)*	**16 *(0.15)***
Cardiac pathology	12 *(0.11)*		1 *(0.01)*	**13 *(0.12)***
Ocular pathology	1 *(0.01)*	2 *(0.02)*	9 *(0.08)*	**12 *(0.11)***
Total N *(%)*	**4,719 *(43.60)***	**4,273 *(39.48)***	**1,831 *(16.92)***	**10,823 *(100.00)***

Figure 2 - Cattle 2019 – Number of antibiograms by bacteria and pathology (all age groups included)

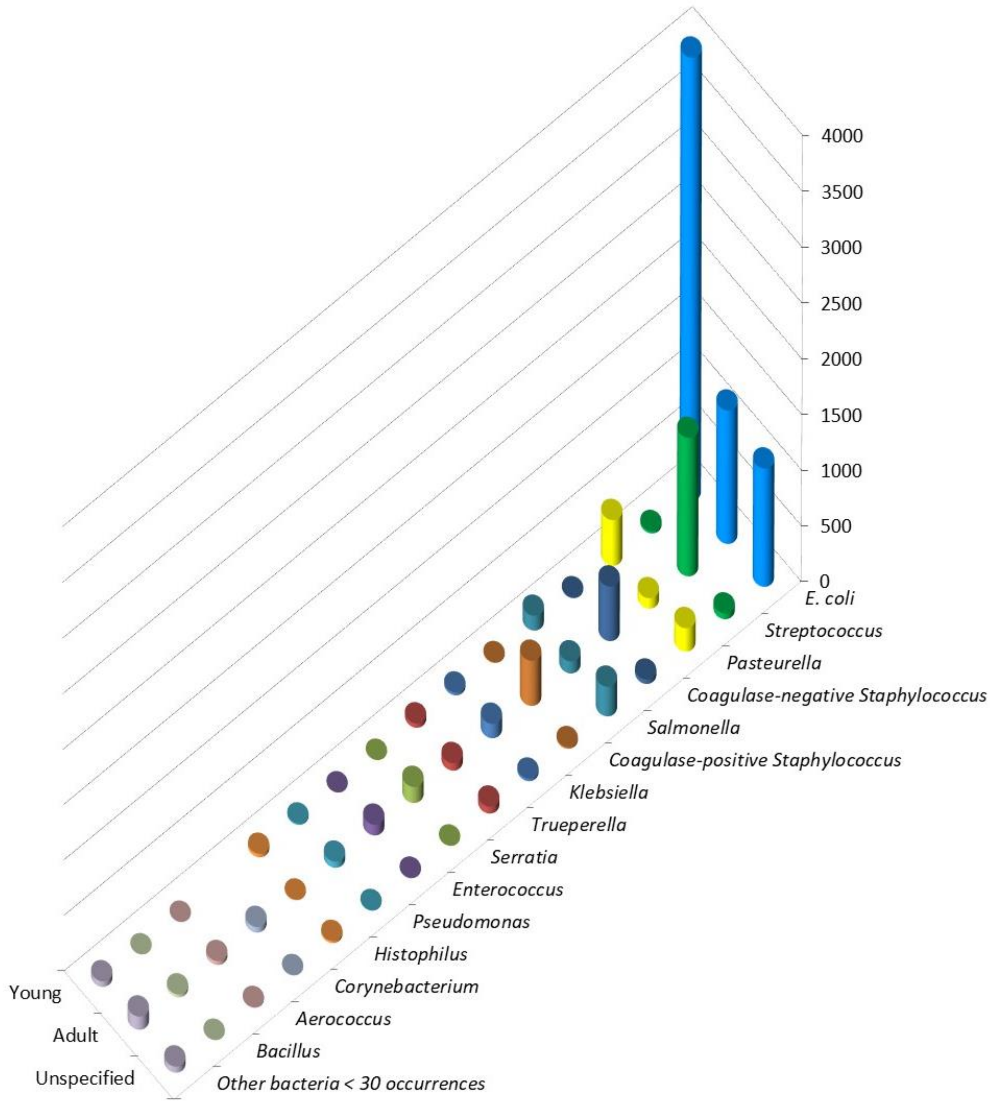


Note: *only values for pathologies >1% and bacterial groups having more than 30 occurrences are represented. Detailed values are presented in table 2 below.*

Table 2 - Cattle 2019 – 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	Omphalitis	Arthritis	Skin and soft tissue infections	Nervous system pathology	Cardiac pathology	Ocular pathology	
E. coli	4,647 *(42.94)*	1,114 *(10.29)*	109 *(1.01)*	123 *(1.14)*	31 *(0.29)*	94 *(0.87)*	41 *(0.38)*	35 *(0.32)*	16 *(0.15)*	10 *(0.09)*	2 *(0.02)*	9 *(0.08)*	7 *(0.06)*		**6,238 *(57.64)***
Streptococcus	10 *(0.09)*	1,230 *(11.36)*	14 *(0.13)*	38 *(0.35)*	9 *(0.08)*	3 *(0.03)*	4 *(0.04)*	2 *(0.02)*	3 *(0.03)*	2 *(0.02)*	1 *(0.01)*			1 *(0.01)*	**1,317 *(12.17)***
Pasteurella	20 *(0.18)*	27 *(0.25)*	615 *(5.68)*	37 *(0.34)*		7 *(0.06)*	3 *(0.03)*	2 *(0.02)*	1 *(0.01)*	1 *(0.01)*			3 *(0.03)*	1 *(0.01)*	**717 *(6.62)***
Coagulase-negative Staphylococcus	2 *(0.02)*	488 *(4.51)*	8 *(0.07)*	27 *(0.25)*	5 *(0.05)*				2 *(0.02)*	1 *(0.01)*	4 *(0.04)*	1 *(0.01)*			**538 *(4.97)***
Salmonella	321 *(2.97)*	4 *(0.04)*	3 *(0.03)*	9 *(0.08)*	163 *(1.51)*	7 *(0.06)*	1 *(0.01)*					1 *(0.01)*			**509 *(4.7)***
Coagulase-positive Staphylococcus	2 *(0.02)*	401 *(3.71)*	6 *(0.06)*	10 *(0.09)*	2 *(0.02)*				1 *(0.01)*	1 *(0.01)*	4 *(0.04)*				**427 *(3.95)***
Klebsiella	26 *(0.24)*	129 *(1.19)*	10 *(0.09)*	3 *(0.03)*	1 *(0.01)*	2 *(0.02)*	3 *(0.03)*	1 *(0.01)*		1 *(0.01)*		1 *(0.01)*			**177 *(1.64)***
Trueperella	4 *(0.04)*	50 *(0.46)*	57 *(0.53)*	32 *(0.3)*	10 *(0.09)*	1 *(0.01)*		2 *(0.02)*	8 *(0.07)*	2 *(0.02)*	3 *(0.03)*				**169 *(1.56)***
Serratia	1 *(0.01)*	145 *(1.34)*	1 *(0.01)*	2 *(0.02)*	1 *(0.01)*										**150 *(1.39)***
Enterococcus	2 *(0.02)*	91 *(0.84)*	2 *(0.02)*	4 *(0.04)*	1 *(0.01)*						2 *(0.02)*				**102 *(0.94)***
Pseudomonas	6 *(0.06)*	52 *(0.48)*	7 *(0.06)*	3 *(0.03)*			3 *(0.03)*						1 *(0.01)*		**72 *(0.67)***
Histophilus		1 *(0.01)*	52 *(0.48)*	1 *(0.01)*		1 *(0.01)*									**55 *(0.51)***
Corynebacterium		48 *(0.44)*	1 *(0.01)*	2 *(0.02)*	1 *(0.01)*			1 *(0.01)*							**53 *(0.49)***
Aerococcus		33 *(0.30)*	1 *(0.01)*	2 *(0.02)*	2 *(0.02)*		1 *(0.01)*	2 *(0.02)*					2 *(0.02)*	1 *(0.01)*	**44 *(0.41)***
Bacillus	1 *(0.01)*	26 *(0.24)*	1 *(0.01)*	2 *(0.02)*	1 *(0.01)*										**31 *(0.29)***
Other bacteria < 30 occurrences	41 *(0.38)*	98 *(0.91)*	22 *(0.20)*	23 *(0.21)*	15 *(0.14)*	2 *(0.02)*		3 *(0.03)*	4 *(0.04)*	1 *(0.01)*	2 *(0.02)*	4 *(0.04)*	0	9 *(0.08)*	**224 *(2.07)***
Total N *(%)*	**5,083 *(46.96)***	**3,937 *(36.38)***	**909 *(8.40)***	**318 *(2.94)***	**242 *(2.24)***	**117 *(1.08)***	**56 *(0.52)***	**48 *(0.44)***	**35 *(0.32)***	**19 *(0.18)***	**18 *(0.17)***	**16 *(0.15)***	**13 *(0.12)***	**12 *(0.11)***	**10,823 *(100.00)***

Figure 3 - Cattle 2019 – 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 2019 – Number of antibiograms by bacteria and age group

Bacteria N (%)	Age group N (%)			Total N (%)
	Young	Adult	Unspecified	
E. coli	3,975 *(36.73)*	1,199 *(11.08)*	1,064 *(9.83)*	**6,238** ***(57.64)***
Streptococcus	21 *(0.19)*	1,245 *(11.50)*	51 *(0.47)*	**1,317** ***(12.17)***
Pasteurella	412 *(3.81)*	94 *(0.87)*	211 *(1.95)*	**717** ***(6.62)***
Coagulase-negative Staphylococcus	8 *(0.07)*	491 *(4.54)*	39 *(0.36)*	**538** ***(4.97)***
Salmonella	133 *(1.23)*	109 *(1.01)*	267 *(2.47)*	**509** ***(4.70)***
Coagulase-positive Staphylococcus	7 *(0.06)*	406 *(3.75)*	14 *(0.13)*	**427** ***(3.95)***
Klebsiella	25 *(0.23)*	130 *(1.20)*	22 *(0.20)*	**177** ***(1.64)***
Trueperella	39 *(0.36)*	68 *(0.63)*	62 *(0.57)*	**169** ***(1.56)***
Serratia	2 *(0.02)*	145 *(1.34)*	3 *(0.03)*	**150** ***(1.39)***
Enterococcus	1 *(0.01)*	96 *(0.89)*	5 *(0.05)*	**102** ***(0.94)***
Pseudomonas	12 *(0.11)*	55 *(0.51)*	5 *(0.05)*	**72** ***(0.67)***
Histophilus	31 *(0.29)*	5 *(0.05)*	19 *(0.18)*	**55** ***(0.51)***
Corynebacterium		50 *(0.46)*	3 *(0.03)*	**53** ***(0.49)***
Aerococcus	2 *(0.02)*	35 *(0.32)*	7 *(0.06)*	**44** ***(0.41)***
Bacillus	1 *(0.01)*	26 *(0.24)*	4 *(0.04)*	**31** ***(0.29)***
Other bacteria < 30 occurrences	50 *(0.46)*	119 *(1.10)*	55 *(0.51)*	**224** ***(2.07)***
Total N *(%)*	**4,719 *(43.60)***	**4,273 *(39.48)***	**1,831 *(16.92)***	**10,823 *(100.00)***

Table 4 - Cattle 2019 – Digestive pathology – Young animals – *E. coli*: susceptibility to antibiotics (proportion) (N= 3,681)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*3,588*	**15**
Amoxicillin-Clavulanic ac.	*3,679*	**41**
Cephalexin	*3,148*	**82**
Cephalothin	*636*	**75**
Cefoxitin	*3,352*	**91**
Cefuroxime	*1,419*	**82**
Cefoperazone	*895*	**91**
Ceftiofur	*3,668*	**97**
Cefquinome 30 µg	*3,465*	**94**
Streptomycin 10 UI	*2,251*	**17**
Spectinomycin	*1,391*	**55**
Kanamycin 30 UI	*1,203*	**38**
Gentamicin 10 UI	*3,623*	**79**
Neomycin	*2,530*	**44**
Apramycin	*1,989*	**93**
Tetracycline	*3,505*	**23**
Doxycycline	*248*	**7**
Chloramphenicol	*169*	**56**
Florfenicol	*2,757*	**76**
Nalidixic ac.	*2,179*	**68**
Oxolinic ac.	*592*	**67**
Flumequine	*1,311*	**68**
Enrofloxacin	*3,070*	**91**
Marbofloxacin	*2,539*	**91**
Danofloxacin	*905*	**91**
Sulfonamides	*646*	**23**
Trimethoprim	*331*	**64**
Trimethoprim-Sulfonamides	*3,672*	**60**

Table 5 - Cattle 2019 – Mastitis – Adults – *E. coli:* susceptibility to antibiotics (proportion) (N= 1,114)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,102*	**66**
Amoxicillin-Clavulanic ac.	*1,110*	**78**
Cephalexin	*1,020*	**87**
Cephalothin	*373*	**89**
Cefoxitin	*1,015*	**96**
Cefuroxime	*531*	**93**
Cefoperazone	*686*	**99**
Cefovecin	*60*	**100**
Ceftiofur	*1,040*	**100**
Cefquinome 30 µg	*1,021*	**100**
Streptomycin 10 UI	*728*	**74**
Spectinomycin	*215*	**92**
Kanamycin 30 UI	*565*	**89**
Gentamicin 10 UI	*1,107*	**98**
Neomycin	*764*	**86**
Apramycin	*382*	**99**
Tetracycline	*1,010*	**80**
Chloramphenicol	*43*	**70**
Florfenicol	*743*	**95**
Nalidixic ac.	*750*	**95**
Oxolinic ac.	*173*	**94**
Flumequine	*336*	**95**
Enrofloxacin	*940*	**98**
Marbofloxacin	*938*	**97**
Danofloxacin	*430*	**98**
Sulfonamides	*283*	**82**
Trimethoprim	*243*	**89**
Trimethoprim-Sulfonamides	*1,082*	**88**

Table 6 - Cattle 2019 – All pathologies and age groups included – *Salmonella* Typhimurium*:* susceptibility to antibiotics (proportion) (N= 146)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*141*	**25**
Amoxicillin-Clavulanic ac.	*146*	**47**
Cephalexin	*122*	**97**
Cephalothin	*44*	**100**
Cefoxitin	*130*	**99**
Cefuroxime	*54*	**94**
Cefoperazone	*49*	**41**
Ceftiofur	*145*	**98**
Cefquinome 30 µg	*119*	**97**
Streptomycin 10 UI	*67*	**10**
Spectinomycin	*51*	**39**
Kanamycin 30 UI	*35*	**91**
Gentamicin 10 UI	*132*	**95**
Neomycin	*109*	**90**
Apramycin	*85*	**99**
Tetracycline	*137*	**17**
Florfenicol	*124*	**51**
Nalidixic ac.	*90*	**97**
Oxolinic ac.	*44*	**98**
Flumequine	*60*	**97**
Enrofloxacin	*124*	**99**
Marbofloxacin	*118*	**100**
Danofloxacin	*45*	**100**
Sulfonamides	*30*	**7**
Trimethoprim-Sulfonamides	*145*	**97**

Table 7 - Cattle 2019 – All pathologies and age groups included – *Salmonella* Mbandaka*:* susceptibility to antibiotics (proportion) (N= 71)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*70*	**100**
Amoxicillin-Clavulanic ac.	*71*	**100**
Cephalexin	*65*	**100**
Cephalothin	*53*	**100**
Cefoxitin	*71*	**100**
Cefuroxime	*52*	**98**
Cefoperazone	*55*	**100**
Ceftiofur	*71*	**100**
Cefquinome 30 µg	*65*	**100**
Streptomycin 10 UI	*53*	**87**
Kanamycin 30 UI	*53*	**100**
Gentamicin 10 UI	*71*	**100**
Neomycin	*68*	**100**
Tetracycline	*71*	**100**
Florfenicol	*68*	**100**
Nalidixic ac.	*55*	**100**
Enrofloxacin	*71*	**100**
Marbofloxacin	*66*	**100**
Danofloxacin	*53*	**100**
Sulfonamides	*49*	**98**
Trimethoprim	*48*	**100**
Trimethoprim-Sulfonamides	*71*	**100**

Table 8 - Cattle 2019 – All pathologies and age groups included – *Salmonella* Montevideo*:* susceptibility to antibiotics (proportion) (N= 157)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*151*	**100**
Amoxicillin-Clavulanic ac.	*157*	**99**
Cephalexin	*150*	**99**
Cephalothin	*113*	**98**
Cefoxitin	*157*	**99**
Cefuroxime	*113*	**100**
Cefoperazone	*128*	**100**
Ceftiofur	*157*	**100**
Cefquinome 30 µg	*157*	**100**
Streptomycin 10 UI	*128*	**90**
Kanamycin 30 UI	*128*	**100**
Gentamicin 10 UI	*157*	**100**
Neomycin	*153*	**100**
Apramycin	*33*	**100**
Tetracycline	*156*	**99**
Florfenicol	*156*	**100**
Nalidixic ac.	*117*	**100**
Enrofloxacin	*156*	**100**
Marbofloxacin	*144*	**100**
Danofloxacin	*128*	**100**
Sulfonamides	*127*	**100**
Trimethoprim	*115*	**100**
Trimethoprim-Sulfonamides	*157*	**100**

Table 9 - Cattle 2019 – Respiratory pathology – Young animals – *Pasteurella multocida:* susceptibility to antibiotics (proportion) (N= 191)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*185*	**98**
Amoxicillin-Clavulanic ac.	*183*	**99**
Cephalexin	*64*	**100**
Ceftiofur	*186*	**99**
Cefquinome 30 µg	*180*	**96**
Streptomycin 10 UI	*157*	**26**
Kanamycin 30 UI	*31*	**61**
Gentamicin 10 UI	*173*	**95**
Tetracycline	*182*	**60**
Doxycycline	*137*	**67**
Florfenicol	*190*	**99**
Nalidixic ac.	*64*	**78**
Oxolinic ac.	*106*	**72**
Flumequine	*125*	**75**
Enrofloxacin	*187*	**90**
Marbofloxacin	*170*	**97**
Trimethoprim-Sulfonamides	*191*	**92**

Table 10 - Cattle 2019 – Respiratory pathology – Young animals – *Mannheimia haemolytica:* susceptibility to antibiotics (proportion) (N= 155)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*145*	**90**
Amoxicillin-Clavulanic ac.	*148*	**97**
Cephalexin	*68*	**99**
Ceftiofur	*150*	**99**
Cefquinome 30 µg	*141*	**99**
Streptomycin 10 UI	*109*	**13**
Kanamycin 30 UI	*36*	**78**
Gentamicin 10 UI	*134*	**90**
Neomycin	*33*	**48**
Tetracycline	*152*	**76**
Doxycycline	*81*	**68**
Florfenicol	*154*	**95**
Nalidixic ac.	*82*	**84**
Oxolinic ac.	*49*	**69**
Flumequine	*76*	**71**
Enrofloxacin	*152*	**91**
Marbofloxacin	*136*	**96**
Danofloxacin	*39*	**85**
Trimethoprim-Sulfonamides	*155*	**92**

Table 11 - Cattle 2019 – Mastitis – Adults – *Serratia Marcescens:* susceptibility to antibiotics (proportion) (N= 130)

Antibiotic	*Total (N)*	**% S**
Amoxicillin-Clavulanic ac.	*125*	**14**
Cephalothin	*34*	**0**
Cefoxitin	*110*	**32**
Cefuroxime	*52*	**0**
Cefoperazone	*78*	**99**
Ceftiofur	*123*	**98**
Cefquinome 30 µg	*120*	**99**
Streptomycin 10 UI	*87*	**61**
Kanamycin 30 UI	*55*	**100**
Gentamicin 10 UI	*130*	**100**
Neomycin	*76*	**99**
Apramycin	*46*	**100**
Tetracycline	*117*	**5**
Florfenicol	*78*	**94**
Nalidixic ac.	*68*	**100**
Flumequine	*56*	**96**
Enrofloxacin	*115*	**100**
Marbofloxacin	*113*	**100**
Danofloxacin	*35*	**100**
Trimethoprim-Sulfonamides	*117*	**99**

Table 12 - Cattle 2019 – Mastitis – Adults – *Klebsiella pneumoniae:* susceptibility to antibiotics (proportion) (N= 73)

Antibiotic	*Total (N)*	**% S**
Amoxicillin-Clavulanic ac.	*73*	**88**
Cefoxitin	*64*	**95**
Cefoperazone	*47*	**94**
Ceftiofur	*66*	**100**
Cefquinome 30 µg	*66*	**100**
Streptomycin 10 UI	*53*	**83**
Kanamycin 30 UI	*32*	**100**
Gentamicin 10 UI	*73*	**99**
Neomycin	*55*	**98**
Apramycin	*32*	**100**
Tetracycline	*66*	**88**
Florfenicol	*41*	**100**
Nalidixic ac.	*43*	**95**
Enrofloxacin	*64*	**100**
Marbofloxacin	*57*	**100**
Trimethoprim-Sulfonamides	*72*	**96**

Table 13 - Cattle 2019 – Mastitis – Adults – Coagulase-positive *Staphylococcus*: susceptibility to antibiotics (proportion) (N= 401)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*400*	**83**
Cefoxitin	*383*	**92**
Oxacillin	*44*	**98**
Cefovecin	*98*	**100**
Erythromycin	*356*	**95**
Tylosin	*267*	**99**
Spiramycin	*391*	**97**
Lincomycin	*400*	**98**
Pirlimycin	*34*	**97**
Streptomycin 10 UI	*310*	**87**
Kanamycin 30 UI	*257*	**99**
Gentamicin 10 UI	*392*	**99**
Neomycin	*214*	**98**
Tetracycline	*376*	**96**
Florfenicol	*124*	**98**
Enrofloxacin	*314*	**100**
Marbofloxacin	*344*	**100**
Trimethoprim-Sulfonamides	*345*	**98**
Rifampicin	*102*	**99**

Table 14 - Cattle 2019 – Mastitis – Adults – Coagulase-negative *Staphycoccus*: susceptibility to antibiotics (proportion) (N= 488)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*482*	**74**
Cefoxitin	*448*	**97**
Oxacillin	*76*	**95**
Cefovecin	*96*	**98**
Erythromycin	*412*	**88**
Tylosin	*310*	**92**
Spiramycin	*471*	**91**
Lincomycin	*485*	**79**
Pirlimycin	*60*	**92**
Streptomycin 10 UI	*360*	**81**
Kanamycin 30 UI	*279*	**98**
Gentamicin 10 UI	*471*	**99**
Neomycin	*273*	**97**
Tetracycline	*459*	**82**
Florfenicol	*172*	**99**
Enrofloxacin	*385*	**99**
Marbofloxacin	*396*	**100**
Trimethoprim-Sulfonamides	*373*	**97**
Rifampicin	*136*	**96**

Table 15 - Cattle 2019 – Mastitis – Adults – *Streptococcus uberis*: susceptibility to antibiotics (proportion) (N= 969)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*790*	**85**
Erythromycin	*912*	**86**
Tylosin	*521*	**82**
Spiramycin	*921*	**85**
Lincomycin	*964*	**85**
Streptomycin 500 µg	*885*	**88**
Kanamycin 1000 µg	*732*	**94**
Gentamicin 500 µg	*923*	**98**
Tetracycline	*877*	**84**
Doxycycline	*48*	**92**
Florfenicol	*382*	**97**
Enrofloxacin	*821*	**68**
Marbofloxacin	*769*	**94**
Trimethoprim-Sulfonamides	*903*	**90**
Rifampicin	*312*	**59**

Table 16 - Cattle 2019 – Mastitis – Adults – *Streptococcus dysgalactiae:* susceptibility to antibiotics (proportion) (N= 167)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*133*	**97**
Erythromycin	*151*	**89**
Tylosin	*103*	**86**
Spiramycin	*165*	**91**
Lincomycin	*166*	**89**
Streptomycin 500 µg	*148*	**95**
Kanamycin 1000 µg	*121*	**93**
Gentamicin 500 µg	*156*	**100**
Tetracycline	*155*	**12**
Florfenicol	*60*	**100**
Enrofloxacin	*147*	**52**
Marbofloxacin	*146*	**90**
Trimethoprim-Sulfonamides	*152*	**91**
Rifampicin	*65*	**72**

