Assessment of antibiotics sensitivity of the most frequent potential pathogen bacteria isolated in the microbiology laboratory of the Faculty of Veterinary Medicine Iași, during 2017-2018

Cristina RÎMBU[1], Cristina HORHOGEA[1], Carmen CREȚU[1], Mariana GRECU[1], Raluca RUSU[1], Andreea COZMA[1], Cătălin CARP-CĂRARE[1]
1 Faculty of Veterinary Medicine, USAMV Ion Ionescu de la Brad Iași
8, Mihail Sadoveanu Alley, 700489
rebegeacristina@yahoo.com

Abstract
In the veterinary practice, establishing the etiological diagnosis represents the quintessence of the anti-infectious therapy. The final diagnosis based on the correctness of the laboratory results and the microbiological examination, together with the hematological, immunological, histopathological, etc., has a major role in getting the right therapeutic protocol. In the current context, characterized by a wide etiological variety of infections, it is necessary to identify and test the sensitivity to antibiotics of pathogens isolated from different biological samples. The present study of the Microbiology Laboratory of the Faculty of Veterinary Medicine Iași presents the results obtained on various strains isolated from dogs and cats with different diseases during 2017-2018. The tests performed on of 83 microbiological samples (otic, pharyngeal, cutaneous and conjunctival secretions, urine, feces, etc.) identified 107 aerobic and anaerobic bacterial strains, classified into 20 bacterial genera. The most commonly isolated aerobic bacterial species were: Staphylococcus pseudointermedius (27.10%), Streptococcus sp.gr.G (8.41), Enterococcus faecalis (4.67%), Streptococcus sp. gr.C (3.73%), Pseudomonas aeruginosa (5.60%), Klebsiella pneumoniae (2.80%). The most commonly isolated anaerobic bacterial species were: Clostridium perfringens (9.35%), Campylobacter sp. (1.87%).The results of the antibiograms revealed a wide variability of sensitivity and resistance of the isolated strains to the antibiotics, most of them being multiple drug resistance.
Key words: *bacteria, antibiograma, drug resistence*

Introduction

In the medical-veterinary practice, establishing the etiological diagnosis represents the quintessence of the anti-infectious therapy. Establishing the existence of pathogenic or saprophytic microorganisms in the pathological products, isolation, identification and testing of antibiotics, are only performed in microbiology laboratories (Solcan Ghe et al., 2005; Carp-Cărare C. et al., 2015)

The Microbiology Laboratory of the Faculty of Veterinary Medicine of Iasi, receives and processes biological samples taken from pets and livestock from Iasi County and neighboring counties. The numerical distribution of these samples differs from one year to another and from one season to another depending on the pathological entities that evolve at one point.

In the current context, the increased resistance of bacteria to antimicrobial substances used in therapy, the mirobiological examination was increasingly requested by the veterinary clinicians (Carp-Cărare C. et al., 2015). The bacteriologist correlates the significance of an isolate with respect to patient anamnetic data and suggests to the current doctors the most suggestive ways of microbiological investigation to ensures optimal final diagnosis. The final diagnosis based on the correctness of the laboratory results and the microbiological examination, together with the hematological, immunological, histopathological, etc., has a major role in getting the right therapeutic protocol (Solcan Ghe et al., 2005, Predoi et al., 2011).

The benefits of targeted therapy have also been observed by animal owners so that in recent years, the number of applications for the microbiological examination and the antibiogram has increased.

In the current context, characterized by a wide etiological variety of infections, it is necessary to identify and test the sensitivity to antibiotics of pathogens isolated from different biological samples. The present study of the Microbiology Laboratory of the Faculty of Veterinary Medicine Iași presents the results obtained on various strains isolated from dogs and cats with different diseases during 2017-2018.

Material and method

During the study, 83 samples represented by otic, pharyngeal, cutaneous, conjunctival exudates, urine samples, feces samples, were microbiologically tested. The animals were part of the case of the Faculty of Veterinary Medicine of Iasi and of the veterinary clinics from Iasi county. Sampling was performed under aseptic conditions and was different, depending on the location of the infection and the properties of the suspected etiological agent (Whitley R. D.,2000., Solcan Ghe et al., 2005; Carp-Cărare C. et al., 2015; Grecu M et al., 2016; Rîmbu C. et al., 2018). The pathological materials were subjected to the microbiological examination in the Microbiology Laboratory of the Faculty of Veterinary Medicine Iasi.