Annex 3

Sheep

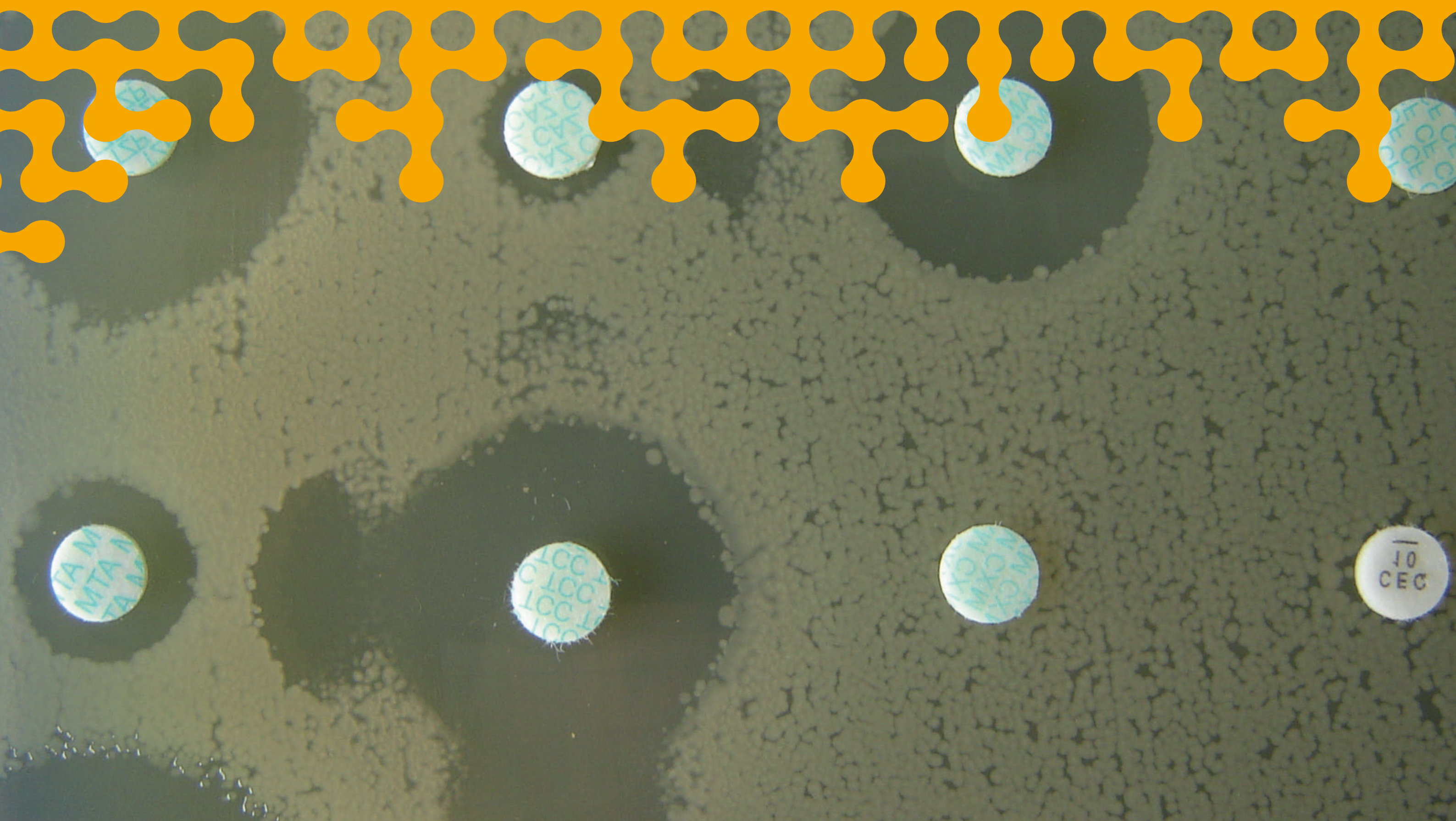
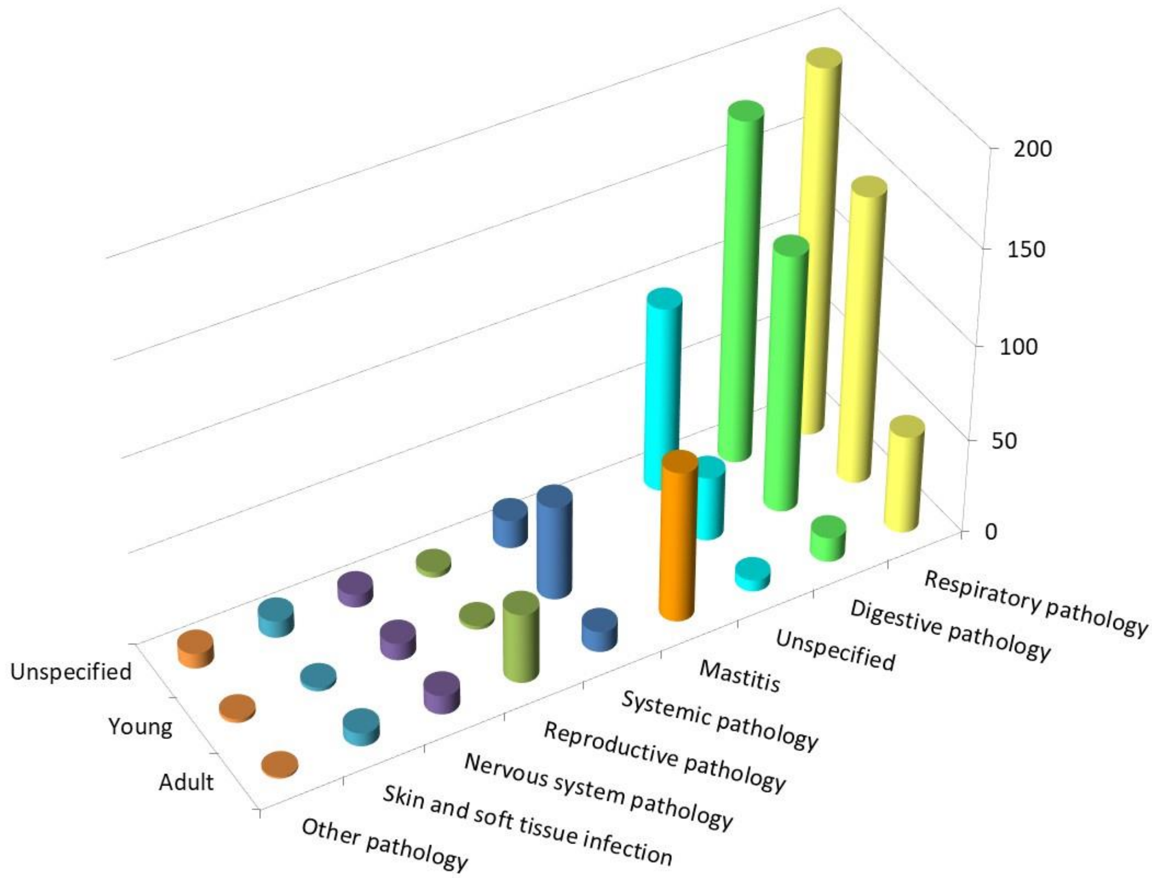


Figure 1 - Sheep 2019 – Number of antibiograms by age group and pathology

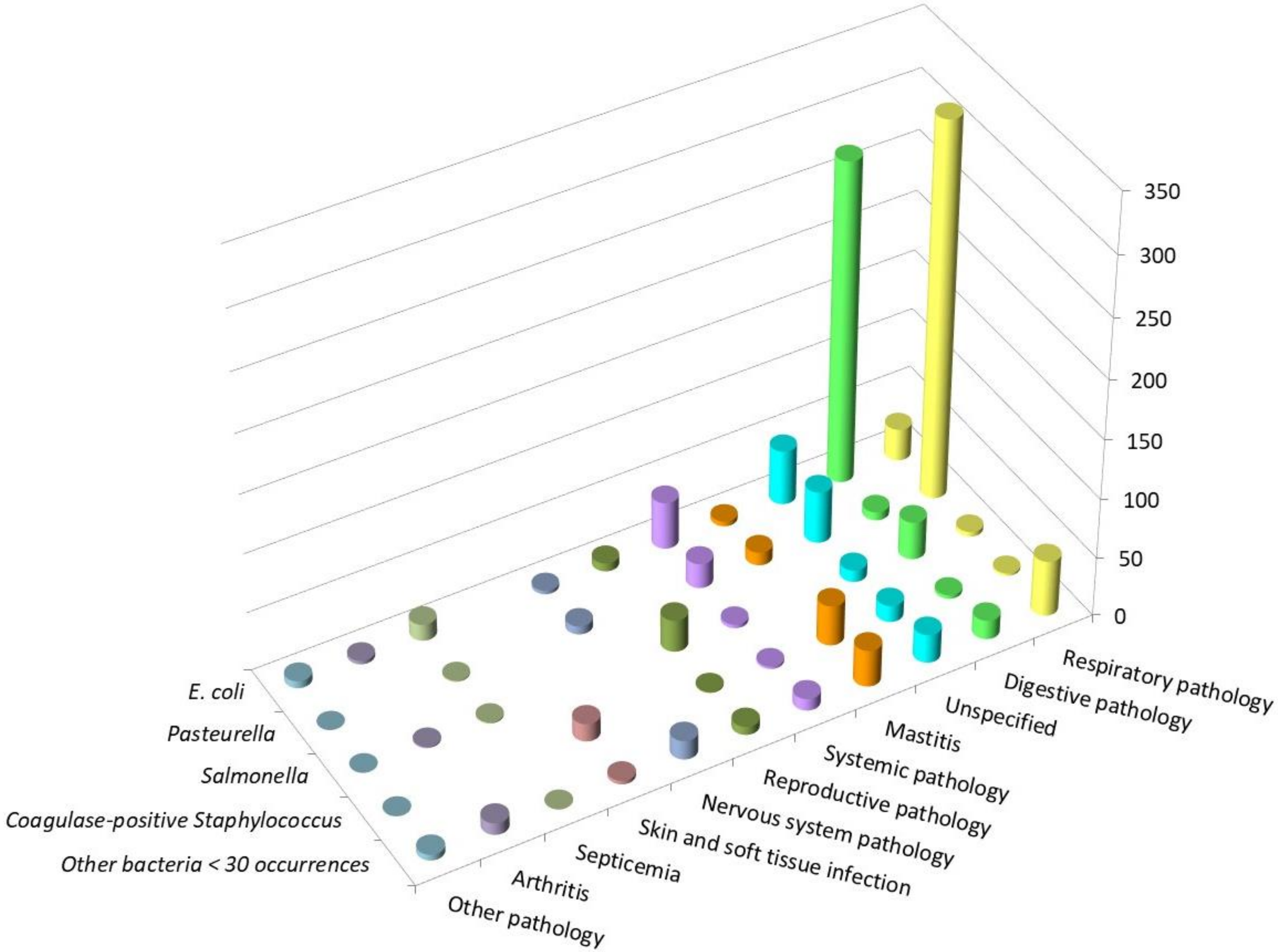


Note: *all values are detailed in table 1 (including other pathologies. representing less than 1%, grouped together).*

Table 1 - Sheep 2019 – Number of antibiograms by age group and pathology

Pathology N (%)	Age group N (%)			Total N (%)
	Unspecified	Young	Adult	
Respiratory pathology	193 *(16.8)*	152 *(13.3)*	52 *(4.5)*	**397** ***(34.6)***
Digestive pathology	180 *(15.7)*	136 *(11.9)*	13 *(1.1)*	**329** ***(28.7)***
Unspecified	98 *(8.5)*	34 *(3.0)*	6 *(0.5)*	**138** ***(12)***
Mastitis			80 *(7.0)*	**80** ***(7.0)***
Systemic pathology	15 *(1.3)*	50 *(4.4)*	11 *(1.0)*	**76** ***(6.6)***
Reproductive pathology	3 *(0.3)*	2 *(0.2)*	37 *(3.2)*	**42** ***(3.7)***
Nervous system pathology	7 *(0.6)*	9 *(0.8)*	10 *(0.9)*	**26** ***(2.3)***
Skin and soft tissue infections	9 *(0.8)*	2 *(0.2)*	7 *(0.6)*	**18** ***(1.6)***
Septicemia	2 *(0.2)*	13 *(1.1)*	1 *(0.1)*	**16** ***(1.4)***
Arthritis	6 *(0.5)*	8 *(0.7)*		**14** ***(1.2)***
Kidney and urinary tract pathology	4 *(0.3)*	1 *(0.1)*		**5** ***(0.4)***
Ocular pathology	4 *(0.3)*		1 *(0.1)*	**5** ***(0.4)***
Cardiac pathology		1 *(0.1)*		**1** ***(0.1)***
Total N ***(%)***	**521** ***(45.4)***	**408** ***(35.6)***	**218** ***(19.0)***	**1,147** ***(100.0)***

Figure 2 - Sheep 2019 – 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 2019 – Number of antibiograms by bacterial group and pathology

Bacteria N **(%)**	**Pathology N (%)**													**Total N** ***(%)***
	Respiratory pathology	Digestive pathology	Unspecified	Mastitis	Systemic pathology	Reproductive pathology	Nervous system pathology	Skin and soft tissue infections	Septicemia	Arthritis	Kidney and urinary tract pathology	Ocular pathology	Cardiac pathology	
E. coli	27 *(2.4)*	271 *(23.6)*	46 *(4.0)*	4 *(0.3)*	40 *(3.5)*	7 *(0.6)*	3 *(0.3)*		14 *(1.2)*	3 *(0.3)*	4 *(0.3)*	1 *(0.1)*	1 *(0.1)*	**421** ***(36.7)***
Pasteurella	317 *(27.6)*	7 *(0.6)*	44 *(3.8)*	11 *(1.0)*	21 *(1.8)*		7 *(0.6)*		1 *(0.1)*					**408** ***(35.6)***
Salmonella	4 *(0.3)*	32 *(2.8)*	10 *(0.9)*		3 *(0.3)*	27 *(2.4)*			1 *(0.1)*	1 *(0.1)*				**78** ***(6.8)***
Coagulase-positive Staphylococcus	2 *(0.2)*	3 *(0.3)*	14 *(1.2)*	34 *(3.0)*	2 *(0.2)*	1 *(0.1)*		15 *(1.3)*						**71** ***(6.2)***
Other bacteria < 30 occurrences	47 *(4.1)*	16 *(1.4)*	24 *(2.1)*	31 *(2.7)*	10 *(0.9)*	7 *(0.6)*	16 *(1.4)*	3 *(0.3)*		10 *(0.9)*	1 *(0.1)*	4 *(0.3)*		**169** ***(14.7)***
Total N ***(%)***	**397** ***(34.6)***	**329** ***(28.7)***	**138** ***(12.0)***	**80** ***(7.0)***	**76** ***(6.6)***	**42** ***(3.7)***	**26** ***(2.3)***	**18** ***(1.6)***	**16** ***(1.4)***	**14** ***(1.2)***	**5** ***(0.4)***	**5** ***(0.4)***	**1** ***(0.1)***	**1,147** ***(100.0)***

Table 3 - Sheep 2019 – Digestive pathology – *E. coli:* susceptibility to antibiotics (proportion) (N= 271)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*271*	**49**
Amoxicillin-Clavulanic ac.	*270*	**60**
Cephalexin	*259*	**91**
Cefoxitin	*255*	**95**
Cefuroxime	*54*	**87**
Cefoperazone	*35*	**100**
Ceftiofur	*271*	**99**
Cefquinome 30 µg	*244*	**100**
Streptomycin 10 UI	*225*	**38**
Spectinomycin	*47*	**85**
Kanamycin 30 UI	*47*	**83**
Gentamicin 10 UI	*267*	**94**
Neomycin	*89*	**83**
Apramycin	*35*	**97**
Tetracycline	*260*	**35**
Florfenicol	*238*	**90**
Nalidixic ac.	*239*	**93**
Flumequine	*32*	**100**
Enrofloxacin	*250*	**97**
Marbofloxacin	*79*	**99**
Danofloxacin	*36*	**100**
Trimethoprim-Sulfonamides	*271*	**61**

Table 4 - Sheep 2019 – Respiratory pathology – All age groups – *Mannheimia haemolytica:* susceptibility to antibiotics (proportion) (N= 177)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*174*	**95**
Amoxicillin-Clavulanic ac.	*160*	**96**
Cephalexin	*154*	**99**
Cefoxitin	*110*	**99**
Ceftiofur	*173*	**100**
Cefquinome 30 µg	*158*	**99**
Streptomycin 10 UI	*137*	**15**
Gentamicin 10 UI	*159*	**95**
Neomycin	*50*	**48**
Tetracycline	*171*	**89**
Florfenicol	*172*	**99**
Nalidixic ac.	*158*	**91**
Enrofloxacin	*173*	**94**
Marbofloxacin	*63*	**100**
Trimethoprim-Sulfonamides	*177*	**99**

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Annex 4

Goats

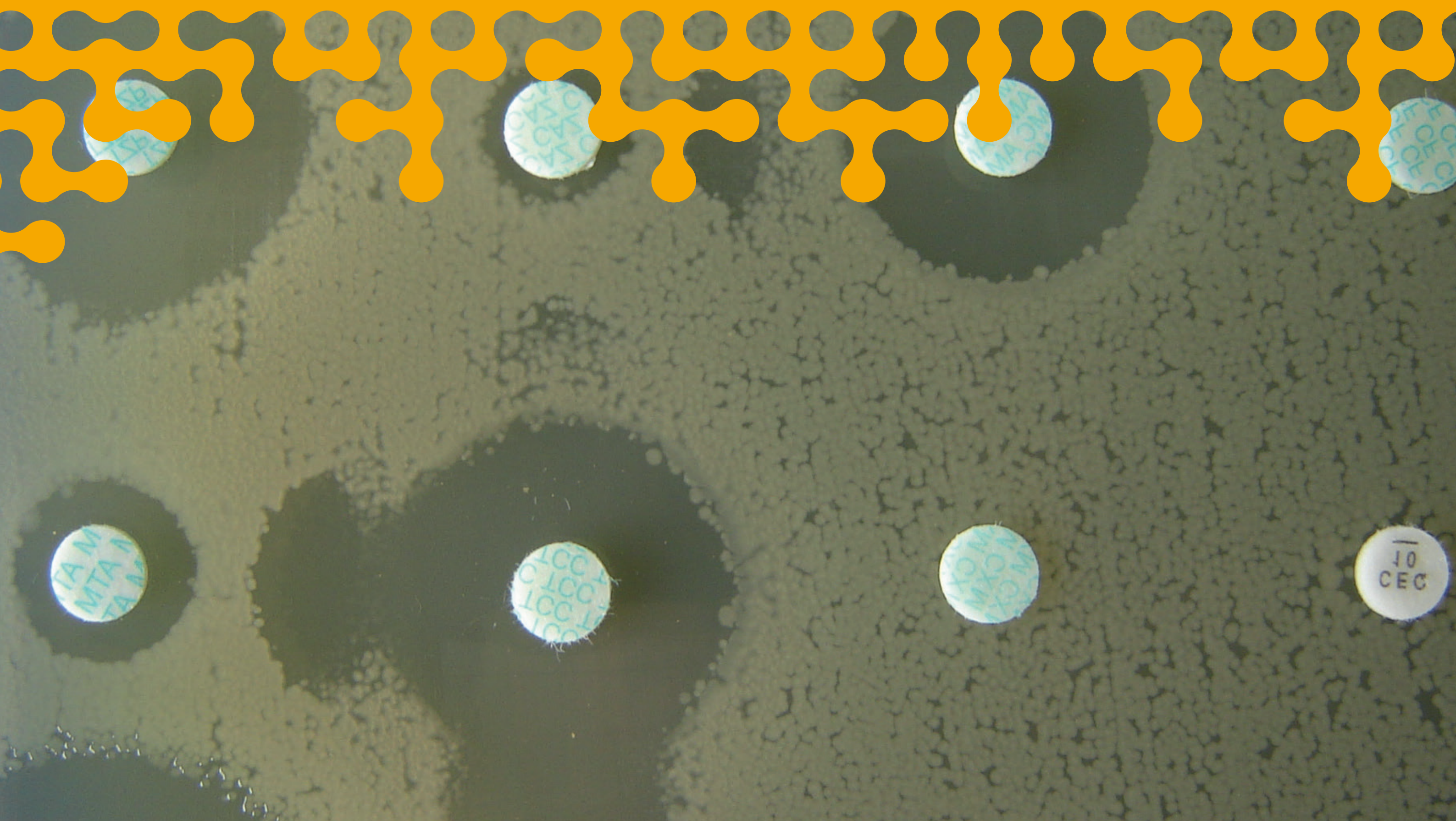
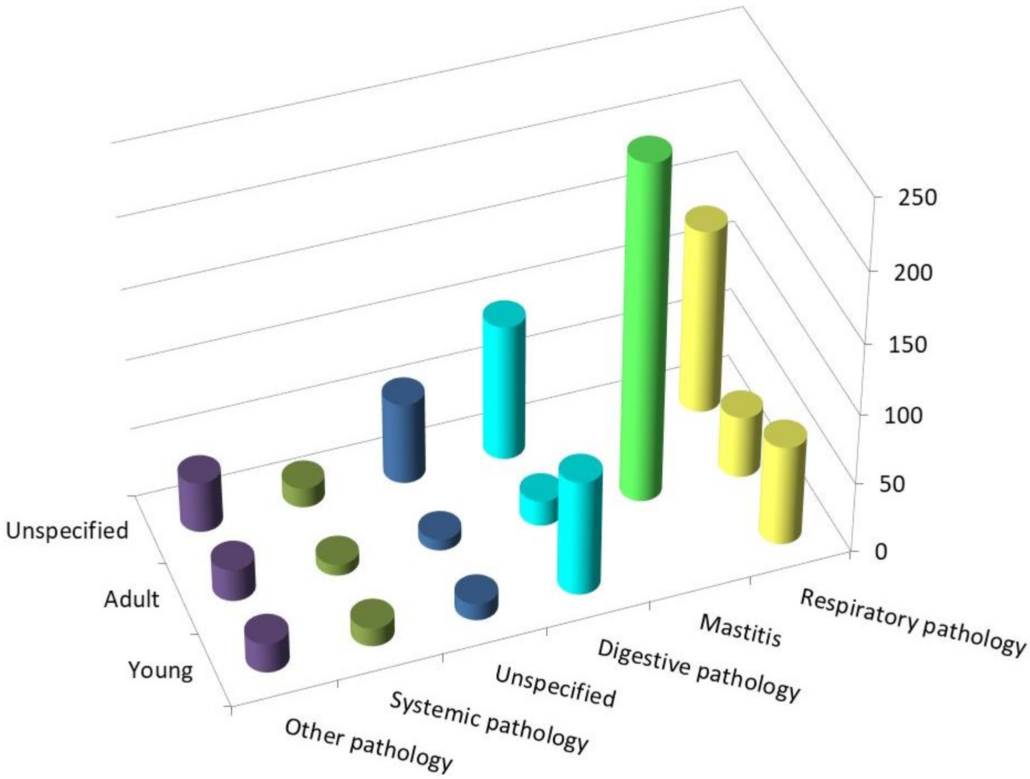


Figure 1 - Goats 2019 – Number of antibiograms by age group and pathology

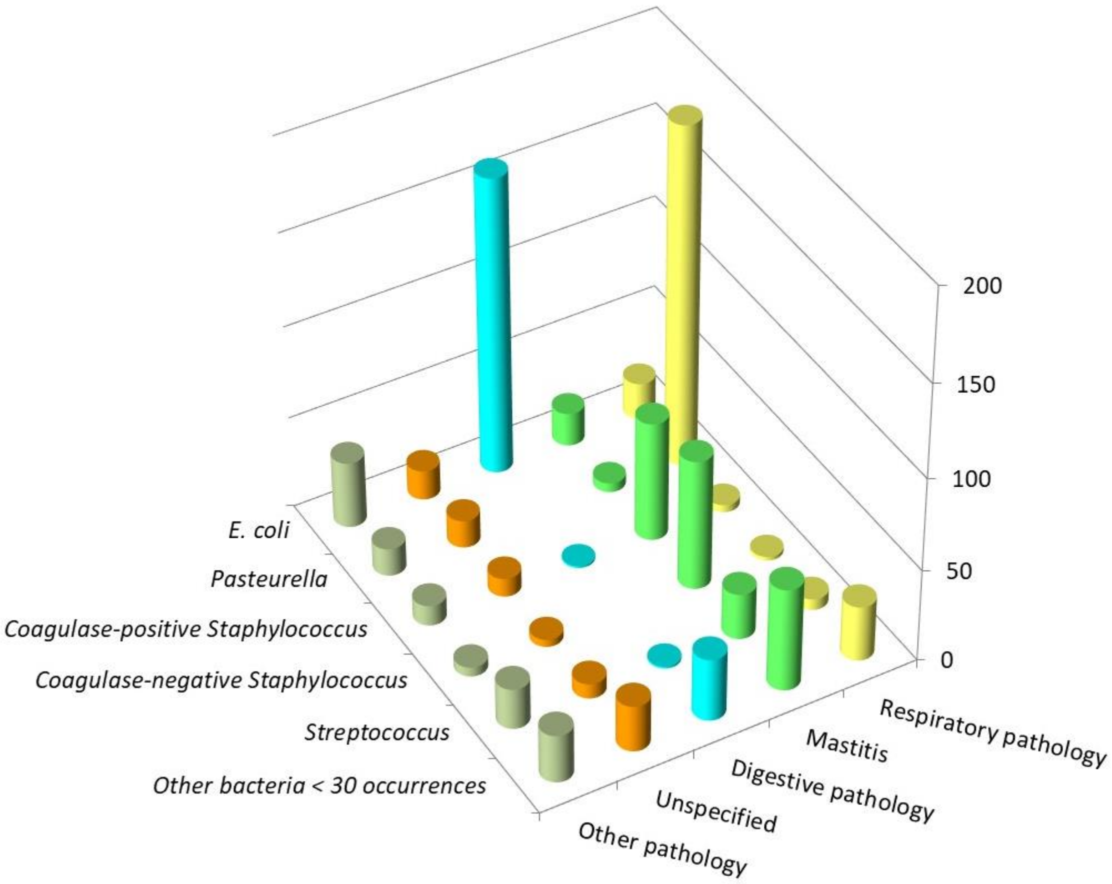


Note: *all values are detailed in table 1 (including other pathologies. representing less than 1%. grouped together).*

Table 1 - Goats 2019 – Number of antibiograms by age group and pathology

Pathology N (%)	**Age group N (%)**			**Total N (%)**
	Adult	Unspecified	Young	
Respiratory pathology	44 *(5.0)*	132 *(15.1)*	71 *(8.1)*	**247** ***(28.2)***
Mastitis	240 *(27.4)*			**240** ***(27.4)***
Digestive pathology	18 *(2.1)*	97 *(11.1)*	82 *(9.4)*	**197** ***(22.5)***
Unspecified	8 *(0.9)*	58 *(6.6)*	12 *(1.4)*	**78** ***(8.9)***
Systemic pathology	8 *(0.9)*	14 *(1.6)*	13 *(1.5)*	**35** ***(4)***
Kidney and urinary tract pathology	5 *(0.6)*	7 *(0.8)*	4 *(0.5)*	**16** ***(1.8)***
Arthritis	3 *(0.3)*	7 *(0.8)*	4 *(0.5)*	**14** ***(1.6)***
Reproductive pathology	3 *(0.3)*	9 *(1.0)*		**12** ***(1.4)***
Skin and soft tissue infections	8 *(0.9)*	4 *(0.5)*		**12** ***(1.4)***
Nervous system pathology	2 *(0.2)*	5 *(0.6)*	3 *(0.3)*	**10** ***(1.1)***
Septicemia	2 *(0.2)*		7 *(0.8)*	**9** ***(1.0)***
Cardiac pathology		1 *(0.1)*	2 *(0.2)*	**3** ***(0.3)***
Ocular pathology		1 *(0.1)*	1 *(0.1)*	**2** ***(0.2)***
Otitis		2 *(0.2)*		**2** ***(0.2)***
Total N *(%)*	**341** ***(38.9)***	**337** ***(38.4)***	**199** ***(22.7)***	**877** ***(100.0)***

Figure 2 - Goats 2019 – 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 2019 – Number of antibiograms by bacterial group and pathology

Bacteria N ***(%)***	**Pathology N (%)**														**Total N** ***(%)***
	Respiratory pathology	Mastitis	Digestive pathology	Unspecif ied	Systemic pathology	Kidney and urinary tract pathology	Arthritis	Reproductive pathology	Skin and soft tissue infections	Nervous system pathology	Septicemia	Cardiac pathology	Ocular pathology	Otitis	
E. coli	20 *(2.3)*	18 *(2.1)*	161 *(18.4)*	16 *(1.8)*	13 *(1.5)*	7 *(0.8)*	1 *(0.1)*	4 *(0.5)*		2 *(0.2)*	8 *(0.9)*	1 *(0.1)*			**251** ***(28.6)***
Pasteurella	185 *(21.1)*	5 *(0.6)*		15 *(1.7)*	10 *(1.1)*			1 *(0.1)*	1 *(0.1)*	1 *(0.1)*		2 *(0.2)*			**220** ***(25.1)***
Coagulase-positive Staphylococcus	4 *(0.5)*	65 *(7.4)*	1 *(0.1)*	10 *(1.1)*	1 *(0.1)*		1 *(0.1)*	1 *(0.1)*	7 *(0.8)*					1 *(0.1)*	**91** ***(10.4)***
Coagulase-negative Staphylococcus	2 *(0.2)*	71 *(8.1)*		4 *(0.5)*		1 *(0.1)*	2 *(0.2)*		1 *(0.1)*	1 *(0.1)*					**82** ***(9.4)***
Streptococcus	6 *(0.7)*	25 *(2.9)*	1 *(0.1)*	8 *(0.9)*	7 *(0.8)*	1 *(0.1)*	9 *(1.0)*	2 *(0.2)*	1 *(0.1)*		1 *(0.1)*			1 *(0.1)*	**62** ***(7.1)***
Other bacteria < 30 occurrences	30 *(3.4)*	56 *(6.4)*	34 *(3.9)*	25 *(2.9)*	4 *(0.5)*	7 *(0.8)*	1 *(0.1)*	4 *(0.5)*	2 *(0.2)*	6 *(0.7)*			2 *(0.2)*		**171** ***(19.5)***
Total N ***(%)***	**247** ***(28.2)***	**240** ***(27.4)***	**197** ***(22.5)***	**78** ***(8.9)***	**35** ***(4.0)***	**16** ***(1.8)***	**14** ***(1.6)***	**12** ***(1.4)***	**12** ***(1.4)***	**10** ***(1.1)***	**9** ***(1.0)***	**3** ***(0.3)***	**2** ***(0.2)***	**2** ***(0.2)***	**877** ***(100.0)***

Table 3 - Goats 2019 – All pathologies and age groups included – *E. coli:* susceptibility to antibiotics (proportion) (N= 255)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*247*	**42**
Amoxicillin-Clavulanic ac.	*251*	**66**
Cephalexin	*224*	**84**
Cephalothin	*102*	**73**
Cefoxitin	*231*	**94**
Cefuroxime	*105*	**90**
Cefoperazone	*99*	**94**
Ceftiofur	*249*	**96**
Cefquinome 30 µg	*223*	**96**
Streptomycin 10 UI	*181*	**40**
Spectinomycin	*119*	**76**
Kanamycin 30 UI	*99*	**75**
Gentamicin 10 UI	*248*	**88**
Neomycin	*168*	**74**
Apramycin	*77*	**100**
Tetracycline	*239*	**37**
Florfenicol	*213*	**85**
Nalidixic ac.	*214*	**84**
Flumequine	*47*	**81**
Enrofloxacin	*205*	**88**
Marbofloxacin	*169*	**94**
Danofloxacin	*91*	**95**
Trimethoprim-Sulfonamides	*249*	**57**

Table 4 - Goats 2019 – All pathologies and age groups included – *Pasteurella*: susceptibility to antibiotics (proportion) (N= 220)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*216*	**90**
Amoxicillin-Clavulanic ac.	*191*	**94**
Cephalexin	*173*	**98**
Cephalothin	*58*	**100**
Cefoxitin	*87*	**100**
Cefuroxime	*63*	**98**
Cefoperazone	*64*	**98**
Ceftiofur	*195*	**98**
Cefquinome 30 µg	*204*	**97**
Streptomycin 10 UI	*172*	**30**
Spectinomycin	*80*	**60**
Kanamycin 30 UI	*69*	**57**
Gentamicin 10 UI	*184*	**95**
Neomycin	*106*	**63**
Tetracycline	*210*	**84**
Doxycycline	*44*	**80**
Florfenicol	*215*	**100**
Nalidixic ac.	*171*	**82**
Flumequine	*48*	**83**
Enrofloxacin	*211*	**94**
Marbofloxacin	*170*	**97**
Danofloxacin	*78*	**94**
Trimethoprim-Sulfonamides	*220*	**80**

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Annex 5

Pigs

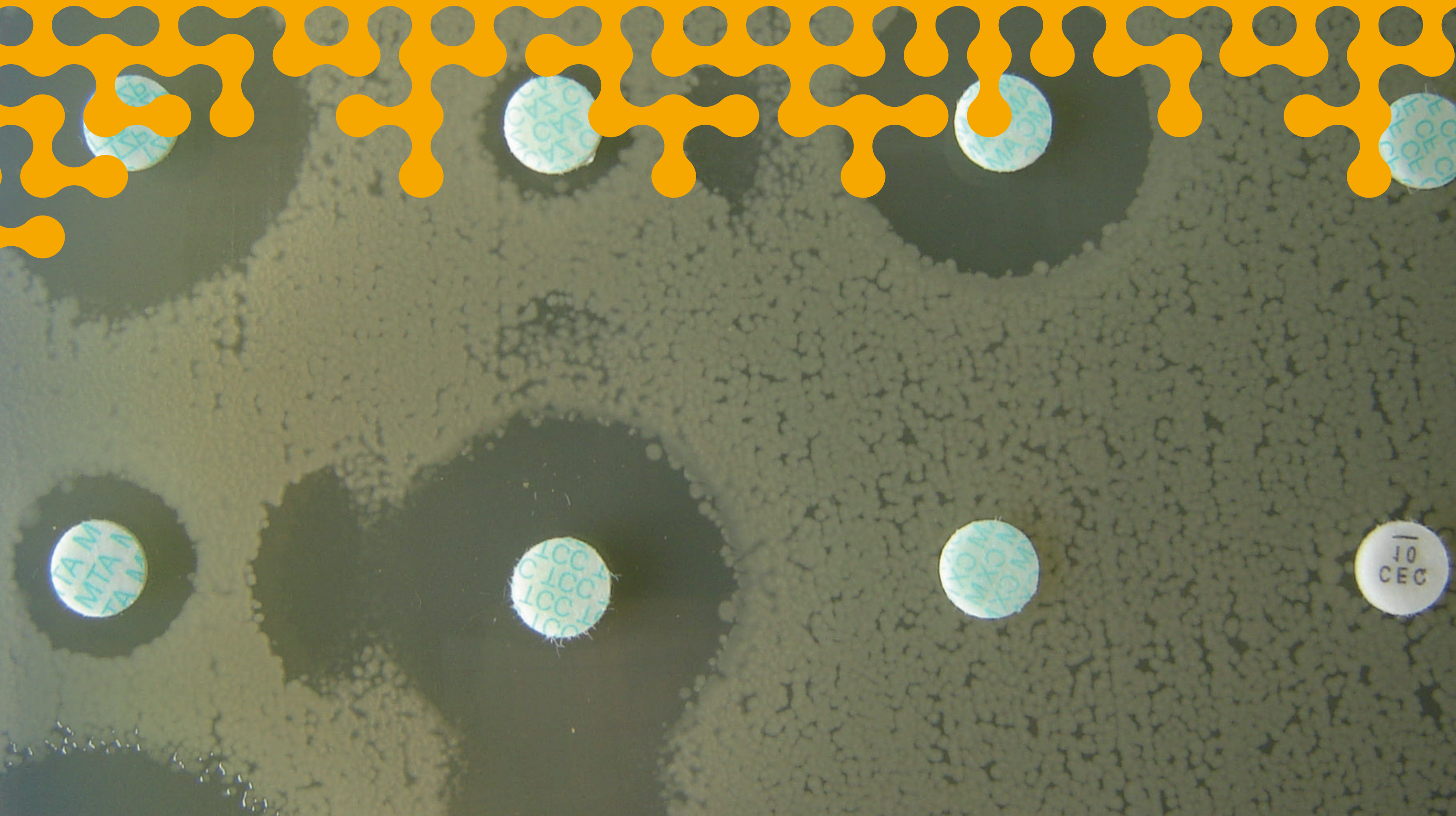


Figure 1 - Pigs 2019 – Antibiogram proportions by animal category

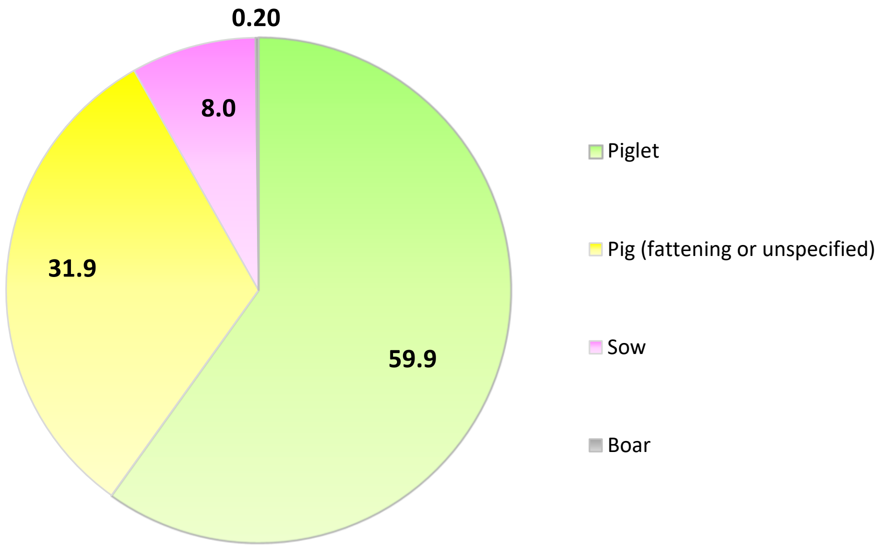
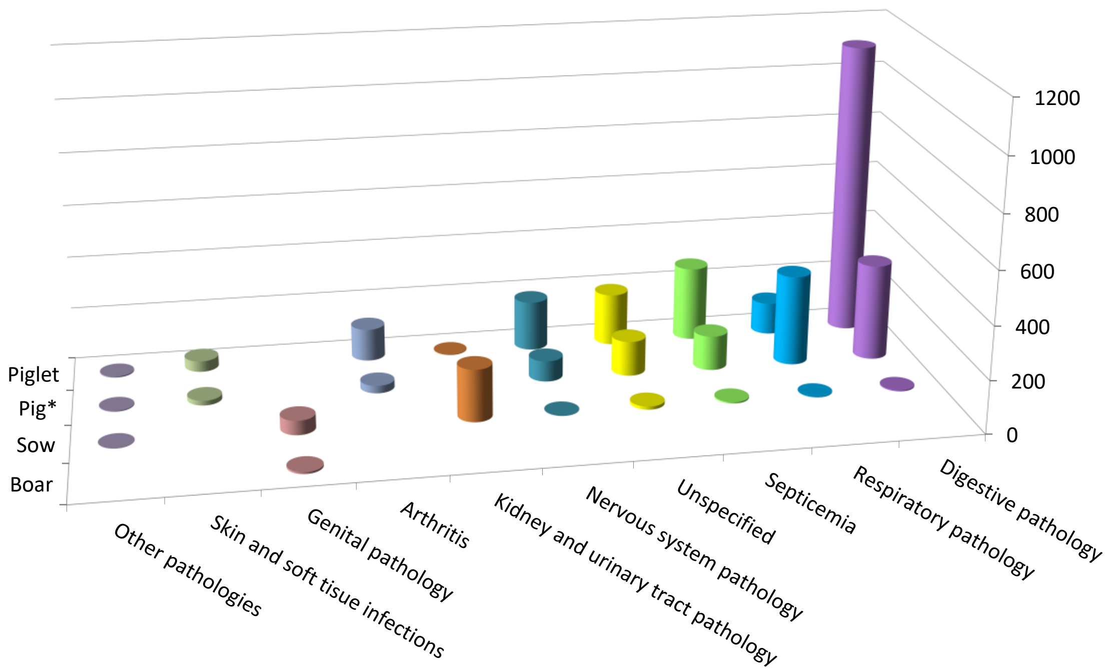


Figure 2 - Pigs 2019 – Number of antibiograms by pathology and animal category

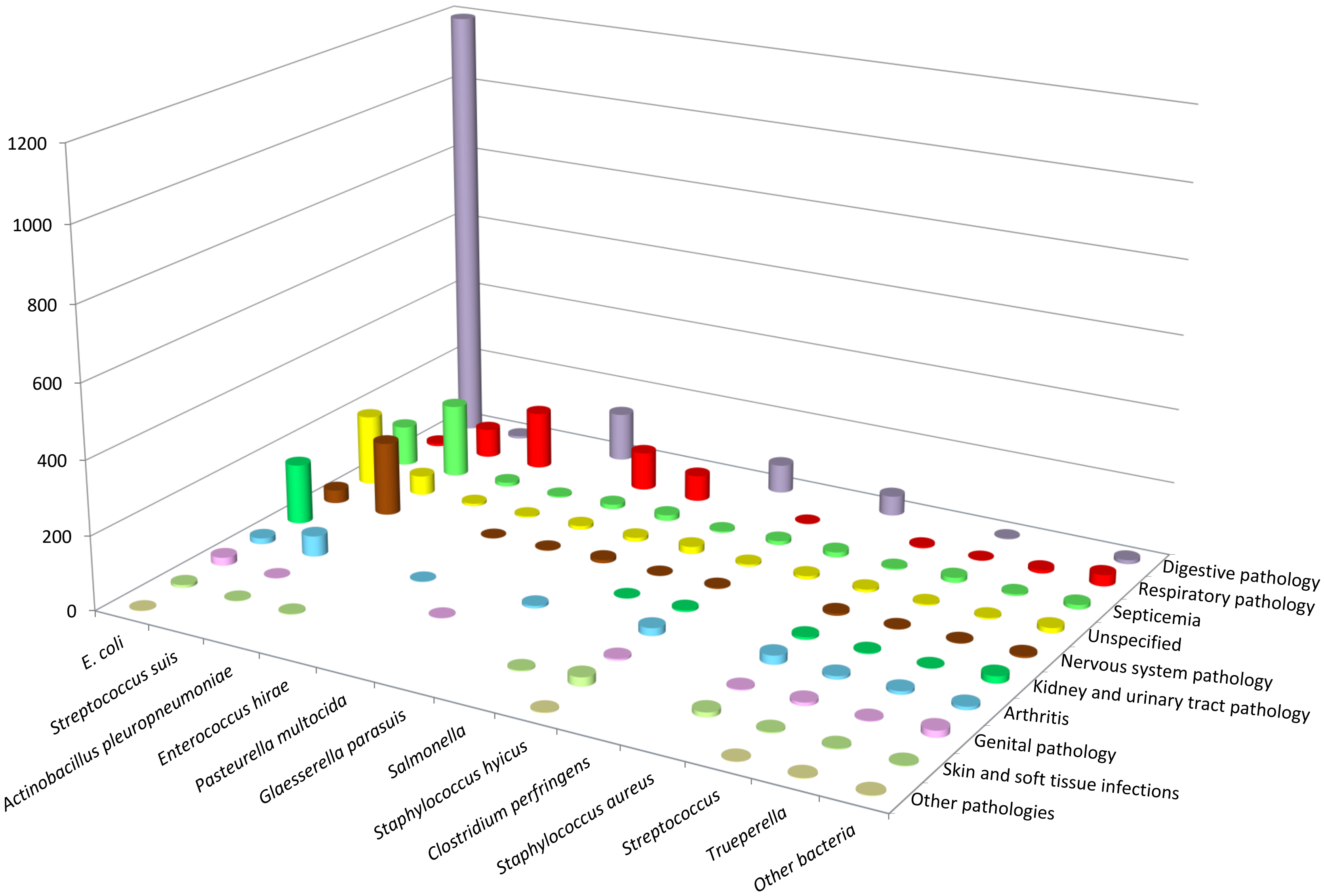


* fattening or unspecified

Table 1 - Pigs 2019 – Number of antibiograms by pathology and animal category

Age group or physiological stage N (%)	**Pathology N *(%)***										**Total N *(%)***
	Digestive pathology	Respiratory pathology	Septicemia	Unspecified	Nervous system pathology	Kidney and urinary tract pathology	Arthritis	Genital pathology	Skin and soft tissue infections	Other	
Piglet	1,112 *(32.13)*	122 *(3.52)*	282 *(8.15)*	198 *(5.72)*	189 *(5.46)*	2 *(0.06)*	123 *(3.55)*		41 *(1.18)*	4 *(0.12)*	**2,073** ***(59.90)***
Porc	366 *(10.57)*	344 *(9.94)*	132 *(3.81)*	133 *(3.84)*	79 *(2.28)*		29 *(0.84)*		18 *(0.52)*	3 *(0.09)*	**1,104** ***(31.90)***
Sow	4 *(0.12)*	2 *(0.06)*	5 *(0.14)*	12 *(0.35)*	1 *(0.03)*	198 *(5.72)*		54 *(1.56)*		1 *(0.03)*	**277** ***(8.00)***
Boar								7 *(0.20)*			**7** ***(0.20)***
Total N *(%)*	**1,482** ***(42.82)***	**468** ***(13.52)***	**419** ***(12.11)***	**343** ***(9.91)***	**269** ***(7.77)***	**200** ***(5.78)***	**152** ***(4.39)***	**61** ***(1.76)***	**59** ***(1.70)***	**8** ***(0.23)***	**3,461** ***(100.00)***

Figure 3 - Pigs 2019 – 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 2019 – Number of antibiograms by bacteria and pathology

Bacteria N ***(%)***	**Pathology N *(%)***										**Total N** ***(%)***
	Digestive pathology	Respiratory pathology	Septicemia	Unspecified	Nervous system pathology	Kidney and urinary tract pathology	Arthritis	Genital pathology	Skin and soft tissue infections	Other	
E. coli	1,197 *(34.59)*	8 *(0.23)*	110 *(3.18)*	193 *(5.58)*	36 *(1.04)*	164 *(4.74)*	16 *(0.46)*	22 *(0.64)*	8 *(0.23)*	1 *(0.03)*	**1,755** ***(50.71)***
Streptococcus suis	7 *(0.20)*	80 *(2.31)*	201 *(5.81)*	53 *(1.53)*	202 *(5.84)*		56 *(1.62)*	1 *(0.03)*	1 *(0.03)*		**601** ***(17.36)***
Actinobacillus pleuropneumoniae		158 *(4.57)*	11 *(0.32)*	7 *(0.20)*					2 *(0.06)*		**178** ***(5.14)***
Enterococcus hirae	133 *(3.84)*		4 *(0.12)*	4 *(0.12)*	1 *(0.03)*		1 *(0.03)*				**143** ***(4.13)***
Pasteurella multocida		105 *(3.03)*	13 *(0.38)*	10 *(0.29)*	2 *(0.06)*			1 *(0.03)*			**131** ***(3.79)***
Glaesserella parasuis		71 *(2.05)*	16 *(0.46)*	11 *(0.32)*	9 *(0.26)*		7 *(0.20)*				**114** ***(3.29)***
Salmonella	78 *(2.25)*		4 *(0.12)*	20 *(0.58)*	1 *(0.03)*	1 *(0.03)*			3 *(0.09)*		**107** ***(3.09)***
Staphylococcus hyicus		1 *(0.03)*	11 *(0.32)*	6 *(0.17)*	3 *(0.09)*	5 *(0.14)*	21 *(0.61)*	5 *(0.14)*	24 *(0.69)*	2 *(0.06)*	**78** ***(2.25)***
Clostridium perfringens	54 *(1.56)*		14 *(0.40)*	9 *(0.26)*							**77** ***(2.22)***
Staphylococcus aureus		4 *(0.12)*	4 *(0.12)*	8 *(0.23)*	6 *(0.17)*	7 *(0.20)*	24 *(0.69)*	3 *(0.09)*	13 *(0.38)*		**69** ***(1.99)***
Streptococcus	2 *(0.06)*	1 *(0.03)*	14 *(0.40)*	4 *(0.12)*	2 *(0.06)*	3 *(0.09)*	9 *(0.26)*	9 *(0.26)*	3 *(0.09)*	1 *(0.03)*	**48** ***(1.39)***
Trueperella		9 *(0.26)*	5 *(0.14)*	4 *(0.12)*	2 *(0.06)*	1 *(0.03)*	9 *(0.26)*	2 *(0.06)*	3 *(0.09)*	2 *(0.06)*	**37** ***(1.07)***
Other bacteria *< 30 occurrences*	11 *(0.32)*	31 *(0.90)*	12 *(0.35)*	14 *(0.40)*	5 *(0.14)*	19 *(0.55)*	9 *(0.26)*	18 *(0.52)*	2 *(0.06)*	2 *(0.06)*	**123** ***3.55)***
Total N **(%)**	**1,482** ***(42.82)***	**468** ***(13.52)***	**419** ***(12.11)***	**343** ***(9.91)***	**269** ***(7.77)***	**200** ***(5.78)***	**152** ***(4.39)***	**61** ***(1.76)***	**59** ***(1.70)***	**8** ***(0.23)***	**3,461** ***(100.00)***

Table 3 - Pigs 2019 – All pathologies and age groups included – *E. coli*: susceptibility to antibiotics (proportion) (N= 1,755)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,728*	**44**
Amoxicillin-Clavulanic ac.	*1,738*	**72**
Cephalexin	*841*	**90**
Cephalothin	*486*	**78**
Cefoxitin	*1,377*	**95**
Cefuroxime	*273*	**96**
Cefoperazone	*266*	**97**
Ceftiofur	*1,749*	**99**
Cefquinome 30 µg	*496*	**99**
Streptomycin 10 UI	*391*	**48**
Spectinomycin	*1,418*	**67**
Gentamicin 10 UI	*1,593*	**91**
Neomycin	*1,673*	**80**
Apramycin	*1,643*	**93**
Tetracycline	*1,468*	**36**
Florfenicol	*1,641*	**89**
Nalidixic ac.	*937*	**77**
Oxolinic ac.	*790*	**81**
Flumequine	*798*	**79**
Enrofloxacin	*1,695*	**97**
Marbofloxacin	*1,296*	**97**
Danofloxacin	*272*	**95**
Trimethoprim	*453*	**55**
Trimethoprim-Sulfonamides	*1,735*	**53**

Table 4 - Pigs 2019 – Digestive pathology – Piglets (post-weaning included) – *E. coli*: susceptibility to antibiotics (proportion) (N= 893)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	879	**43**
Amoxicillin-Clavulanic ac.	890	**72**
Cephalexin	396	**92**
Cephalothin	279	**78**
Cefoxitin	706	**96**
Ceftiofur	891	**99**
Cefquinome 30 µg	146	**99**
Streptomycin 10 UI	207	**51**
Spectinomycin	805	**65**
Gentamicin 10 UI	845	**90**
Neomycin	885	**77**
Apramycin	883	**91**
Tetracycline	699	**36**
Florfenicol	847	**88**
Nalidixic ac.	505	**74**
Oxolinic ac.	375	**81**
Flumequine	358	**77**
Enrofloxacin	888	**97**
Marbofloxacin	635	**97**
Trimethoprim	260	**56**
Trimethoprim-Sulfonamides	882	**53**

Table 5 - Pigs 2019 – Kidney and urinary tract pathology – Sows – *E. coli*: susceptibility to antibiotics (proportion) (N= 162)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*158*	**41**
Amoxicillin-Clavulanic ac.	*162*	**70**
Ceftiofur	*161*	**100**
Neomycin	*109*	**95**
Apramycin	*103*	**99**
Tetracycline	*162*	**46**
Florfenicol	*157*	**90**
Oxolinic ac.	*105*	**81**
Enrofloxacin	*112*	**92**
Marbofloxacin	*157*	**94**
Trimethoprim-Sulfonamides	*162*	**61**

Table 6 - Pigs 2019 – All pathologies included – *Actinobacillus pleuropneumoniae*: susceptibility to antibiotics (proportion) (N= 178)

Antibiotic	*Total (N)*	% S
Amoxicillin	*172*	**95**
Amoxicillin-Clavulanic ac.	*92*	**100**
Ceftiofur	*176*	**100**
Tilmicosin	*175*	**94**
Tetracycline	*122*	**84**
Doxycycline	*148*	**80**
Florfenicol	*174*	**100**
Marbofloxacin	*133*	**100**
Trimethoprim-Sulfonamides	*177*	**94**

Table 7 - Pigs 2019 – All pathologies included – *Pasteurella multocida*: susceptibility to antibiotics (proportion) (N= 131)

Antibiotic	*Total (N)*	% S
Amoxicillin	*119*	**100**
Ceftiofur	*131*	**99**
Tilmicosin	*124*	**98**
Tetracycline	*101*	**95**
Doxycycline	*101*	**98**
Florfenicol	*127*	**100**
Marbofloxacin	*101*	**100**
Trimethoprim-Sulfonamides	*131*	**87**

Table 8 - Pigs 2019 – All pathologies included – *Streptococcus suis*: susceptibility to antibiotics (proportion) (N= 601)

Antibiotic	*Total (N)*	% S
Amoxicillin	*574*	**99**
Oxacillin	*594*	**97**
Erythromycin	*470*	**46**
Tylosin	*297*	**35**
Spiramycin	*314*	**42**
Lincomycin	*469*	**39**
Streptomycin 500 µg	*292*	**98**
Kanamycin 1000 µg	*228*	**96**
Gentamicin 500 µg	*464*	**100**
Tetracycline	*316*	**20**
Doxycycline	*202*	**36**
Trimethoprim-Sulfonamides	*600*	**87**

Annex 6

Poultry

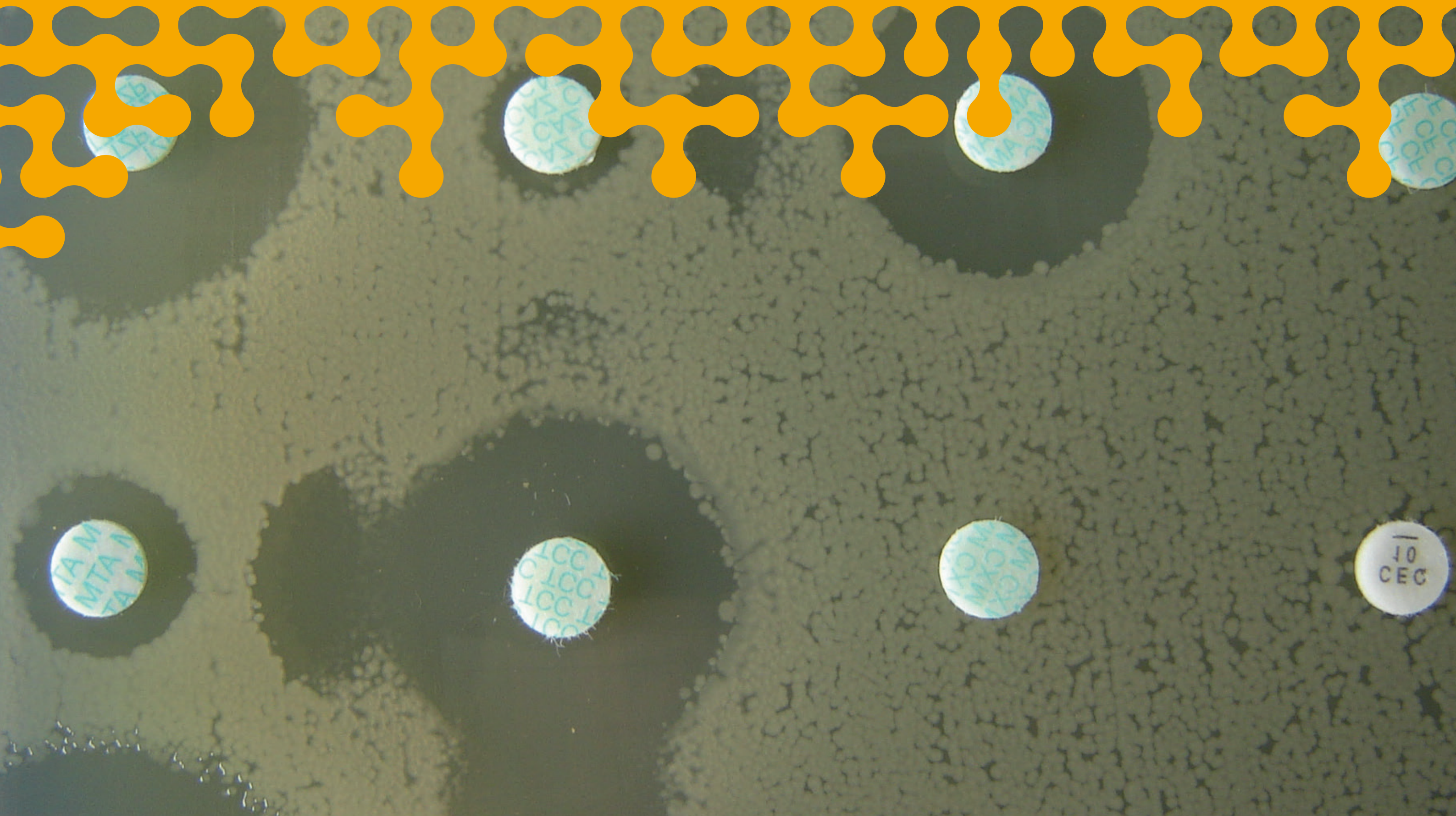
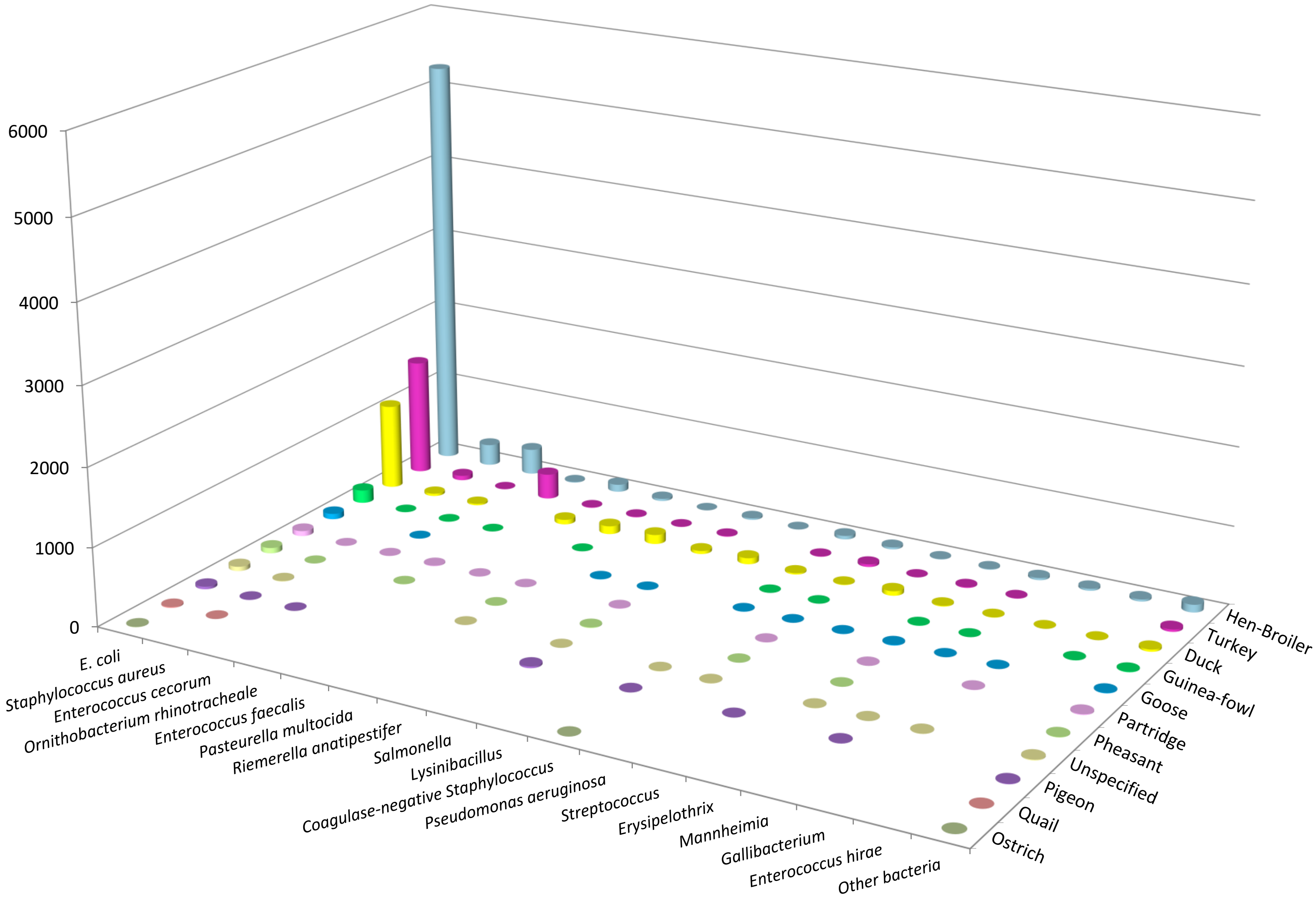


Figure 1 - Poultry 2019 – Number of antibiograms by bacteria and animal



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

Table 1 - Poultry 2019 – Number of antibiograms by bacteria and animal

Bacteria N *(%)*	Animal species N *(%)*											Total N *(%)*
	Hen-chicken	Turkey	Duck	Guinea-fowl	Goose	Partridge	Pheasant	Poultry	Pigeon	Quail	Ostrich	
E. coli	5,296 *(49.70)*	1,502 *(14.10)*	1,105 *(10.37)*	168 *(1.58)*	72 *(0.68)*	66 *(0.62)*	70 *(0.66)*	56 *(0.53)*	33 *(0.31)*	11 *(0.10)*	4 *(0.04)*	**8,383** ***(78.67)***
Staphylococcus aureus	277 *(2.60)*	60 *(0.56)*	31 *(0.29)*	2 *(0.02)*		2 *(0.02)*	1 *(0.01)*	5 *(0.05)*	3 *(0.03)*	1 *(0.01)*		**382** ***(3.58)***
Enterococcus cecorum	333 *(3.13)*	2 *(0.02)*	19 *(0.18)*	3 *(0.03)*	3 *(0.03)*	2 *(0.02)*			1 *(0.01)*			**363** ***(3.41)***
Ornithobacterium rhinotracheale	8 *(0.08)*	328 *(3.08)*		1 *(0.01)*		7 *(0.07)*	2 *(0.02)*					**346** ***(3.25)***
Enterococcus faecalis	96 *(0.90)*	6 *(0.06)*	61 *(0.57)*			2 *(0.02)*						**165** ***(1.55)***
Pasteurella multocida	29 *(0.27)*	7 *(0.07)*	105 *(0.99)*	1 *(0.01)*		1 *(0.01)*	2 *(0.02)*	1 *(0.01)*				**146** ***(1.37)***
Riemerella anatipestifer	1 *(0.01)*	3 *(0.03)*	120 *(1.13)*		4 *(0.04)*							**128** ***(1.20)***
Salmonella	21 *(0.20)*	8 *(0.08)*	40 *(0.38)*		2 *(0.02)*	4 *(0.04)*	7 *(0.07)*	1 *(0.01)*	21 *(0.20)*			**104** ***(0.98)***
Lysinibacillus	2 *(0.02)*		79 *(0.74)*									**81** ***(0.76)***
Coagulase-negative Staphylococcus	46 *(0.43)*	5 *(0.05)*	17 *(0.16)*	1 *(0.01)*	2 *(0.02)*			3 *(0.03)*	1 *(0.01)*		1 *(0.01)*	**76** ***(0.71)***
Pseudomonas aeruginosa	26 *(0.24)*	34 *(0.32)*	6 *(0.06)*	1 *(0.01)*	1 *(0.01)*	2 *(0.02)*	1 *(0.01)*	2 *(0.02)*				**73** ***(0.69)***
Streptococcus	5 *(0.05)*	1 *(0.01)*	58 *(0.54)*		2 *(0.02)*				1 *(0.01)*			**67** ***(0.63)***
Erysipelothrix	8 *(0.08)*	10 *(0.09)*	10 *(0.09)*	3 *(0.03)*	8 *(0.08)*	1 *(0.01)*	1 *(0.01)*	2 *(0.02)*				**43** ***(0.40)***
Mannheimia	28 *(0.26)*	4 *(0.04)*	3 *(0.03)*	1 *(0.01)*	1 *(0.01)*			1 *(0.01)*	2 *(0.02)*			**40** ***(0.38)***
Gallibacterium	26 *(0.24)*		1 *(0.01)*		1 *(0.01)*	2 *(0.02)*		2 *(0.02)*				**32** ***(0.30)***
Enterococcus hirae	27 *(0.25)*		1 *(0.01)*	2 *(0.02)*								**30** ***(0.28)***
Other bacteria < 30 occurrences	99 *(0.93)*	30 *(0.28)*	28 *(0.26)*	6 *(0.06)*	5 *(0.05)*	9 *(0.08)*	4 *(0.04)*	9 *(0.08)*	5 *(0.05)*	1 *(0.01)*	1 *(0.01)*	**197** ***(1.85)***
Total N (%)	**6,328** ***(59.38)***	**2,000** ***(18.77)***	**1,684** ***(15.80)***	**189** ***(1.77)***	**101** ***(0.95)***	**98** ***(0.92)***	**88** ***(0.83)***	**82** ***(0.77)***	**67** ***(0.63)***	**13** ***(0.12)***	**6** ***(0.06)***	10,656 ***(100.00)***

Table 2 - Hens and broilers 2019 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N=5,296)

Antibiotic	*Total (N)*	**% S**
Ampicillin	*284*	**79**
Amoxicillin	*5,267*	**71**
Amoxicillin-Clavulanic ac.	*4,154*	**86**
Cephalexin	*1,655*	**93**
Cephalothin	*2,451*	**92**
Cefoxitin	*4,077*	**99**
Cefuroxime	*249*	**97**
Cefoperazone	*222*	**99**
Ceftiofur	*5,040*	**99**
Cefquinome 30 µg	*1,546*	**98**
Spectinomycin	*1,590*	**86**
Gentamicin 10 UI	*5,177*	**98**
Neomycin	*2,928*	**99**
Apramycin	*2,832*	**100**
Tetracycline	*4,244*	**69**
Doxycycline	*1,240*	**70**
Florfenicol	*4,004*	**99**
Nalidixic ac.	*4,623*	**66**
Oxolinic ac.	*715*	**69**
Flumequine	*4,142*	**69**
Enrofloxacin	*5,262*	**95**
Marbofloxacin	*402*	**93**
Danofloxacin	*233*	**91**
Trimethoprim	*2,430*	**84**
Trimethoprim-Sulfonamides	*5,268*	**83**

Table 3 – Laying hens (table eggs and hatching eggs) 2019 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N= 1,843)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,819*	**79**
Amoxicillin-Clavulanic ac.	*1,572*	**89**
Cephalexin	*405*	**92**
Cephalothin	*1,136*	**94**
Cefoxitin	*1,536*	**99**
Ceftiofur	*1,793*	**99**
Cefquinome 30 µg	*407*	**99**
Spectinomycin	*402*	**88**
Gentamicin 10 UI	*1,818*	**98**
Neomycin	*1,217*	**99**
Apramycin	*1,172*	**100**
Tetracycline	*1,477*	**74**
Doxycycline	*374*	**68**
Florfenicol	*1,503*	**99**
Nalidixic ac.	*1,750*	**76**
Flumequine	*1,558*	**78**
Enrofloxacin	*1,819*	**97**
Trimethoprim	*1,130*	**93**
Trimethoprim-Sulfonamides	*1,820*	**92**

Table 4 – Broilers 2019 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N= 2,962)

Antibiotic	*Total (N)*	**% S**
Ampicillin	*217*	**81**
Amoxicillin	*2,960*	**66**
Amoxicillin-Clavulanic ac.	*2,234*	**84**
Cephalexin	*982*	**92**
Cephalothin	*1,250*	**90**
Cefoxitin	*2,212*	**99**
Cefuroxime	*115*	**99**
Cefoperazone	*112*	**99**
Ceftiofur	*2,759*	**99**
Cefquinome 30 µg	*982*	**98**
Spectinomycin	*962*	**85**
Gentamicin 10 UI	*2,888*	**98**
Neomycin	*1,391*	**99**
Apramycin	*1,374*	**100**
Tetracycline	*2,429*	**67**
Doxycycline	*850*	**71**
Florfenicol	*2,196*	**99**
Nalidixic ac.	*2,626*	**60**
Oxolinic ac.	*447*	**72**
Flumequine	*2,417*	**63**
Enrofloxacin	*2,960*	**95**
Marbofloxacin	*131*	**95**
Danofloxacin	*118*	**94**
Trimethoprim	*1,243*	**76**
Trimethoprim-Sulfonamides	*2,961*	**77**

Table 5 - Turkeys 2019 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N= 1,502)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,500*	**62**
Amoxicillin-Clavulanic ac.	*1,161*	**82**
Cephalexin	*631*	**94**
Cephalothin	*518*	**86**
Cefoxitin	*1,145*	**99**
Ceftiofur	*1,497*	**99**
Cefquinome 30 µg	*586*	**99**
Spectinomycin	*596*	**93**
Gentamicin 10 UI	*1,499*	**99**
Neomycin	*592*	**99**
Apramycin	*587*	**100**
Tetracycline	*1,156*	**61**
Doxycycline	*554*	**61**
Florfenicol	*1,137*	**98**
Nalidixic ac.	*1,416*	**78**
Flumequine	*1,139*	**78**
Enrofloxacin	*1,499*	**97**
Trimethoprim	*518*	**84**
Trimethoprim-Sulfonamides	*1,500*	**84**

Table 6 - Ducks 2019 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N= 1,105)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*1,104*	**57**
Amoxicillin-Clavulanic ac.	*1,083*	**75**
Cephalexin	*613*	**84**
Cephalothin	*494*	**73**
Cefoxitin	*1,047*	**98**
Ceftiofur	*1,103*	**99**
Cefquinome 30 µg	*607*	**99**
Spectinomycin	*569*	**93**
Gentamicin 10 UI	*1,086*	**98**
Neomycin	*517*	**98**
Apramycin	*480*	**99**
Tetracycline	*1,078*	**43**
Doxycycline	*446*	**37**
Florfenicol	*1,064*	**98**
Nalidixic ac.	*1,055*	**71**
Oxolinic ac.	*130*	**71**
Flumequine	*1,055*	**70**
Enrofloxacin	*1,104*	**98**
Trimethoprim	*467*	**70**
Trimethoprim-Sulfonamides	*1,104*	**71**

Table 7 - Guinea-fowls 2019 – All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N= 168)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*165*	**55**
Amoxicillin-Clavulanic ac.	*153*	**78**
Cefoxitin	*140*	**99**
Ceftiofur	*159*	**99**
Gentamicin 10 UI	*161*	**99**
Tetracycline	*157*	**50**
Florfenicol	*137*	**92**
Nalidixic ac.	*144*	**70**
Flumequine	*151*	**72**
Enrofloxacin	*165*	**95**
Trimethoprim-Sulfonamides	*166*	**67**

Table 8 - Hens and broilers 2019 – All pathologies included - *Staphylococcus aureus*: susceptibility to antibiotics (proportion) (N= 277)

Antibiotic	*Total (N)*	**Total (N)**
Penicillin G	*274*	**93**
Cefoxitin	*266*	**97**
Erythromycin	*210*	**93**
Tylosin	*237*	**96**
Spiramycin	*198*	**96**
Lincomycin	*273*	**94**
Gentamicin 10 UI	*235*	**99**
Neomycin	*133*	**99**
Tetracycline	*210*	**84**
Doxycycline	*109*	**83**
Enrofloxacin	*273*	**99**
Trimethoprim-Sulfonamides	*276*	**100**

Table 9 - Hens and broilers 2019 – All pathologies included – *Enterococcus cecorum*: susceptibility to antibiotics (proportion) (N= 333)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*333*	**97**
Erythromycin	*231*	**59**
Tylosin	*224*	**53**
Spiramycin	*229*	**37**
Lincomycin	*327*	**58**
Gentamicin 500 µg	*228*	**98**
Tetracycline	*235*	**10**
Trimethoprim-Sulfonamides	*331*	**56**

Annex 7

Rabbits

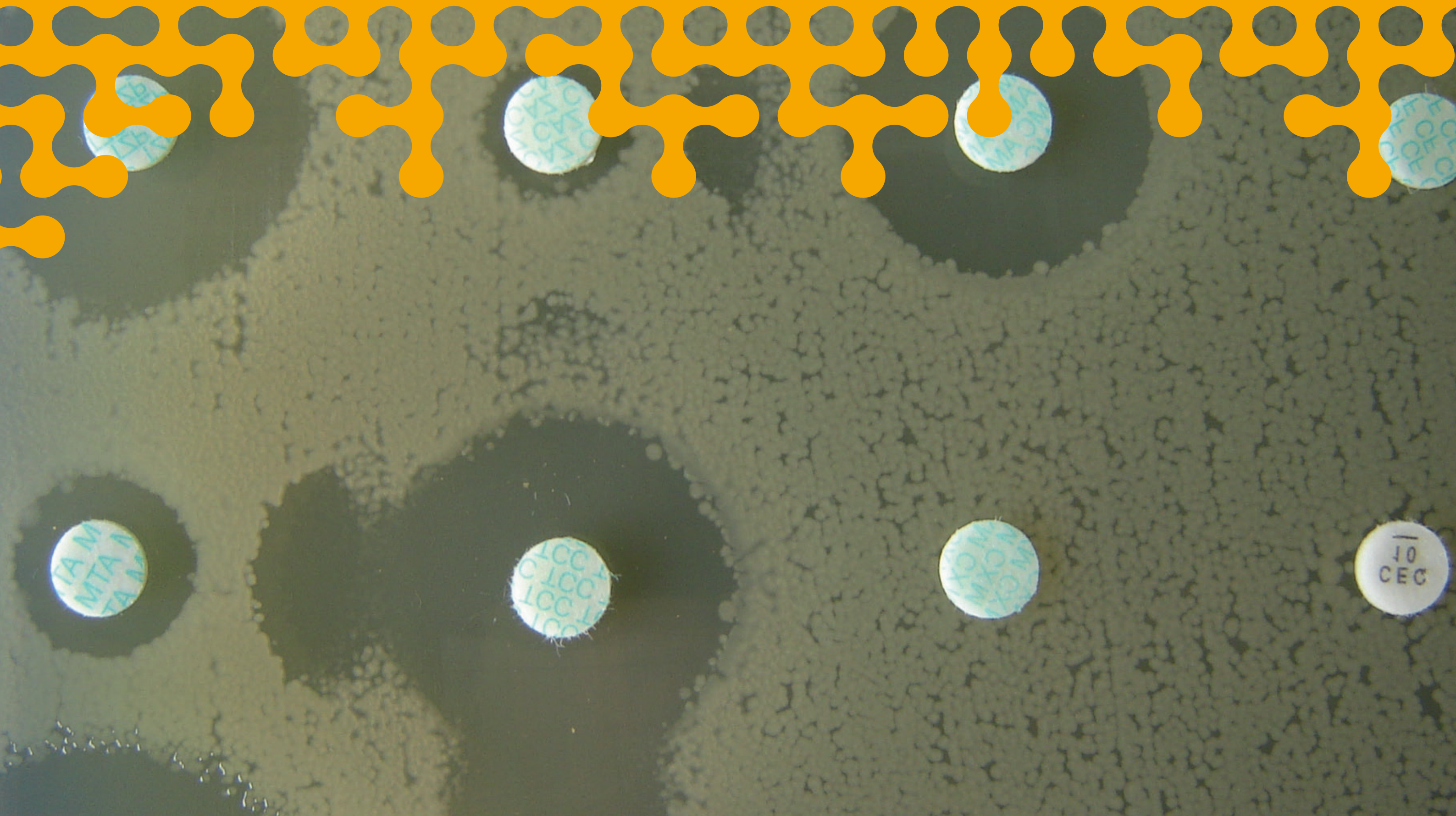
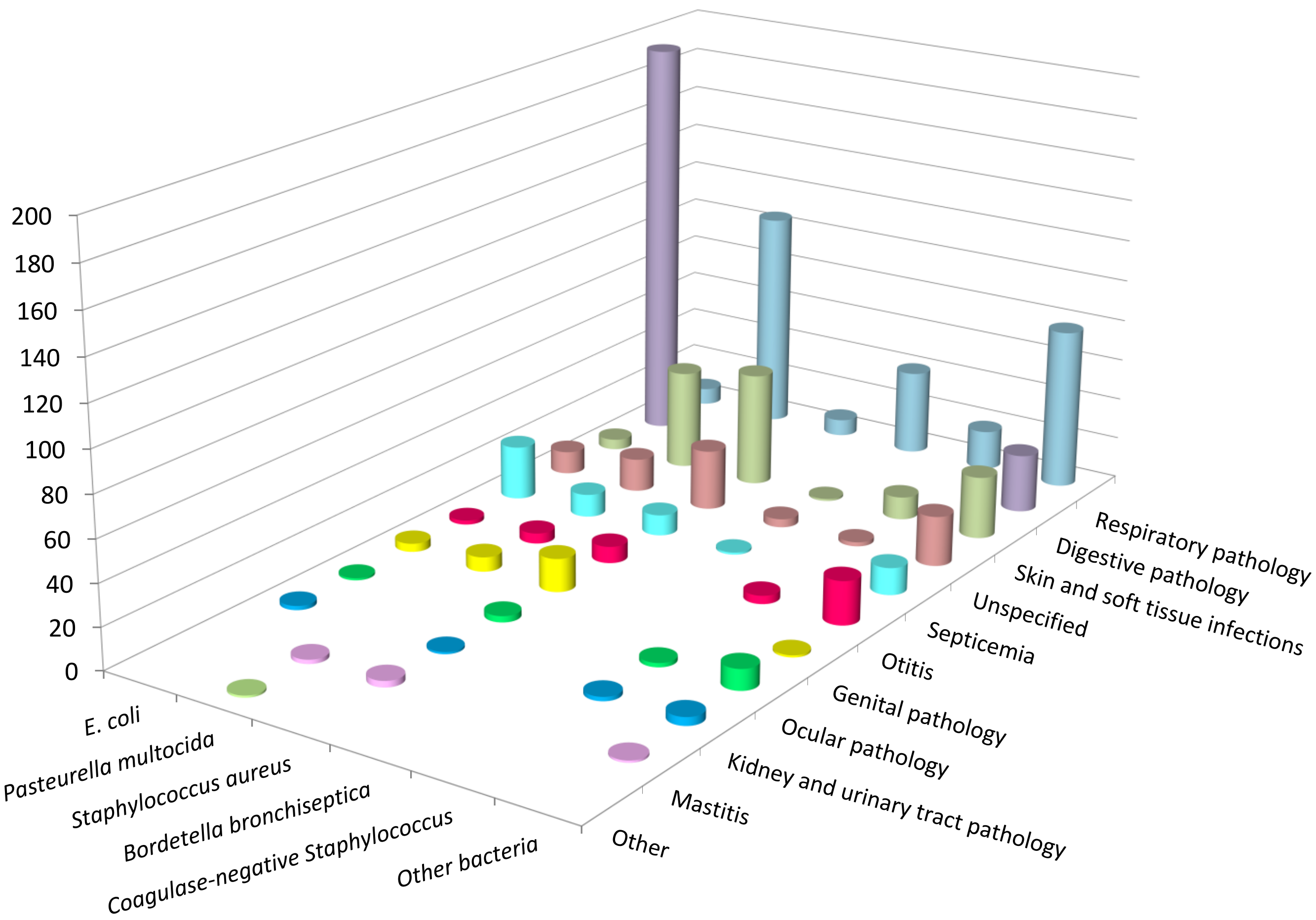


Figure 1 - Rabbits 2019 – Number of antibiograms by bacteria and pathology



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

Table 1 - Rabbits 2019 – Number of antibiograms by bacteria and pathology

Bacteria N *(%)*	**Pathology N** *(%)*											**Total N** *(%)*
	Respiratory pathology	Digestive pathology	Skin and soft tissue infections	Unspecified	Septicemia	Otitis	Genital pathology	Ocular pathology	Kidney and urinary tract pathology	Mastitis	Other	
E. coli	8	195	5	11	26	2	4	1	2			**254**
	(0.91)	*(22.16)*	*(0.57)*	*(1.25)*	*(2.95)*	*(0.23)*	*(0.45)*	*(0.11)*	*(0.23)*			***(28.86)***
Pasteurella multocida	106		48	16	11	5	7			2	1	**196**
	(12.05)		*(5.45)*	*(1.82)*	*(1.25)*	*(0.57)*	*(0.80)*			*(0.23)*	*(0.11)*	***(22.27)***
Staphylococcus aureus	8		55	29	10	8	16	3	1	3		**133**
	(0.91)		*(6.25)*	*(3.30)*	*(1.14)*	*(0.91)*	*(1.82)*	*(0.34)*	*(0.11)*	*(0.34)*		***(15.11)***
Bordetella bronchiseptica	41		1	4	1							**47**
	(4.66)		*(0.11)*	*(0.45)*	*(0.11)*							***(5.34)***
Coagulase-negative Staphylococcus	19		11	2		4		2	2			**40**
	(2.16)		*(1.25)*	*(0.23)*		*(0.45)*		*(0.23)*	*(0.23)*			***(4.55)***
Other bacteria	78	28	30	24	13	21	1	10	4	1		**210**
< 30 occurrences	*(8.86)*	*(3.18)*	*(3.41)*	*(2.73)*	*(1.48)*	*(2.39)*	*(0.11)*	*(1.14)*	*(0.45)*	*(0.11)*		***(23.86)***
Total N	**260**	**223**	**150**	**86**	**61**	**40**	**28**	**16**	**9**	**6**	**1**	**880**
(%)	***(29.55)***	***(25.34)***	***(17.05)***	***(9.77)***	***(6.93)***	***(4.55)***	***(3.18)***	***(1.82)***	***(1.02)***	***(0.68)***	***(0.11)***	***(100.00)***

Table 2 - Rabbits 2019 - All pathologies included - *E. coli*: susceptibility to antibiotics (proportion) (N = 254)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*189*	**53**
Amoxicillin-Clavulanic ac.	*189*	**78**
Cephalexin	*183*	**73**
Cefoxitin	*211*	**93**
Ceftiofur	*226*	**100**
Cefquinome 30 µg	*166*	**100**
Spectinomycin	*170*	**88**
Gentamicin 10 UI	*250*	**90**
Neomycin	*238*	**89**
Apramycin	*234*	**88**
Tetracycline	*246*	**18**
Nalidixic ac.	*207*	**81**
Enrofloxacin	*245*	**98**
Danofloxacin	*144*	**98**
Trimethoprim-Sulfonamides	*249*	**33**

Table 3 - Rabbits 2019 – All pathologies included - *Pasteurella multocida*: susceptibility to antibiotics (proportion) (N= 196)

Antibiotic	*Total (N)*	**% S**
Tilmicosin	*152*	**93**
Gentamicin 10 UI	*172*	**98**
Tetracycline	*188*	**97**
Doxycycline	*145*	**96**
Nalidixic ac.	*156*	**58**
Flumequine	*144*	**88**
Enrofloxacin	*179*	**97**
Trimethoprim-Sulfonamides	*193*	**88**

Table 4 - Rabbits 2019 – All pathologies included - *Staphylococcus aureus*: susceptibility to antibiotics (proportion) (N= 133)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*101*	**71**
Cefoxitin	*120*	**95**
Erythromycin	*121*	**50**
Spiramycin	*104*	**50**
Lincomycin	*112*	**53**
Gentamicin 10 UI	*128*	**77**
Tetracycline	*128*	**63**
Enrofloxacin	*105*	**93**
Trimethoprim-Sulfonamides	*133*	**82**

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Annex 8
Fish

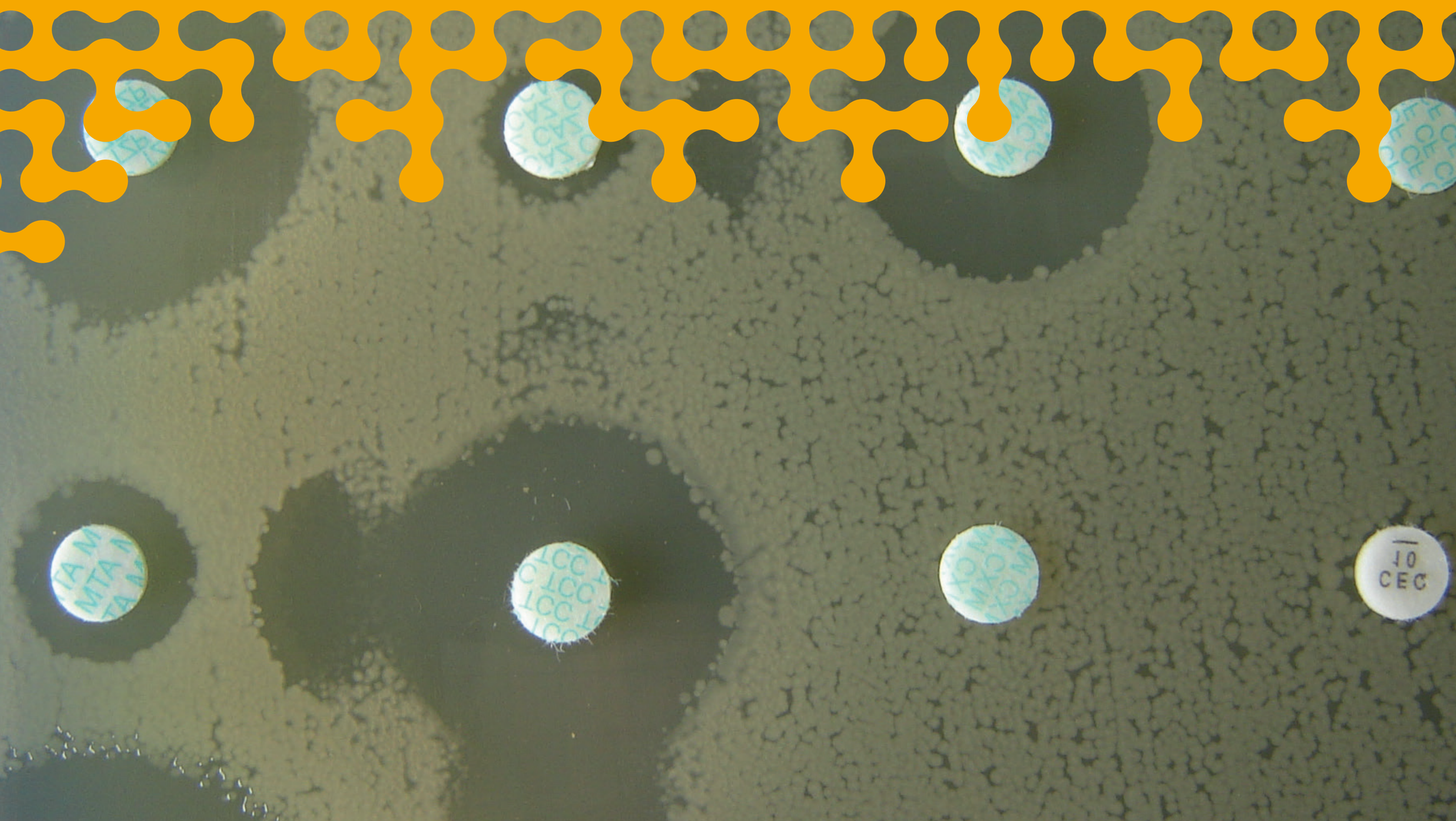

Figure 1 - Fish 2019 – Antibiogram proportions by animal species

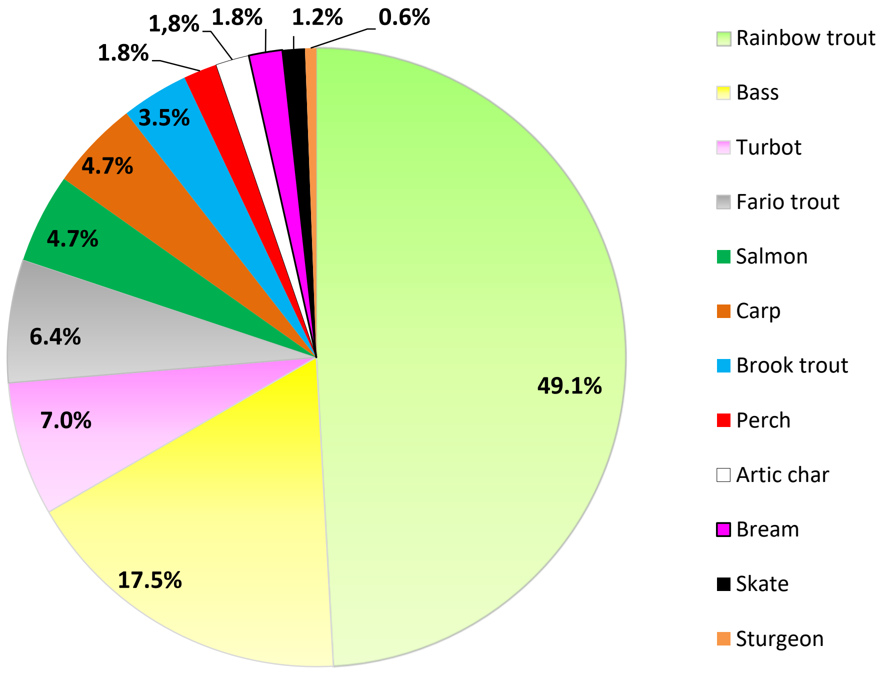

Table 1 - Fish 2019 – Number of antibiograms by bacteria and pathology

Bacteria N *(%)*	**Pathology N** *(%)*			**Total N** *(%)*
	Unspecified	Septicemia	Skin and soft tissue infections	
Aeromonas salmonicida	75 *(43.86)*	14 *(8.19)*		**89** ***(52.05)***
Vibrio	18 *(10.53)*	11 *(6.43)*		**29** ***(16.96)***
Aeromonas	5 *(2.92)*	4 *(2.34)*	4 *(2.34)*	**13** ***(7.60)***
Carnobacterium maltaromaticum	8 *(4.68)*	3 *(1.75)*		**11** ***(6.43)***
Yersinia ruckeri	9 *(5.26)*			**9** ***(5.26)***
Photobacterium damselae	4 *(2.34)*	2 *(1.17)*		**6** ***(3.51)***
Lactococcus garvieae	3 *(1.75)*	2 *(1.17)*		**5** ***(2.92)***
Pseudomonas	2 *(1.17)*		1 *(0.58)*	**3** ***(1.75)***
Citrobacter			2 *(1.17)*	**2** ***(1.17)***
Edwardsiella tarda	1 *(0.58)*			**1** ***(0.58)***
Pseudomonas aeruginosa	1 *(0.58)*			**1** ***(0.58)***
Shewanella putrefaciens	1 *(0.58)*			**1** ***(0.58)***
Delftia acidovorans			1 *(0.58)*	**1** ***(0.58)***
Total N *(%)*	**127** ***(74.27)***	**36** ***(21.05)***	**8** ***(4.68)***	**171** ***(100.00)***

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Annex 9

Horses

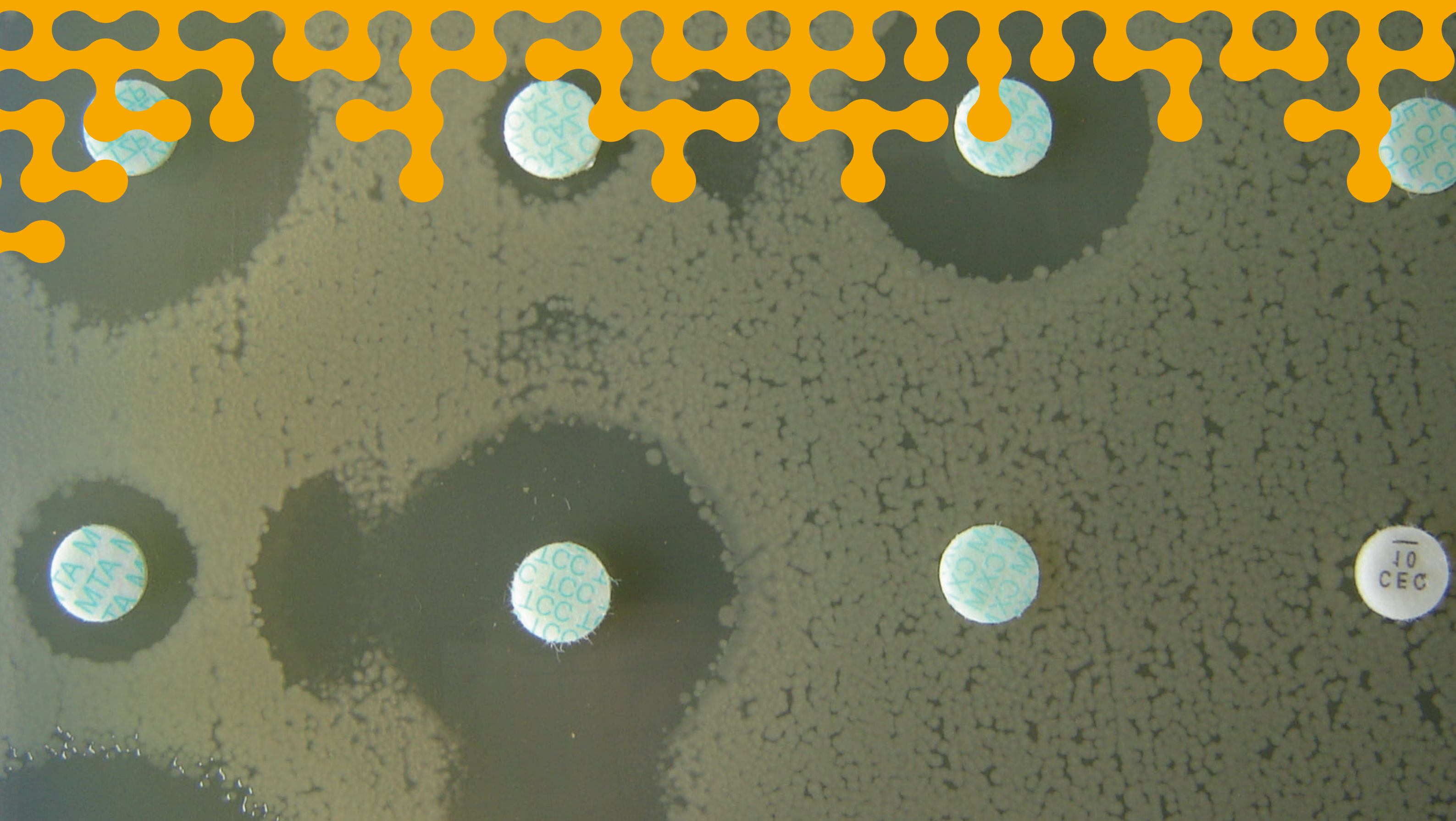
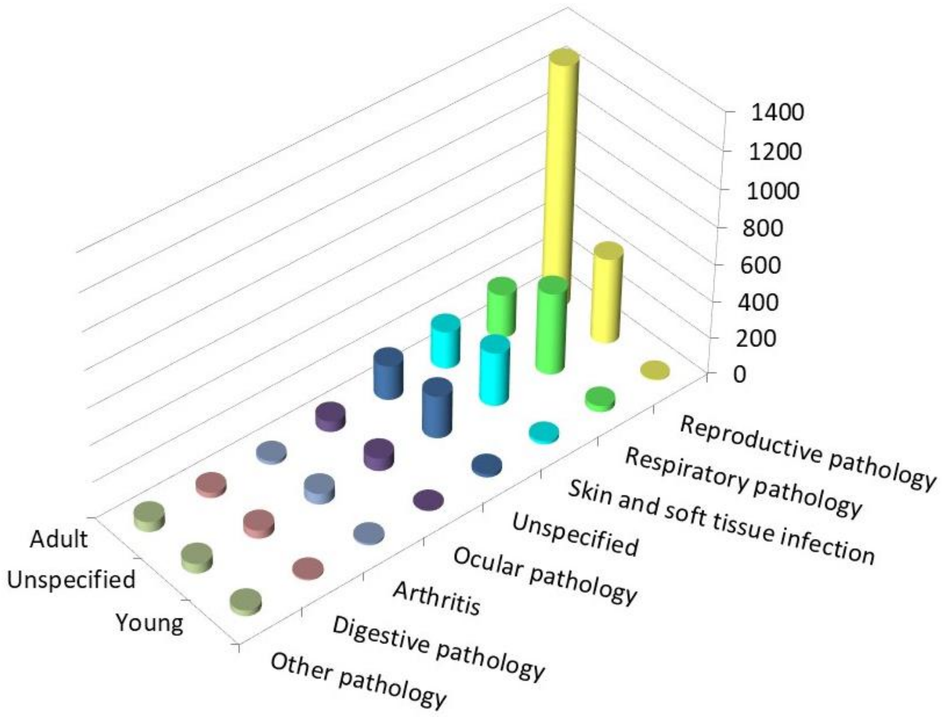


Figure 1 - Horses 2019 – Number of antibiograms by age group and pathology

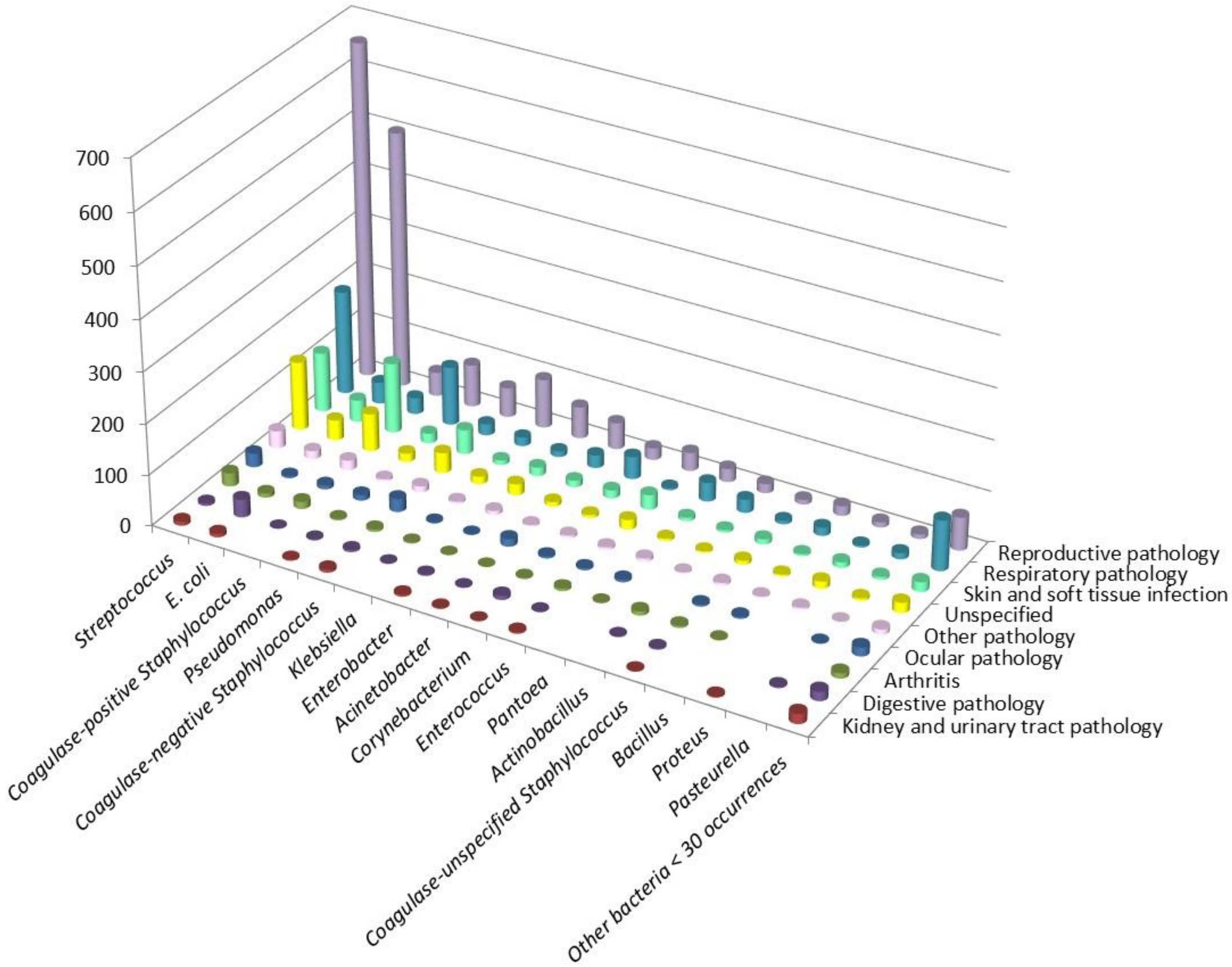


Note: *all values are detailed in table 1 (including other pathologies representing less than 1% grouped together)*

Table 1 - Horses 2019 – Number of antibiograms by age group and pathology

Pathology N (%)	Age group N (%)			Total N (%)
	Adult	Unspecified	Young	
Reproductive pathology	1,305 *(33.11)*	466 *(11.82)*	5 *(0.13)*	**1,776** ***(45.05)***
Respiratory pathology	238 *(6.04)*	445 *(11.29)*	34 *(0.86)*	**717** ***(18.19)***
Skin and soft tissue infections	202 *(5.12)*	292 *(7.41)*	17 *(0.43)*	**511** ***(12.96)***
Unspecified	187 *(4.74)*	230 *(5.83)*	19 *(0.48)*	**436** ***(11.06)***
Ocular pathology	59 *(1.50)*	70 *(1.78)*	4 *(0.1)*	**133** ***(3.37)***
Arthritis	21 *(0.53)*	59 *(1.50)*	11 *(0.28)*	**91** ***(2.31)***
Digestive pathology	30 *(0.76)*	45 *(1.14)*	8 *(0.20)*	**83** ***(2.11)***
Kidney and urinary tract pathology	27 *(0.68)*	27 *(0.68)*	1 *(0.03)*	**55** ***(1.40)***
Mastitis	31 *(0.79)*			**31** ***(0.79)***
Omphalitis			29 *(0.74)*	**29** ***(0.74)***
Systemic pathology	7 *(0.18)*	18 *(0.46)*	2 *(0.05)*	**27** ***(0.68)***
Cardiovascular disease	3 *(0.08)*	18 *(0.46)*	1 *(0.03)*	**22** ***(0.56)***
Bone pathology	5 *(0.13)*	10 *(0.25)*		**15** ***(0.38)***
Otitis	4 *(0.10)*	6 *(0.15)*		**10** ***(0.25)***
Oral pathology	4 *(0.10)*	1 *(0.03)*		**5** ***(0.13)***
Nervous system pathology	1 *(0.03)*			**1** ***(0.03)***
Total N ***(%)***	**2,124** ***(53.88)***	**1,687** ***(42.8)***	**131** ***(3.32)***	**3,942** ***(100.00)***

Figure 2 - Horses 2019 – 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 2019 – Number of antibiograms by bacterial group and pathology

Bacteria N *(%)*	Pathology N (%) Reproductive pathology	Respiratory pathology	Skin and soft tissue infections	Unspecified	Ocular pathology	Arthritis	Digestive pathology	Kidney and urinary tract pathology	Mastitis	Omphalitis	Systemic pathology	Cardiovascular disease	Bone pathology	Otitis	Oral pathology	Nervous system pathology	**Total N *(%)***
Streptococcus	659 *(16.72)*	204 *(5.18)*	117 *(2.97)*	135 *(3.42)*	27 *(0.68)*	26 *(0.66)*	5 *(0.13)*	8 *(0.20)*	13 *(0.33)*	7 *(0.18)*	7 *(0.18)*	1 *(0.03)*	4 *(0.1)*	1 *(0.03)*	1 *(0.03)*		**1,215 *(30.82)***
E. coli	504 *(12.79)*	42 *(1.07)*	43 *(1.09)*	40 *(1.01)*	4 *(0.10)*	8 *(0.20)*	35 *(0.89)*	7 *(0.18)*	3 *(0.08)*	7 *(0.18)*	3 *(0.08)*	1 *(0.03)*	2 *(0.05)*				**699 *(17.73)***
Coagulase-positive Staphylococcus	47 *(1.19)*	32 *(0.81)*	138 *(3.50)*	74 *(1.88)*	8 *(0.20)*	14 *(0.36)*	1 *(0.03)*		3 *(0.08)*	6 *(0.15)*	4 *(0.1)*	2 *(0.05)*	1 *(0.03)*	2 *(0.05)*		1 *(0.03)*	**333 *(8.45)***
Pseudomonas	83 *(2.11)*	115 *(2.92)*	19 *(0.48)*	17 *(0.43)*	11 *(0.28)*	3 *(0.08)*	2 *(0.05)*	2 *(0.05)*	2 *(0.05)*		1 *(0.03)*			1 *(0.03)*			**256 *(6.49)***
Coagulase-negative Staphylococcus	58 *(1.47)*	22 *(0.56)*	48 *(1.22)*	40 *(1.01)*	26 *(0.66)*	5 *(0.13)*	4 *(0.1)*	6 *(0.15)*	3 *(0.08)*	2 *(0.05)*	1 *(0.03)*	3 *(0.08)*		3 *(0.08)*			**221 *(5.61)***
Klebsiella	96 *(2.44)*	17 *(0.43)*	9 *(0.23)*	15 *(0.38)*	2 *(0.05)*	2 *(0.05)*	1 *(0.03)*		4 *(0.1)*								**146 *(3.7)***
Enterobacter	62 *(1.57)*	11 *(0.28)*	17 *(0.43)*	22 *(0.56)*	1 *(0.03)*	1 *(0.03)*	2 *(0.05)*	4 *(0.10)*		2 *(0.05)*	2 *(0.05)*	1 *(0.03)*	2 *(0.05)*	1 *(0.03)*			**128 *(3.25)***
Acinetobacter	52 *(1.32)*	25 *(0.63)*	13 *(0.33)*	9 *(0.23)*	15 *(0.38)*	1 *(0.03)*	1 *(0.03)*	2 *(0.05)*				2 *(0.05)*			1 *(0.03)*		**121 *(3.07)***
Corynebacterium	23 *(0.58)*	44 *(1.12)*	16 *(0.41)*	6 *(0.15)*	4 *(0.10)*	2 *(0.05)*	8 *(0.2)*	1 *(0.03)*			2 *(0.05)*	1 *(0.03)*	1 *(0.03)*		1 *(0.03)*		**109 *(2.77)***
Enterococcus	36 *(0.91)*	4 *(0.10)*	29 *(0.74)*	19 *(0.48)*	4 *(0.10)*	5 *(0.13)*	1 *(0.03)*	3 *(0.08)*	1 *(0.03)*	1 *(0.03)*	1 *(0.03)*	1 *(0.03)*		1 *(0.03)*			**106 *(2.69)***
Pantoea	26 *(0.66)*	37 *(0.94)*	7 *(0.18)*	5 *(0.13)*	5 *(0.13)*	1 *(0.03)*			1 *(0.03)*		1 *(0.03)*	2 *(0.05)*	1 *(0.03)*		1 *(0.03)*		**87 *(2.21)***
Actinobacillus	18 *(0.46)*	26 *(0.66)*	5 *(0.13)*	3 *(0.08)*		8 *(0.20)*	1 *(0.03)*					2 *(0.05)*					**63 *(1.6)***
Coagulase-unspecified Staphylococcus	9 *(0.23)*	7 *(0.18)*	10 *(0.25)*	8 *(0.20)*	4 *(0.10)*	4 *(0.10)*	2 *(0.05)*	1 *(0.03)*			2 *(0.05)*	2 *(0.05)*	1 *(0.03)*				**50 *(1.27)***
Bacillus	19 *(0.48)*	16 *(0.41)*	4 *(0.10)*	4 *(0.10)*	4 *(0.10)*	1 *(0.03)*			1 *(0.03)*		1 *(0.03)*						**50 *(1.27)***
Proteus	10 *(0.25)*	4 *(0.10)*	11 *(0.28)*	14 *(0.36)*				2 *(0.05)*		3 *(0.08)*			1 *(0.03)*				**45 *(1.14)***
Pasteurella	9 *(0.23)*	12 *(0.30)*	6 *(0.15)*	5 *(0.13)*	1 *(0.03)*		2 *(0.05)*							1 *(0.03)*			**36 *(0.91)***
Other bacteria < 30 occurrences	65 *(1.65)*	99 *(2.51)*	19 *(0.48)*	20 *(0.51)*	17 *(0.43)*	10 *(0.25)*	18 *(0.46)*	19 *(0.48)*		1 *(0.03)*	2 *(0.05)*	4 *(0.10)*	2 *(0.05)*		1 *(0.03)*		**277 *(7.03)***
Total N *(%)*	**1,776 *(45.05)***	**717 *(18.19)***	**511 *(12.96)***	**436 *(11.06)***	**133 *(3.37)***	**91 *(2.31)***	**83 *(2.11)***	**55 *(1.40)***	**31 *(0.79)***	**29 *(0.74)***	**27 *(0.68)***	**22 *(0.56)***	**15 *(0.38)***	**10 *(0.25)***	**5 *(0.13)***	**1 *(0.03)***	**3,942 *(100.00)***

Table 3 - Horses 2019 – Reproductive pathology – All ages groups included – *E. coli*: susceptibility to antibiotics (proportion) (N= 503)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*503*	**66**
Amoxicillin-Clavulanic ac.	*504*	**78**
Cephalexin	*377*	**87**
Cefoxitin	*372*	**97**
Cefuroxime	*46*	**93**
Cefoperazone	*71*	**100**
Ceftiofur	*504*	**97**
Cefquinome 30 µg	*502*	**97**
Streptomycin 10 UI	*356*	**65**
Spectinomycin	*52*	**62**
Kanamycin 30 UI	*465*	**92**
Gentamicin 10 UI	*504*	**94**
Neomycin	*236*	**95**
Amikacine	*124*	**97**
Apramycin	*65*	**100**
Tetracycline	*378*	**78**
Florfenicol	*341*	**98**
Nalidixic ac.	*338*	**97**
Oxolinic ac.	*126*	**90**
Flumequine	*166*	**96**
Enrofloxacin	*483*	**98**
Marbofloxacin	*481*	**98**
Danofloxacin	*77*	**100**
Trimethoprim-Sulfonamides	*504*	**70**

Table 4 - Horses 2019 – Respiratory pathology – All ages groups included – *E. coli*: susceptibility to antibiotics (proportion) (N= 42)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*42*	**62**
Amoxicillin-Clavulanic ac.	*42*	**74**
Cephalexin	*38*	**71**
Cefoxitin	*42*	**98**
Ceftiofur	*42*	**98**
Cefquinome 30 µg	*38*	**100**
Streptomycin 10 UI	*37*	**41**
Kanamycin 30 UI	*37*	**78**
Gentamicin 10 UI	*42*	**83**
Tetracycline	*40*	**75**
Florfenicol	*40*	**95**
Nalidixic ac.	*39*	**87**
Enrofloxacin	*42*	**93**
Marbofloxacin	*37*	**92**
Trimethoprim-Sulfonamides	*42*	**69**

Table 5 - Horses 2019 – Skin and soft tissue infections – All ages groups included – *E. coli*: susceptibility to antibiotics (proportion) (N= 43)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*43*	**56**
Amoxicillin-Clavulanic ac.	*43*	**65**
Cephalexin	*43*	**77**
Cefoxitin	*42*	**93**
Ceftiofur	*43*	**91**
Cefquinome 30 µg	*40*	**95**
Streptomycin 10 UI	*41*	**27**
Kanamycin 30 UI	*38*	**84**
Gentamicin 10 UI	*43*	**86**
Tetracycline	*42*	**57**
Florfenicol	*40*	**93**
Nalidixic ac.	*37*	**89**
Enrofloxacin	*43*	**91**
Marbofloxacin	*40*	**95**
Trimethoprim-Sulfonamides	*43*	**49**

Table 6 - Horses 2019 – All pathologies and ages groups included – *Klebsiella*: susceptibility to antibiotics (proportion) (N= 146)

Antibiotic	*Total (N)*	**% S**
Amoxicillin-Clavulanic ac.	*146*	**77**
Cefoxitin	*119*	**92**
Ceftiofur	*144*	**90**
Cefquinome 30 µg	*138*	**94**
Streptomycin 10 UI	*110*	**78**
Kanamycin 30 UI	*122*	**88**
Gentamicin 10 UI	*146*	**87**
Neomycin	*55*	**96**
Tetracycline	*119*	**76**
Florfenicol	*110*	**91**
Nalidixic ac.	*106*	**86**
Flumequine	*33*	**85**
Enrofloxacin	*138*	**93**
Marbofloxacin	*132*	**96**
Trimethoprim-Sulfonamides	*145*	**78**

Table 7 - Horses 2019 – All pathologies and ages groups included – *Enterobacter:* susceptibility to antibiotics (proportion) (N= 128)

Antibiotic	*Total (N)*	**% S**
Amoxicillin-Clavulanic ac.	*128*	**13**
Cephalexin	*106*	**10**
Cefoxitin	*112*	**18**
Ceftiofur	*128*	**74**
Cefquinome 30 µg	*125*	**85**
Streptomycin 10 UI	*101*	**58**
Kanamycin 30 UI	*115*	**72**
Gentamicin 10 UI	*128*	**76**
Neomycin	*38*	**84**
Tetracycline	*107*	**64**
Florfenicol	*97*	**85**
Nalidixic ac.	*104*	**70**
Enrofloxacin	*126*	**90**
Marbofloxacin	*115*	**97**
Trimethoprim-Sulfonamides	*125*	**73**

Table 8 - Horses 2019 – Skin and soft tissue infections – All age groups included – *Staphylococcus aureus*: susceptibility to antibiotics (proportion) (N= 101)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*100*	**54**
Cefoxitin	*94*	**72**
Oxacillin	*69*	**74**
Erythromycin	*101*	**91**
Lincomycin	*33*	**100**
Streptomycin 10 UI	*93*	**88**
Kanamycin 30 UI	*93*	**70**
Gentamicin 10 UI	*101*	**71**
Tetracycline	*94*	**66**
Enrofloxacin	*86*	**93**
Marbofloxacin	*92*	**93**
Trimethoprim-Sulfonamides	*100*	**89**
Rifampicin	*72*	**81**

Table 9 - Horses 2019 – Reproductive pathology – All age groups included – *Streptococcus groupe C and Streptococcus zooepidemicus:* susceptibility to antibiotics (proportion) (N= 428)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*409*	**96**
Erythromycin	*428*	**95**
Tulathromycin	*37*	**100**
Tylosin	*89*	**97**
Spiramycin	*219*	**96**
Lincomycin	*148*	**84**
Streptomycin 500 µg	*348*	**99**
Kanamycin 1000 µg	*322*	**99**
Gentamicin 500 µg	*348*	**100**
Tetracycline	*342*	**30**
Florfenicol	*60*	**98**
Enrofloxacin	*425*	**23**
Marbofloxacin	*413*	**66**
Trimethoprim-Sulfonamides	*427*	**67**
Rifampicin	*332*	**80**

Table 10 - Horses 2019 – Respiratory pathology – All age groups included – *Streptococcus:* susceptibility to antibiotics (proportion) (N= 204)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*204*	**85**
Erythromycin	*203*	**93**
Spiramycin	*51*	**96**
Lincomycin	*108*	**72**
Streptomycin 500 µg	*192*	**94**
Kanamycin 1000 µg	*184*	**99**
Gentamicin 500 µg	*193*	**98**
Tetracycline	*190*	**58**
Florfenicol	*82*	**99**
Enrofloxacin	*196*	**36**
Marbofloxacin	*186*	**66**
Trimethoprim-Sulfonamides	*204*	**64**
Rifampicin	*114*	**70**

Table 11 - Horses 2019 – Skin and soft tissue infections – All age groups included – *Streptococcus:* susceptibility to antibiotics (proportion) (N= 117)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*117*	**98**
Erythromycin	*117*	**89**
Lincomycin	*31*	**84**
Streptomycin 500 µg	*114*	**94**
Kanamycin 1000 µg	*114*	**96**
Gentamicin 500 µg	*114*	**100**
Tetracycline	*112*	**52**
Enrofloxacin	*114*	**22**
Marbofloxacin	*110*	**57**
Trimethoprim-Sulfonamides	*117*	**89**
Rifampicin	*99*	**66**

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Annex 10

Dogs

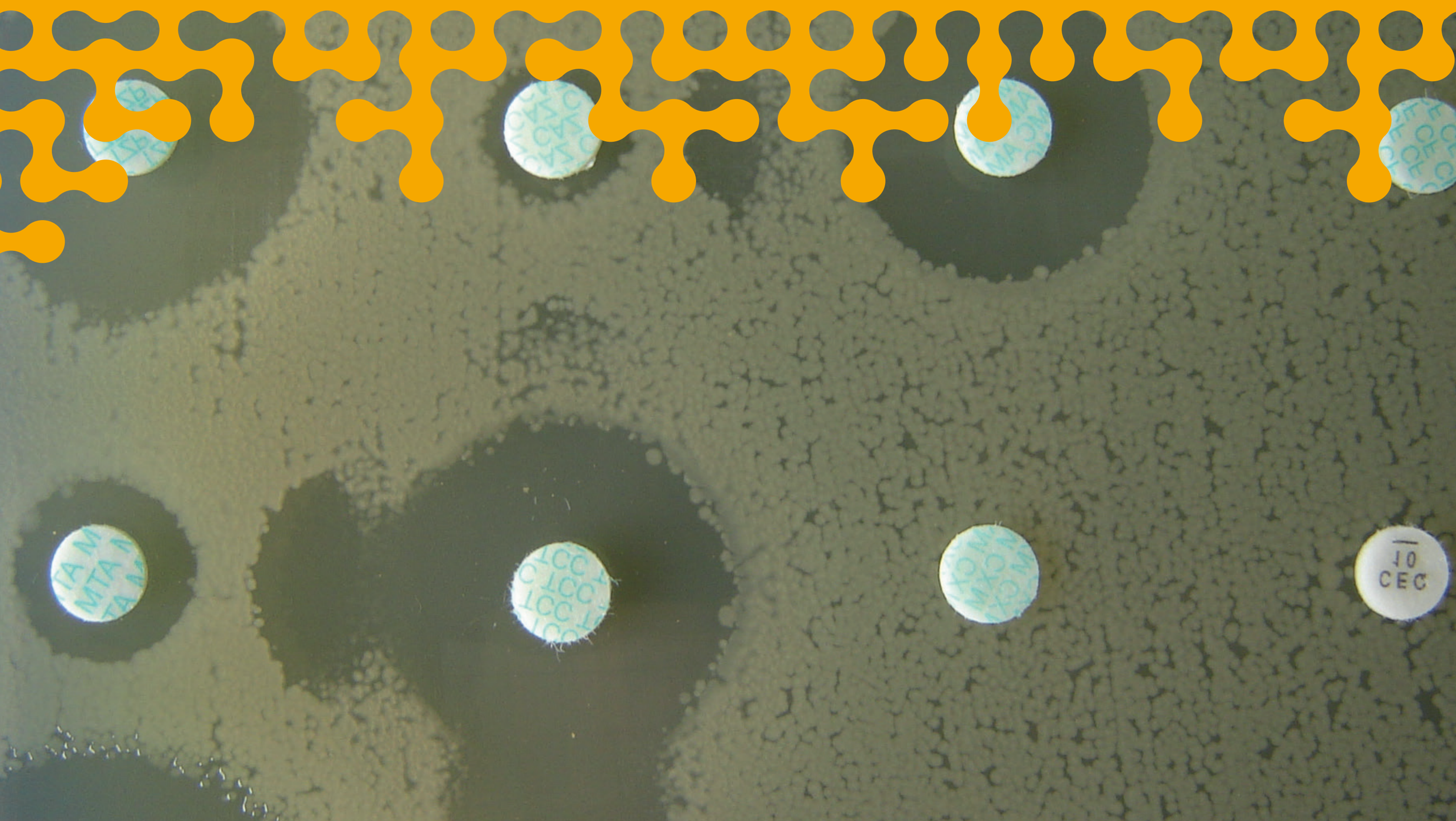
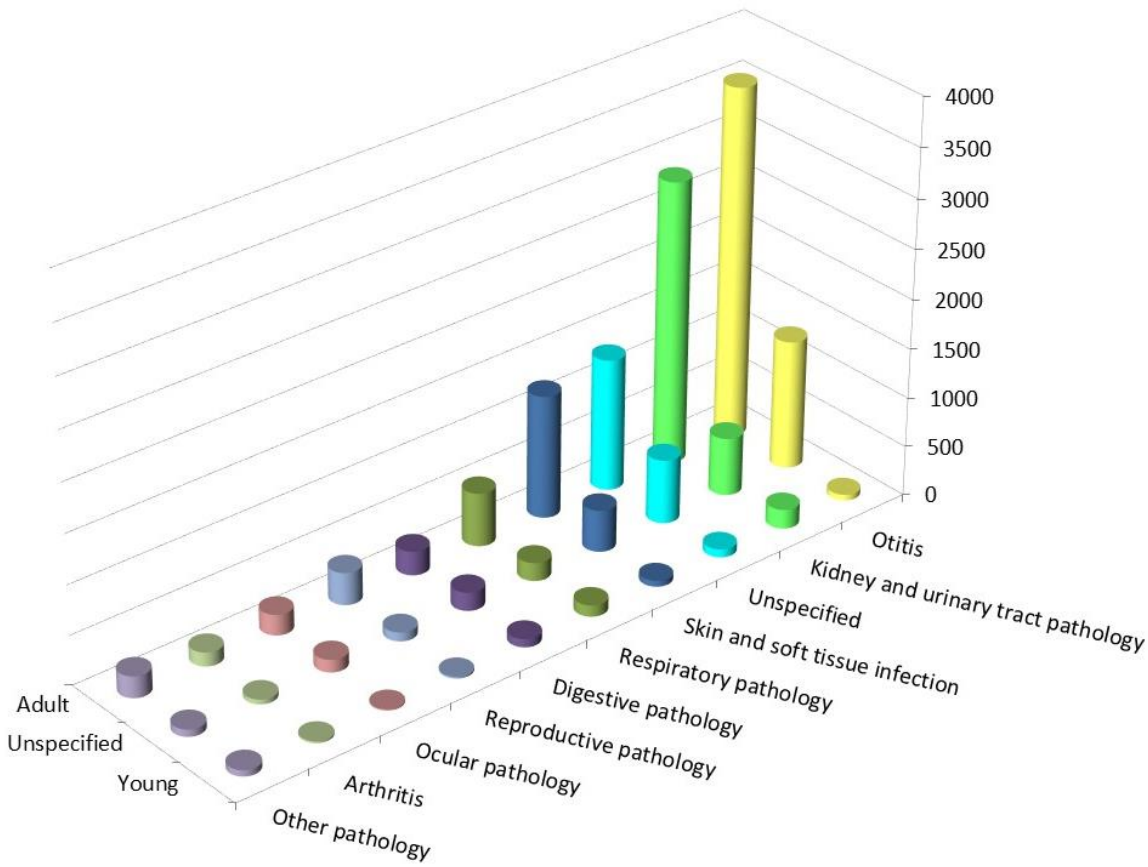


Figure 1 - Dogs 2019 – Number of antibiograms by age group and pathology

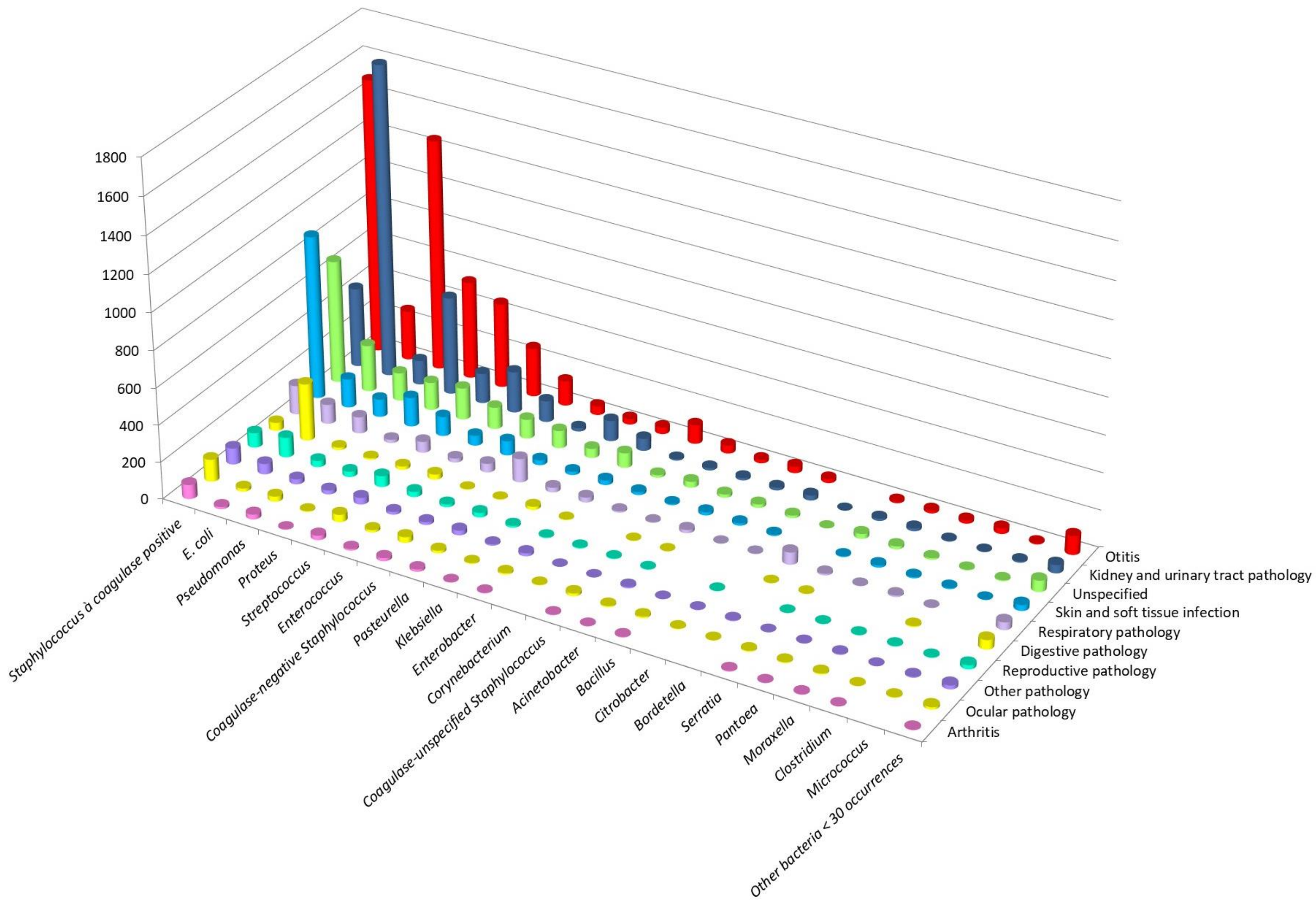


Note: *all values are detailed in table 1 (including other pathologies, representing less than 1%, grouped together)*

Table 1 - Dogs 2019 – Number of antibiograms by age group and pathology

Pathology N %)	Age group N (%)			Total N (%)
	Adult	Unspecified	Young	
Otitis	3,558 *(23.65)*	1,304 *(8.67)*	58 *(0.39)*	**4,920** ***(32.70)***
Kidney and urinary tract pathology	2,868 *(19.06)*	585 *(3.89)*	194 *(1.29)*	**3,647** ***(24.24)***
Unspecified	1,337 *(8.89)*	646 *(4.29)*	80 *(0.53)*	**2,063** ***(13.71)***
Skin and soft tissue infections	1,245 *(8.27)*	422 *(2.80)*	59 *(0.39)*	**1,726** ***(11.47)***
Respiratory pathology	541 *(3.60)*	184 *(1.22)*	114 *(0.76)*	**839** ***(5.58)***
Digestive pathology	242 *(1.61)*	185 *(1.23)*	82 *(0.54)*	**509** ***(3.38)***
Reproductive pathology	327 *(2.17)*	90 *(0.60)*	18 *(0.12)*	**435** ***(2.89)***
Ocular pathology	209 *(1.39)*	128 *(0.85)*	12 *(0.08)*	**349** ***(2.32)***
Arthritis	141 *(0.94)*	47 *(0.31)*	17 *(0.11)*	**205** ***(1.36)***
Bone pathology	91 *(0.60)*	23 *(0.15)*	12 *(0.08)*	**126** ***(0.84)***
Oral pathology	77 *(0.51)*	29 *(0.19)*	10 *(0.07)*	**116** ***(0.77)***
Systemic pathology	14 *(0.09)*	13 *(0.09)*	34 *(0.23)*	**61** ***(0.41)***
Mastitis	26 *(0.17)*			**26** ***(0.17)***
Nervous system pathology	5 *(0.03)*	4 *(0.03)*	2 *(0.01)*	**11** ***(0.07)***
Cardiac pathology	3 *(0.02)*	3 *(0.02)*		**6** ***(0.04)***
Septicemia	1 *(0.01)*		4 *(0.03)*	**5** ***(0.03)***
Muscle pathology	2 *(0.01)*			**2** ***(0.01)***
Total N *(%)*	**10,687 *(71.03)***	**3,663 *(24.35)***	**696 *(4.63)***	**15,046 *(100.00)***

Figure 2 - Dogs 2019 – 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 2019 – Number of antibiograms by bacteria and pathology

Bacteria N (%)	**Pathology N (%)**																	**Total N *(%)***
	Otitis	Kidney and urinary tract pathology	Unspecified	Skin and soft tissue infections	Respiratory pathology	Digestive pathology	Reproductive pathology	Ocular pathology	Arthritis	Bone pathology	Oral pathology	Systemic pathology	Mastitis	Nervous system pathology	Cardiac pathology	Septicemia	Muscle pathology	
Coagulase-positive Staphylococcus	1,491 *(9.91)*	432 *(2.87)*	669 *(4.45)*	889 *(5.91)*	158 *(1.05)*	44 *(0.29)*	79 *(0.53)*	120 *(0.80)*	77 *(0.51)*	41 *(0.27)*	18 *(0.12)*	11 *(0.07)*	14 *(0.09)*	1 *(0.01)*	2 *(0.01)*		1 *(0.01)*	**4,047 *(26.90)***
E. coli	270 *(1.79)*	1,692 *(11.25)*	253 *(1.68)*	156 *(1.04)*	105 *(0.70)*	310 *(2.06)*	107 *(0.71)*	17 *(0.11)*	12 *(0.08)*	12 *(0.08)*	12 *(0.08)*	21 *(0.14)*	6 *(0.04)*	1 *(0.01)*	2 *(0.01)*	2 *(0.01)*	1 *(0.01)*	**2,979 *(19.80)***
Pseudomonas	1,255 *(8.34)*	132 *(0.88)*	152 *(1.01)*	96 *(0.64)*	89 *(0.59)*	14 *(0.09)*	34 *(0.23)*	28 *(0.19)*	26 *(0.17)*	15 *(0.10)*	11 *(0.07)*	1 *(0.01)*						**1,853 *(12.32)***
Proteus	530 *(3.52)*	531 *(3.53)*	151 *(1.00)*	158 *(1.05)*	18 *(0.12)*	9 *(0.06)*	29 *(0.19)*	4 *(0.03)*	3 *(0.02)*	10 *(0.07)*	9 *(0.06)*	2 *(0.01)*						**1,454 *(9.66)***
Streptococcus	461 *(3.06)*	162 *(1.08)*	172 *(1.14)*	105 *(0.70)*	60 *(0.40)*	18 *(0.12)*	59 *(0.39)*	40 *(0.27)*	24 *(0.16)*	7 *(0.05)*	13 *(0.09)*	11 *(0.07)*	2 *(0.01)*			3 *(0.02)*		**1,137 *(7.56)***
Enterococcus	265 *(1.76)*	224 *(1.49)*	118 *(0.78)*	54 *(0.36)*	22 *(0.15)*	28 *(0.19)*	28 *(0.19)*	13 *(0.09)*	9 *(0.06)*	7 *(0.05)*	4 *(0.03)*	1 *(0.01)*	1 *(0.01)*	1 *(0.01)*	1 *(0.01)*			**776 *(5.16)***
Coagulase-negative Staphylococcus	135 *(0.90)*	115 *(0.76)*	104 *(0.69)*	78 *(0.52)*	47 *(0.31)*	3 *(0.02)*	15 *(0.1)*	31 *(0.21)*	16 *(0.11)*	1 *(0.01)*	6 *(0.04)*	1 *(0.01)*	1 *(0.01)*	6 *(0.04)*				**559 *(3.72)***
Pasteurella	47 *(0.31)*	18 *(0.12)*	95 *(0.63)*	26 *(0.17)*	128 *(0.85)*	3 *(0.02)*	24 *(0.16)*	14 *(0.09)*	13 *(0.09)*	5 *(0.03)*	18 *(0.12)*	1 *(0.01)*			1 *(0.01)*			**393 *(2.61)***
Klebsiella	30 *(0.20)*	112 *(0.74)*	50 *(0.33)*	18 *(0.12)*	25 *(0.17)*	17 *(0.11)*	10 *(0.07)*	5 *(0.03)*	2 *(0.01)*	2 *(0.01)*	1 *(0.01)*	4 *(0.03)*						**276 *(1.83)***
Enterobacter	36 *(0.24)*	66 *(0.44)*	80 *(0.53)*	25 *(0.17)*	26 *(0.17)*	3 *(0.02)*	4 *(0.03)*	8 *(0.05)*	3 *(0.02)*	9 *(0.06)*	5 *(0.03)*	1 *(0.01)*	1 *(0.01)*					**267 *(1.77)***
Corynebacterium	102 *(0.68)*	8 *(0.05)*	14 *(0.09)*	16 *(0.11)*	8 *(0.05)*		5 *(0.03)*	3 *(0.02)*			1 *(0.01)*							**157 *(1.04)***
Coagulase-unspecified Staphylococcus	43 *(0.29)*	13 *(0.09)*	32 *(0.21)*	7 *(0.05)*	4 *(0.03)*	1 *(0.01)*	4 *(0.03)*	15 *(0.10)*	3 *(0.02)*	1 *(0.01)*								**123 *(0.82)***
Acinetobacter	19 *(0.13)*	13 *(0.09)*	18 *(0.12)*	17 *(0.11)*	18 *(0.12)*	1 *(0.01)*	3 *(0.02)*	6 *(0.04)*	1 *(0.01)*	4 *(0.03)*	2 *(0.01)*		1 *(0.01)*					**103 *(0.68)***
Bacillus	36 *(0.24)*	15 *(0.10)*	19 *(0.13)*	13 *(0.09)*	1 *(0.01)*			8 *(0.05)*	4 *(0.03)*			1 *(0.01)*						**97 *(0.64)***
Citrobacter	21 *(0.14)*	27 *(0.18)*	14 *(0.09)*	7 *(0.05)*	3 *(0.02)*		2 *(0.01)*	3 *(0.02)*		1 *(0.01)*		1 *(0.01)*						**79 *(0.53)***

Table 2, part 2 - Dogs 2019 – Number of antibiograms by bacteria and pathology

Bacteria N (%)	Pathology N (%)																	Total N *(%)*
	Otitis	Kidney and urinary tract pathology	Unspecified	Skin and soft tissue infections	Respiratory pathology	Digestive pathology	Reproductive pathology	Ocular pathology	Arthritis	Bone pathology	Oral pathology	Systemic pathology	Mastitis	Nervous system pathology	Cardiac pathology	Septicemia	Muscle pathology	
Bordetella		1 *(0.01)*	1 *(0.01)*		66 *(0.44)*	1 *(0.01)*		1 *(0.01)*			1 *(0.01)*	3 *(0.02)*						**74** ***(0.49)***
Serratia	9 *(0.06)*	12 *(0.08)*	26 *(0.17)*	4 *(0.03)*	9 *(0.06)*	2 *(0.01)*	1 *(0.01)*	5 *(0.03)*	4 *(0.03)*									**72** ***(0.48)***
Pantoea	15 *(0.10)*	15 *(0.1)*	16 *(0.11)*	12 *(0.08)*	2 *(0.01)*		2 *(0.01)*	5 *(0.03)*	1 *(0.01)*	1 *(0.01)*								**69** ***(0.46)***
Moraxella	17 *(0.11)*	5 *(0.03)*	9 *(0.06)*	7 *(0.05)*	8 *(0.05)*		2 *(0.01)*	6 *(0.04)*	3 *(0.02)*	1 *(0.01)*	3 *(0.02)*							**61** ***(0.41)***
Clostridium	30 *(0.20)*	2 *(0.01)*	4 *(0.03)*	6 *(0.04)*	1 *(0.01)*	5 *(0.03)*	3 *(0.02)*	1 *(0.01)*	1 *(0.01)*									**53** ***(0.35)***
Micrococcus	6 *(0.04)*	7 *(0.05)*	5 *(0.03)*	1 *(0.01)*			3 *(0.02)*	3 *(0.02)*		2 *(0.01)*	1 *(0.01)*			2 *(0.01)*				**30** ***(0.20)***
Other bacteria < 30 occurrences	102 *(0.68)*	45 *(0.30)*	61 *(0.41)*	31 *(0.21)*	41 *(0.27)*	50 *(0.33)*	21 *(0.14)*	13 *(0.09)*	3 *(0.02)*	7 *(0.05)*	11 *(0.07)*	2 *(0.01)*						**387** ***(2.57)***
Total N *(%)*	**4,920 *(32.70)***	**3,647 *(24.24)***	**2,063 *(13.71)***	**1,726 *(11.47)***	**839 *(5.58)***	**509 *(3.38)***	**435 *(2.89)***	**349 *(2.32)***	**205 *(1.36)***	**126 *(0.84)***	**116 *(0.77)***	**61 *(0.41)***	**26 *(0.17)***	**11 *(0.07)***	**6 *(0.04)***	**5 *(0.03)***	**2 *(0.01)***	**15,046 *(100.00)***

Table 3 - Dogs 2019 – Kidney and urinary tract pathology – All age groups included – *E. coli:* susceptibility to antibiotics (proportion) (N= 964)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*938*	**65**
Amoxicillin-Clavulanic ac.	*964*	**74**
Cephalexin	*947*	**80**
Cephalothin	*72*	**71**
Cefoxitin	*642*	**90**
Cefuroxime	*113*	**72**
Cefoperazone	*94*	**95**
Cefovecin	*225*	**94**
Ceftiofur	*954*	**97**
Cefquinome 30 µg	*571*	**98**
Streptomycin 10 UI	*679*	**75**
Kanamycin 30 UI	*493*	**95**
Tobramycin	*167*	**97**
Gentamicin 10 UI	*960*	**98**
Neomycin	*298*	**95**
Apramycin	*51*	**100**
Tetracycline	*851*	**79**
Doxycycline	*221*	**48**
Chloramphenicol	*336*	**74**
Florfenicol	*542*	**95**
Nalidixic ac.	*670*	**87**
Oxolinic ac.	*62*	**95**
Flumequine	*224*	**90**
Enrofloxacin	*849*	**96**
Marbofloxacin	*794*	**95**
Danofloxacin	*78*	**95**
Sulfonamides	*39*	**90**
Trimethoprim-Sulfonamides	*962*	**88**

Table 4 - Dogs 2019 – Skin and soft tissue infections – All age groups included – *E. coli:* susceptibility to antibiotics (proportion) (N= 95)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*94*	**64**
Amoxicillin-Clavulanic ac.	*95*	**80**
Cephalexin	*92*	**77**
Cefoxitin	*75*	**87**
Cefovecin	*30*	**77**
Ceftiofur	*95*	**96**
Cefquinome 30 µg	*57*	**98**
Streptomycin 10 UI	*74*	**73**
Kanamycin 30 UI	*44*	**93**
Gentamicin 10 UI	*94*	**99**
Neomycin	*42*	**93**
Tetracycline	*88*	**63**
Doxycycline	*30*	**47**
Chloramphenicol	*37*	**46**
Florfenicol	*54*	**94**
Nalidixic ac.	*84*	**86**
Enrofloxacin	*87*	**94**
Marbofloxacin	*62*	**94**
Trimethoprim-Sulfonamides	*95*	**81**

Table 5 - Dogs 2019 – Otitis – All age groups included – *E. coli*: susceptibility to antibiotics (proportion) (N= 191)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*188*	**70**
Amoxicillin-Clavulanic ac.	*188*	**79**
Cephalexin	*183*	**78**
Cefoxitin	*164*	**90**
Cefovecin	*54*	**94**
Ceftiofur	*185*	**94**
Cefquinome 30 µg	*135*	**98**
Streptomycin 10 UI	*131*	**82**
Kanamycin 30 UI	*85*	**95**
Gentamicin 10 UI	*189*	**94**
Neomycin	*92*	**87**
Tetracycline	*178*	**74**
Doxycycline	*50*	**52**
Chloramphenicol	*52*	**60**
Florfenicol	*127*	**94**
Nalidixic ac.	*175*	**82**
Enrofloxacin	*184*	**93**
Marbofloxacin	*140*	**96**
Trimethoprim-Sulfonamides	*184*	**88**

Table 6 - Dogs 2019 – All pathologies and age groups included – *Pasteurella*: susceptibility to antibiotics (proportion) (N= 369)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*355*	**98**
Amoxicillin-Clavulanic ac.	*359*	**99**
Cephalexin	*357*	**97**
Cefoxitin	*46*	**89**
Cefovecin	*36*	**94**
Ceftiofur	*352*	**99**
Cefquinome 30 µg	*179*	**96**
Streptomycin 10 UI	*199*	**79**
Kanamycin 30 UI	*122*	**95**
Tobramycin	*132*	**99**
Gentamicin 10 UI	*364*	**98**
Neomycin	*99*	**86**
Tetracycline	*340*	**98**
Doxycycline	*64*	**91**
Chloramphenicol	*158*	**97**
Florfenicol	*196*	**99**
Nalidixic ac.	*305*	**93**
Flumequine	*45*	**76**
Enrofloxacin	*360*	**97**
Marbofloxacin	*308*	**99**
Ciprofloxacin	*31*	**100**
Trimethoprim-Sulfonamides	*363*	**90**

Table 7 - Dogs 2019 – Otitis – All age groups included – *Staphylococcus pseudintermedius:* susceptibility to antibiotics (proportion) (N= 888)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*880*	**23**
Cefoxitin	*450*	**94**
Oxacillin	*591*	**94**
Cefovecin	*395*	**90**
Erythromycin	*885*	**72**
Tylosin	*155*	**79**
Spiramycin	*514*	**75**
Lincomycin	*887*	**74**
Streptomycin 10 UI	*658*	**73**
Kanamycin 30 UI	*477*	**72**
Gentamicin 10 UI	*887*	**90**
Neomycin	*432*	**83**
Tetracycline	*854*	**62**
Doxycycline	*70*	**63**
Chloramphenicol	*264*	**62**
Florfenicol	*633*	**100**
Enrofloxacin	*560*	**93**
Marbofloxacin	*785*	**92**
Pradofloxacin	*32*	**94**
Sulfonamides	*73*	**58**
Trimethoprim-Sulfonamides	*875*	**89**
Fusidic ac.	*542*	**95**
Rifampicin	*175*	**93**

Table 8 - Dogs 2019 – Skin and soft tissue infections – All age groups included – *Staphylococcus pseudintermedius:* susceptibility to antibiotics (proportion) (N= 482)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*478*	**15**
Cefoxitin	*296*	**93**
Oxacillin	*244*	**92**
Cefovecin	*308*	**87**
Erythromycin	*481*	**67**
Tylosin	*117*	**69**
Spiramycin	*283*	**64**
Lincomycin	*482*	**70**
Streptomycin 10 UI	*368*	**67**
Kanamycin 30 UI	*224*	**72**
Gentamicin 10 UI	*482*	**89**
Neomycin	*251*	**73**
Tetracycline	*446*	**65**
Doxycycline	*34*	**56**
Chloramphenicol	*171*	**61**
Florfenicol	*213*	**100**
Enrofloxacin	*352*	**89**
Marbofloxacin	*384*	**91**
Sulfonamides	*85*	**60**
Trimethoprim-Sulfonamides	*477*	**86**
Fusidic ac.	*285*	**94**

Table 9 - Dogs 2019 – Kidney and urinary tract pathology – All age groups included – *Staphylococcus pseudintermedius:* susceptibility to antibiotics (proportion) (N= 210)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*209*	**18**
Cefoxitin	*115*	**96**
Oxacillin	*137*	**94**
Cefovecin	*101*	**93**
Erythromycin	*205*	**70**
Spiramycin	*77*	**73**
Lincomycin	*207*	**74**
Streptomycin 10 UI	*159*	**74**
Kanamycin 30 UI	*143*	**70**
Gentamicin 10 UI	*209*	**91**
Neomycin	*57*	**81**
Tetracycline	*191*	**61**
Chloramphenicol	*47*	**70**
Florfenicol	*129*	**100**
Enrofloxacin	*98*	**91**
Marbofloxacin	*198*	**92**
Trimethoprim-Sulfonamides	*210*	**89**
Fusidic ac.	*136*	**96**

Table 10 - Dogs 2019 – All pathologies and age groups included – All age groups included – *Staphylococcus aureus:* susceptibility to antibiotics (proportion) (N= 322)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*316*	**22**
Cefoxitin	*294*	**82**
Oxacillin	*78*	**95**
Cefovecin	*156*	**86**
Erythromycin	*318*	**73**
Spiramycin	*203*	**78**
Lincomycin	*317*	**80**
Streptomycin 10 UI	*249*	**79**
Kanamycin 30 UI	*150*	**83**
Gentamicin 10 UI	*319*	**90**
Neomycin	*151*	**79**
Tetracycline	*305*	**76**
Chloramphenicol	*109*	**68**
Florfenicol	*127*	**99**
Enrofloxacin	*238*	**89**
Marbofloxacin	*235*	**93**
Sulfonamides	*65*	**49**
Trimethoprim-Sulfonamides	*318*	**88**
Fusidic ac.	*186*	**90**

Table 11 - Dogs 2019 – Otitis – All age groups included – *Staphylococcus aureus:* susceptibility to antibiotics (proportion) (N= 78)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*75*	**21**
Cefoxitin	*66*	**91**
Cefovecin	*45*	**89**
Erythromycin	*77*	**73**
Spiramycin	*62*	**73**
Lincomycin	*78*	**74**
Streptomycin 10 UI	*60*	**73**
Gentamicin 10 UI	*76*	**89**
Neomycin	*44*	**80**
Tetracycline	*77*	**64**
Enrofloxacin	*68*	**94**
Marbofloxacin	*53*	**100**
Trimethoprim-Sulfonamides	*77*	**92**
Fusidic ac.	*39*	**92**

Table 12 - Dogs 2019 – Skin and soft tissue infections – All age groups included – *Staphylococcus aureus:* susceptibility to antibiotics (proportion) (N= 58)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*57*	**26**
Cefoxitin	*50*	**84**
Cefovecin	*32*	**78**
Erythromycin	*58*	**69**
Spiramycin	*42*	**76**
Lincomycin	*56*	**73**
Streptomycin 10 UI	*42*	**79**
Gentamicin 10 UI	*58*	**81**
Neomycin	*33*	**73**
Tetracycline	*55*	**67**
Enrofloxacin	*54*	**87**
Marbofloxacin	*33*	**85**
Trimethoprim-Sulfonamides	*58*	**78**
Fusidic ac.	*34*	**91**

Table 13 - Dogs 2019 – Kidney and urinary tract pathology – All age groups included – *Staphylococcus aureus:* susceptibility to antibiotics (proportion) (N=37)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*37*	**16**
Cefoxitin	*37*	**89**
Erythromycin	*36*	**67**
Lincomycin	*36*	**83**
Gentamicin 10 UI	*37*	**95**
Tetracycline	*34*	**74**
Trimethoprim-Sulfonamides	*37*	**81**

Table 14 - Dogs 2019 – Otitis – All age groups included – *Streptococcus*: susceptibility to antibiotics (proportion) (N= 461)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*427*	**85**
Cefovecin	*75*	**87**
Erythromycin	*456*	**84**
Tylosin	*76*	**88**
Spiramycin	*223*	**85**
Lincomycin	*459*	**82**
Streptomycin 500 µg	*401*	**82**
Kanamycin 1000 µg	*367*	**98**
Gentamicin 500 µg	*450*	**98**
Tetracycline	*428*	**30**
Doxycycline	*44*	**77**
Chloramphenicol	*65*	**32**
Florfenicol	*302*	**97**
Enrofloxacin	*442*	**56**
Marbofloxacin	*422*	**86**
Trimethoprim-Sulfonamides	*455*	**75**
Rifampicin	*46*	**59**

Table 15 - Dogs 2019 – Skin and soft tissue infections – All age groups included – *Streptococcus*: susceptibility to antibiotics (proportion) (N= 105)

Antibiotic	*Total (N)*	**% S**
Oxacillin	*98*	**87**
Erythromycin	*104*	**83**
Spiramycin	*61*	**84**
Lincomycin	*105*	**78**
Streptomycin 500 µg	*90*	**87**
Kanamycin 1000 µg	*81*	**100**
Gentamicin 500 µg	*101*	**99**
Tetracycline	*95*	**37**
Chloramphenicol	*32*	**38**
Florfenicol	*45*	**100**
Enrofloxacin	*99*	**53**
Marbofloxacin	*100*	**83**
Trimethoprim-Sulfonamides	*105*	**79**

Table 16 - Dogs 2019 – All pathologies and age groups included – *Proteus mirabilis*: susceptibility to antibiotics (proportion) (N= 749)

Antibiotic	*Total (N)*	**% S**
Amoxicillin-Clavulanic ac.	*742*	**92**
Cephalexin	*723*	**84**
Cephalothin	*67*	**90**
Cefoxitin	*522*	**91**
Cefuroxime	*106*	**93**
Cefovecin	*107*	**100**
Ceftiofur	*740*	**99**
Cefquinome 30 µg	*512*	**99**
Streptomycin 10 UI	*506*	**73**
Kanamycin 30 UI	*364*	**87**
Tobramycin	*141*	**96**
Gentamicin 10 UI	*748*	**94**
Neomycin	*222*	**86**
Apramycin	*40*	**98**
Chloramphenicol	*226*	**46**
Florfenicol	*480*	**99**
Nalidixic ac.	*579*	**79**
Oxolinic ac.	*49*	**80**
Flumequine	*144*	**83**
Enrofloxacin	*690*	**91**
Marbofloxacin	*628*	**95**
Danofloxacin	*76*	**87**
Trimethoprim-Sulfonamides	*747*	**81**

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Annex 11
Cats

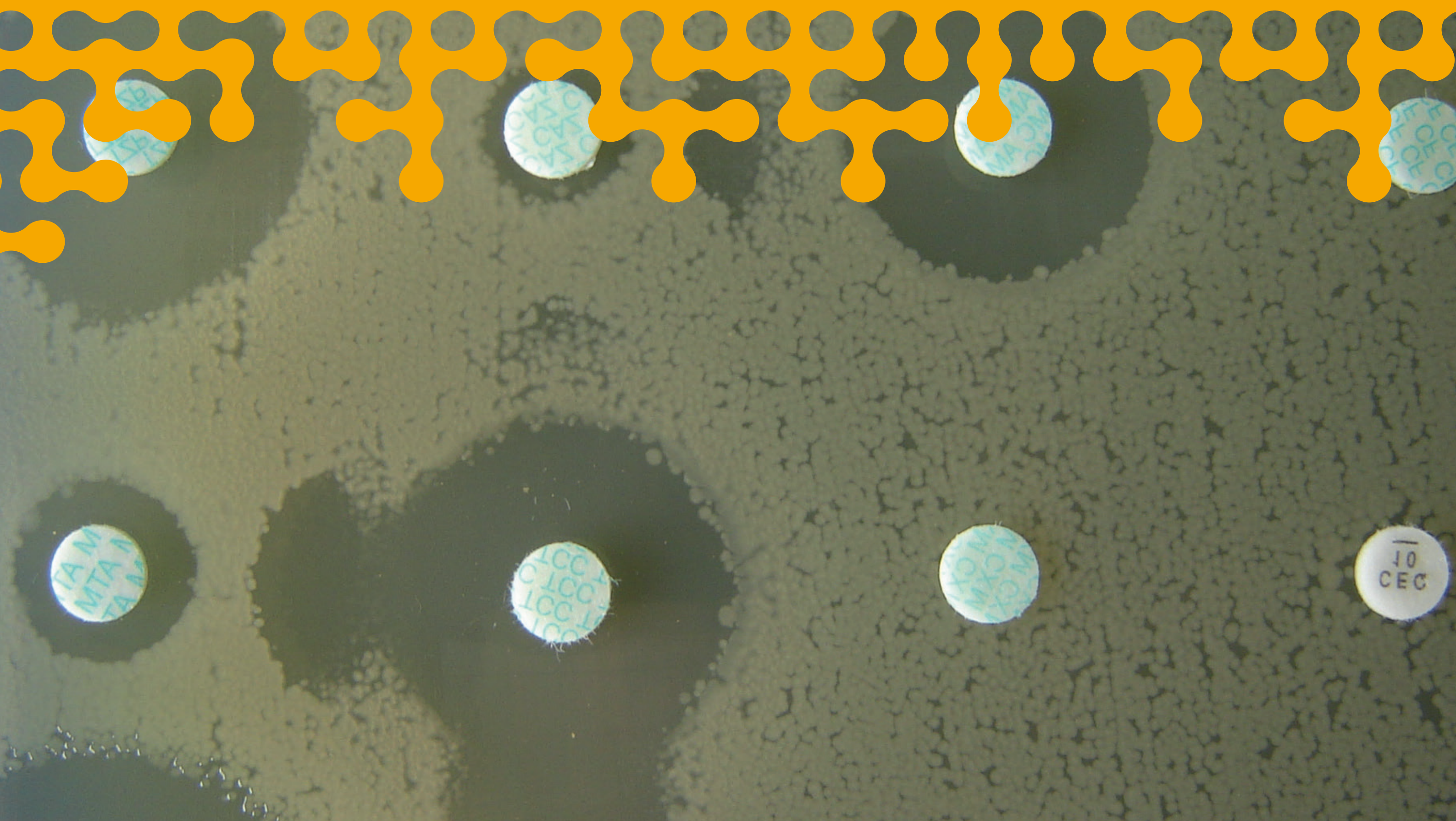
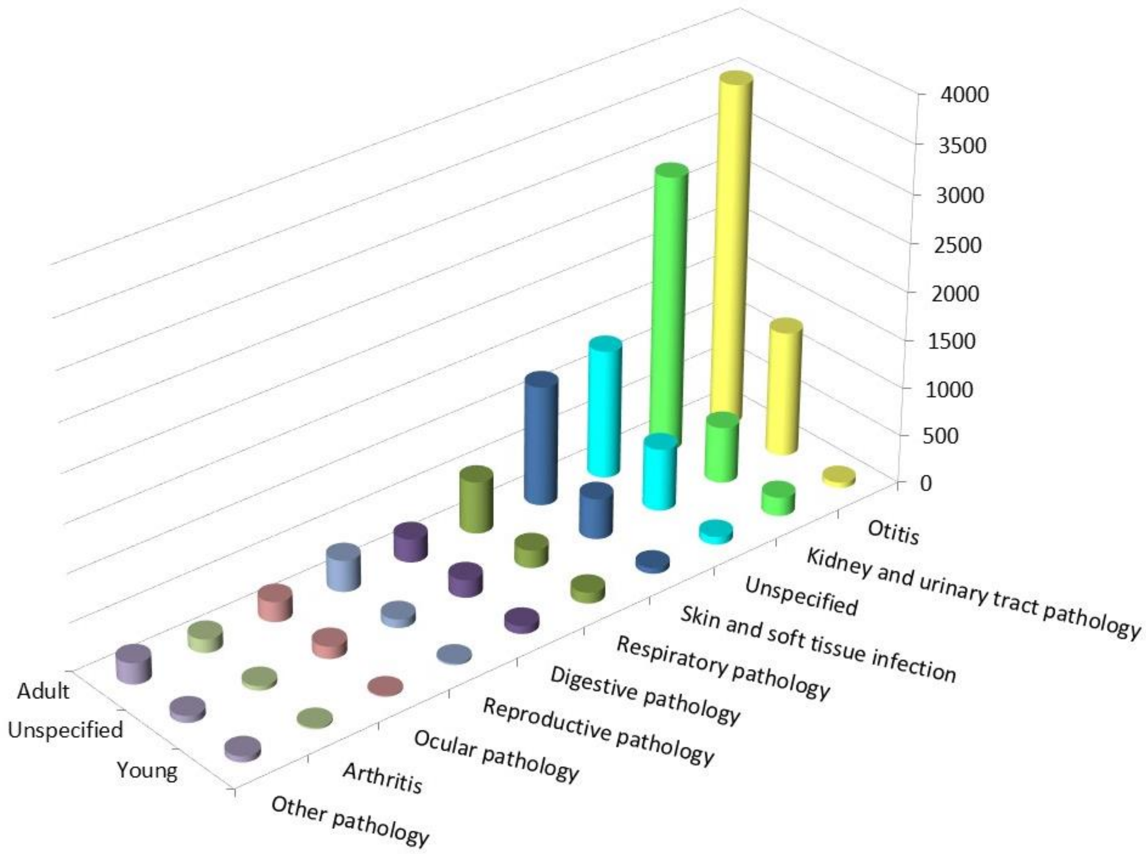


Figure 1 - Cats 2019 – Number of antibiograms by age group and pathology

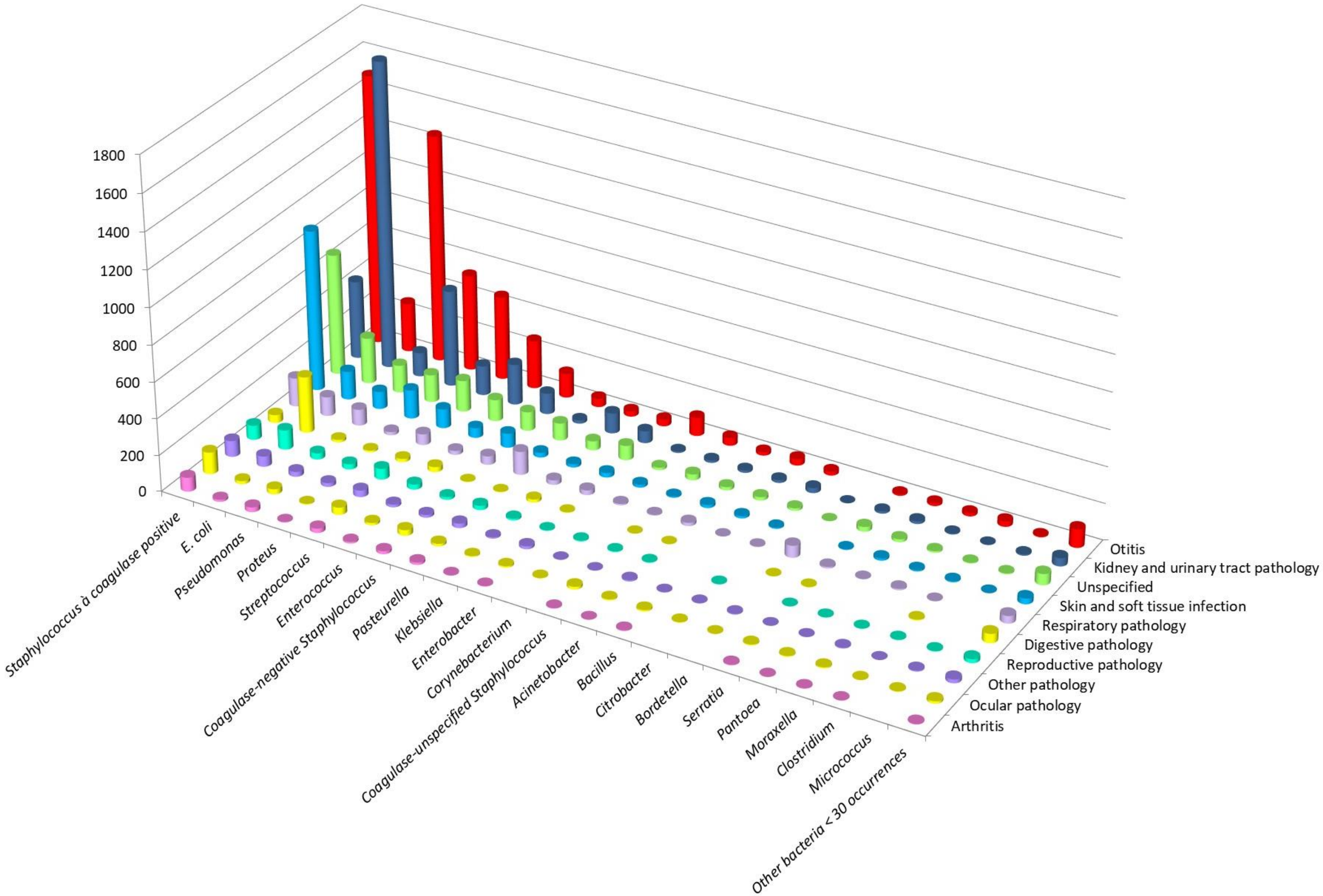


***Note:** all values are detailed in table 1 (including other pathologies, representing less than 1%, grouped together).*

Table 1 - Cats 2019 – Number of antibiograms by age group and pathology

Pathology N (%)	Age group N (%)			Total N (%)
	Adult	Unspecified	Young	
Kidney and urinary tract pathology	1,788 *(33.67)*	377 *(7.10)*	39 *(0.73)*	**2,204** ***(41.51)***
Respiratory pathology	526 *(9.91)*	138 *(2.60)*	79 *(1.49)*	**743** ***(13.99)***
Unspecified	491 *(9.25)*	188 *(3.54)*	44 *(0.83)*	**723** ***(13.62)***
Otitis	415 *(7.82)*	173 *(3.26)*	53 *(1.00)*	**641** ***(12.07)***
Skin and soft tissue infections	260 *(4.90)*	89 *(1.68)*	9 *(0.17)*	**358** ***(6.74)***
Digestive pathology	161 *(3.03)*	101 *(1.90)*	49 *(0.92)*	**311** ***(5.86)***
Ocular pathology	71 *(1.34)*	21 *(0.40)*	17 *(0.32)*	**109** ***(2.05)***
Oral pathology	39 *(0.73)*	51 *(0.96)*	3 *(0.06)*	**93** ***(1.75)***
Reproductive pathology	28 *(0.53)*	18 *(0.34)*	4 *(0.08)*	**50** ***(0.94)***
Bone pathology	16 *(0.30)*	16 *(0.30)*	6 *(0.11)*	**38** ***(0.72)***
Arthritis	19 *(0.36)*	5 *(0.09)*	1 *(0.02)*	**25** ***(0.47)***
Systemic pathology	4 *(0.08)*	2 *(0.04)*	4 *(0.08)*	**10** ***(0.19)***
Nervous system pathology	2 *(0.04)*			**2** ***(0.04)***
Muscle pathology	2 *(0.04)*			**2** ***(0.04)***
Mastitis	1 *(0.02)*			**1** ***(0.02)***
Total N ***(%)***	**3,823** ***(72.00)***	**1 179** ***(22.20)***	**308** ***(5.80)***	**5,310** ***(100.00)***

Figure 2 - Cats 2019 – 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 2019 – Number of antibiograms by bacteria and pathology

Bacteria N (%)	Pathology N (%)															Total N *(%)*
	Kidney and urinary tract pathology	Respiratory pathology	Unspecified	Otitis	Skin and soft tissue i nfections	Digestive pathology	Ocular pathology	Oral pathology	Reproductive pathology	Bone pathology	Arthritis	Systemic pathology	Nervous system pathology	Muscle pathology	Mastitis	
E. coli	1,120 *(21.09)*	55 *(1.04)*	89 *(1.68)*	27 *(0.51)*	23 *(0.43)*	215 *(4.05)*	2 *(0.04)*	9 *(0.17)*	26 *(0.49)*	4 *(0.08)*	1 *(0.02)*	6 *(0.11)*				**1,577** ***(29.70)***
Coagulase-negative Staphylococcus	202 *(3.80)*	90 *(1.69)*	83 *(1.56)*	179 *(3.37)*	73 *(1.37)*	14 *(0.26)*	36 *(0.68)*	27 *(0.51)*	2 *(0.04)*	2 *(0.04)*	2 *(0.04)*					**710** ***(13.37)***
Pasteurella	20 *(0.38)*	237 *(4.46)*	166 *(3.13)*	107 *(2.02)*	36 *(0.68)*	5 *(0.09)*	11 *(0.21)*	19 *(0.36)*	4 *(0.08)*	9 *(0.17)*	11 *(0.21)*	3 *(0.06)*				**628** ***(11.83)***
Coagulase-positive Staphylococcus	133 *(2.50)*	64 *(1.21)*	107 *(2.02)*	137 *(2.58)*	112 *(2.11)*	9 *(0.17)*	22 *(0.41)*	6 *(0.11)*	3 *(0.06)*	1 *(0.02)*	3 *(0.06)*		1 *(0.02)*		1 *(0.02)*	**599** ***(11.28)***
Enterococcus	291 *(5.48)*	22 *(0.41)*	49 *(0.92)*	26 *(0.49)*	33 *(0.62)*	13 *(0.24)*	1 *(0.02)*	4 *(0.08)*	3 *(0.06)*	3 *(0.06)*	3 *(0.06)*					**448** ***(8.44)***
Pseudomonas	77 *(1.45)*	97 *(1.83)*	26 *(0.49)*	35 *(0.66)*	19 *(0.36)*	4 *(0.08)*	5 *(0.09)*	2 *(0.04)*	1 *(0.02)*		1 *(0.02)*					**267** ***(5.03)***
Streptococcus	49 *(0.92)*	36 *(0.68)*	36 *(0.68)*	32 *(0.6)*	11 *(0.21)*	4 *(0.08)*	4 *(0.08)*	13 *(0.24)*	7 *(0.13)*	2 *(0.04)*		1 *(0.02)*				**195** ***(3.67)***
Proteus	78 *(1.47)*	4 *(0.08)*	11 *(0.21)*	8 *(0.15)*	5 *(0.09)*	8 *(0.15)*	1 *(0.02)*	2 *(0.04)*	1 *(0.02)*	2 *(0.04)*				1 *(0.02)*		**121** ***(2.28)***
Enterobacter	43 *(0.81)*	16 *(0.30)*	25 *(0.47)*	8 *(0.15)*	8 *(0.15)*	2 *(0.04)*		3 *(0.06)*	1 *(0.02)*	6 *(0.11)*	2 *(0.04)*					**114** ***(2.15)***
Klebsiella	65 *(1.22)*	3 *(0.06)*	27 *(0.51)*	2 *(0.04)*	1 *(0.02)*	6 *(0.11)*	1 *(0.02)*	1 *(0.02)*	1 *(0.02)*	2 *(0.04)*	1 *(0.02)*					**110** ***(2.07)***
Coagulase-unspecified Staphylococcus	34 *(0.64)*	9 *(0.17)*	14 *(0.26)*	21 *(0.4)*	6 *(0.11)*	3 *(0.06)*	6 *(0.11)*									**93** ***(1.75)***
Acinetobacter	27 *(0.51)*	13 *(0.24)*	15 *(0.28)*	5 *(0.09)*	3 *(0.06)*	1 *(0.02)*	6 *(0.11)*			1 *(0.02)*						**71** ***(1.34)***
Corynebacterium	6 *(0.11)*	6 *(0.11)*	6 *(0.11)*	23 *(0.43)*	4 *(0.08)*		4 *(0.08)*		1 *(0.02)*							**50** ***(0.94)***
Bacillus	12 *(0.23)*	9 *(0.17)*	7 *(0.13)*	7 *(0.13)*	8 *(0.15)*		2 *(0.04)*			4 *(0.08)*						**49** ***(0.92)***
Other bacteria < 30 occurrences	47 *(0.89)*	82 *(1.54)*	62 *(1.17)*	24 *(0.45)*	16 *(0.30)*	27 *(0.51)*	8 *(0.15)*	7 *(0.13)*		2 *(0.04)*	1 *(0.02)*		1 *(0.02)*	1 *(0.02)*		**278** ***(5.24)***
Total N ***(%)***	**2,204** ***(41.51)***	**743** ***(13.99)***	**723** ***(13.62)***	**641** ***(12.07)***	**358** ***(6.74)***	**311** ***(5.86)***	**109** ***(2.05)***	**93** ***(1.75)***	**50** ***(0.94)***	**38** ***(0.72)***	**25** ***(0.47)***	**10** ***(0.19)***	**2** ***(0.04)***	**2** ***(0.04)***	**1** ***(0.02)***	**5,310** ***(100.00)***

Table 3 - Cats 2019 – All pathologies and age groups included – *E. coli:* susceptibility to antibiotics (proportion) (N= 938)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*924*	**65**
Amoxicillin-Clavulanic ac.	*936*	**78**
Cephalexin	*920*	**85**
Cephalothin	*38*	**95**
Cefoxitin	*712*	**93**
Cefuroxime	*137*	**91**
Cefoperazone	*83*	**99**
Cefovecin	*206*	**90**
Ceftiofur	*912*	**96**
Cefquinome 30 µg	*641*	**98**
Streptomycin 10 UI	*658*	**71**
Spectinomycin	*40*	**98**
Kanamycin 30 UI	*467*	**96**
Tobramycin	*117*	**97**
Gentamicin 10 UI	*937*	**97**
Neomycin	*327*	**93**
Apramycin	*67*	**100**
Tetracycline	*854*	**77**
Doxycycline	*192*	**60**
Chloramphenicol	*219*	**79**
Florfenicol	*580*	**92**
Nalidixic ac.	*698*	**89**
Oxolinic ac.	*35*	**94**
Flumequine	*187*	**87**
Enrofloxacin	*826*	**96**
Marbofloxacin	*731*	**96**
Danofloxacin	*69*	**99**
Sulfonamides	*37*	**76**
Trimethoprim-Sulfonamides	*934*	**91**

Table 4 - Cats 2019 – Kidney and urinary tract pathology – All age groups included – *E. coli:* susceptibility to antibiotics (proportion) (N= 599)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*591*	**68**
Amoxicillin-Clavulanic ac.	*597*	**80**
Cephalexin	*590*	**84**
Cefoxitin	*418*	**93**
Cefuroxime	*43*	**88**
Cefoperazone	*37*	**97**
Cefovecin	*128*	**90**
Ceftiofur	*592*	**96**
Cefquinome 30 µg	*375*	**99**
Streptomycin 10 UI	*433*	**73**
Kanamycin 30 UI	*325*	**97**
Tobramycin	*103*	**97**
Gentamicin 10 UI	*599*	**98**
Neomycin	*161*	**94**
Tetracycline	*538*	**77**
Doxycycline	*125*	**55**
Chloramphenicol	*166*	**81**
Florfenicol	*358*	**94**
Nalidixic ac.	*443*	**89**
Flumequine	*110*	**90**
Enrofloxacin	*532*	**96**
Marbofloxacin	*484*	**96**
Trimethoprim-Sulfonamides	*597*	**91**

Table 5 - Cats 2019 – Respiratory pathology – All age groups included – *Pasteurella:* susceptibility to antibiotics (proportion) (N= 195)

Antibiotic	*Total (N)*	**% S**
Amoxicillin	*193*	**96**
Amoxicillin-Clavulanic ac.	*192*	**96**
Cephalexin	*186*	**97**
Ceftiofur	*182*	**99**
Cefquinome 30 µg	*103*	**95**
Streptomycin 10 UI	*109*	**62**
Kanamycin 30 UI	*73*	**85**
Tobramycin	*63*	**98**
Gentamicin 10 UI	*188*	**96**
Neomycin	*42*	**76**
Tetracycline	*190*	**96**
Chloramphenicol	*79*	**95**
Florfenicol	*113*	**100**
Nalidixic ac.	*169*	**95**
Enrofloxacin	*190*	**98**
Marbofloxacin	*174*	**99**
Trimethoprim-Sulfonamides	*195*	**92**

Table 6 - Cats 2019 – All pathologies and age groups included – Coagulase-positive *Staphylococcus*: susceptibility to antibiotics (proportion) (N= 460)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*455*	**46**
Cefoxitin	*294*	**82**
Oxacillin	*232*	**91**
Cefovecin	*164*	**84**
Erythromycin	*451*	**77**
Tylosin	*57*	**88**
Spiramycin	*200*	**83**
Lincomycin	*453*	**84**
Streptomycin 10 UI	*354*	**86**
Kanamycin 30 UI	*301*	**87**
Gentamicin 10 UI	*458*	**93**
Neomycin	*143*	**87**
Tetracycline	*422*	**84**
Doxycycline	*48*	**90**
Chloramphenicol	*88*	**77**
Florfenicol	*290*	**99**
Enrofloxacin	*236*	**89**
Marbofloxacin	*423*	**91**
Trimethoprim-Sulfonamides	*457*	**91**
Fusidic ac.	*273*	**95**
Rifampicin	*51*	**100**

Tableau 7 - Cats 2019 – Otitis – All pathologies and age groups included – Coagulase-positive *Staphylococcus*: susceptibility to antibiotics (proportion) (N= 116)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*115*	**62**
Cefoxitin	*68*	**91**
Oxacillin	*68*	**96**
Cefovecin	*36*	**97**
Erythromycin	*115*	**85**
Spiramycin	*56*	**93**
Lincomycin	*115*	**90**
Streptomycin 10 UI	*88*	**97**
Kanamycin 30 UI	*74*	**99**
Gentamicin 10 UI	*116*	**100**
Neomycin	*37*	**92**
Tetracycline	*111*	**92**
Florfenicol	*83*	**100**
Enrofloxacin	*53*	**100**
Marbofloxacin	*111*	**98**
Trimethoprim-Sulfonamides	*116*	**97**
Fusidic ac.	*69*	**94**

Tableau 8 - Cats 2019 – Skin and soft tissue infections – All pathologies and age groups included – Coagulase-positive *Staphylococcus*: susceptibility to antibiotics (proportion) (N= 79)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*78*	**45**
Cefoxitin	*55*	**82**
Erythromycin	*78*	**71**
Spiramycin	*38*	**79**
Lincomycin	*79*	**82**
Streptomycin 10 UI	*62*	**82**
Kanamycin 30 UI	*53*	**89**
Gentamicin 10 UI	*78*	**96**
Tetracycline	*74*	**85**
Florfenicol	*46*	**98**
Enrofloxacin	*47*	**98**
Marbofloxacin	*72*	**94**
Trimethoprim-Sulfonamides	*79*	**95**
Fusidic ac.	*43*	**100**

Tableau 9 - Cats 2019 – Kidney and urinary tract pathology – All pathologies and age groups included – Coagulase-positive *Staphylococcus*: susceptibility to antibiotics (proportion) (N= 105)

Antibiotic	*Total (N)*	**% S**
Penicillin G	*102*	**44**
Cefoxitin	*60*	**82**
Oxacillin	*52*	**90**
Cefovecin	*43*	**72**
Erythromycin	*98*	**78**
Spiramycin	*39*	**79**
Lincomycin	*99*	**85**
Streptomycin 10 UI	*73*	**81**
Kanamycin 30 UI	*74*	**81**
Gentamicin 10 UI	*104*	**88**
Tetracycline	*85*	**80**
Florfenicol	*51*	**98**
Enrofloxacin	*60*	**75**
Marbofloxacin	*99*	**83**
Trimethoprim-Sulfonamides	*103*	**84**
Fusidic ac.	*47*	**96**

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