In clinical microbiology, bacterial cultivation aims to isolate the bacterial strains from the pathological samples, followed by identification and testing the sensitivity to various antimicrobial substances (by diffusimetric method), in order to initiate and monitor anti-infectious therapy (Whitley R. D.,2000; Carp-Cărare C. et al., 2015) Isolated strains were tested with different antibiotics used in therapy (1,2,3,) or demanded by the clinicians: amoxicillin-acid clavulanic (AMC-30 µg), amoxicillin(AX-25 µg), enrofloxacin(ENR-10 µg), marbofloxacin(MAR-5 µg), ciprofloxacin (CIP-30 µg), norfloxacin(NOR-30 µg), eritromicin (E-15 µg), kanamicin (K-30 µg), streptomycin(S-30 µg), clindamicin(DA-10 µg), doxiciclin (DOX-30 µg), gentamicin (GN-10 µg), ampicilina(AM-25 µg), oxitetraciclin(OT-25 µg), spectinomicin(SPT-10 µg), lincomicin-spectinomicina (LCS-109 µg), cloramphenicol (C-30 µg), neomycin (NE-30 µg), fosfomicina(FOS-200 µg), trimetoprim sulphametoxazol (STX-30 µg), vancomicin(VA-30 µg), cefalexin (CL-30 µg), cefadroxil (CFR-30 µg), cefoxitin(FOX-30 µg), cephalotin (KF-30 µg), cefaclor (CEC-10 µg),fusidic acid (FD-10 µg), colistin (Co-10 µg).The pathological materials have undergone the stages of work according to the general conduct of the bacteriological diagnosis (Carp-Cărare C. and al, 2015).

Results and discussion

The tests performed on of 83 microbiological samples (otic, pharyngeal, cutaneous and conjunctival secretions, urine, feces, etc.) identified 107 aerobic and anaerobic bacterial strains, classified into 20 bacterial genera (table 1).

Of the bacterial species Gram positive, *Staphylococcus pseudointermedius* (27.10%), *Streptococcus* sp.gr.G (8.41%), *Enterococcus fecium* (4.67%), *Streptococcus* sp. Gr.C (3.73%) were most frequently isolated, and of the Gram-negative bacteria, the species *Pseudomonas aeruginosa* (5.60%), *Klebsiella pneumoniae* (2.80%) and other species of *Klebsiella* (2.80%) were most commonly identified.

Table 1. Biological samples and the results of the microbiological examination

No.	Specia	Gen	Age	Breeds	Samples	Bacterial species
1	canine	F	13	Brac	urine	*Enterococcus faecalis*
2	canine	M	4	Pincher	skin scraping	*Streptococcus sp.gr.F, Staphylococcus saprophiticus*
3	canine	M	1	Labrador	otic secretions	*Staphylococcus pseudointermedius*, *Malassezia*
4	feline	F	12	European Cat	feces	negativ
5	canine	F	2	Sharpei	otic secretions	*Malassezia*
5	canine	M	8	Caniche	otic secretions	*Staphylococcus pseudointermedius, Malassezia sp.*
6	canine	M	6	Metis	vomisment	*Candida* sp.
7	feline	F	3	Siamese Himalyan	laringopharyngeal secretions	*Listeria monocytogenes*, *Streptococcus sp*. gr.C
8	canine	M	7	Metis	conjunctival secretions	*Staphylococcus pseudointermedius*
9	canine	M	0,4	Husky	feces	*Campylobacter sp.*
10	feline	F	10	Russian Blue Cat	feces	*Campylobacter sp.*
11	canine	M	13	German Shepherd	pharyngeal secretions	*Klebsiella sp.*
12	canine	F	12	Beagle	pharyngeal secretions	*Streptococcus sp*. gr.C
13	canine	M	1	Mops	otic secretions	*Stapylococcus pseudointermedius, Pseudomonas aeruginosa*
14	canine	M	10	Bichon	pharyngeal secretions	*negativ*
16	canine	M	9	Mops	feces	*Clostridium perfringens*
17	canine	M	4	Buldog	pharyngeal secretions	*Staphylococcus aureus, Streptococcussp. gr.G*
18	canine	F	5	Mops	cistita	*Enterococcus faecalis, Escherichia coli*
19	feline	F	15	Scottish fold	wound	*Staphylococcus pseudointermedius*
20	canine	M	2	Bulldog francese	otic secretions	*Staphylococcus intermedius, Corynebacterium sp.*
21	canine	M	1	Sharpei	skin scraping	*Staphylococcus pseudointermedius*
22	canine	M	10	Carpathian Shepherd	feces	*Clostridium perfringens, Clostridium tetani*
23	canine	M	4	Labrador	skin scraping	*Staphylococcus pseudointermedius*
24	canine	M	4	Labrador	otic secretions	*Pseudomonas aeruginosa, Malassezia sp.*
25	canine	F	3	Boxer	wound	*Staphylococcus pseudointermedius, Klebsiella sp.*
26	canine	F	2	Metis	feces	*Clostridium septicum*
27	canine	M	0,6	Great Dane	feces	*Clostridium perfringens*
28	canine	F	12	Spaniel	pharyngeal secretions	*Micrococcus luteus, Streptococcus sp.gr.G,*
29	canine	F	2,5	Boxer	feces	*Clostridium perfringens*
30	canine	M	4	Pincher	feces	*Clostridium perfringens*

31	canine	M	4	Metis	wound	*Streptococcus gr.G, Staphylococcus intermedius*
32	canine	M	7	Terrier	gastrofeces	*Clostridium perfringens*
33	canine	M	4,5	Terrier yorkshire	pustule	*Staphylococcus intermedius*
34	canine	M		Labrador	otic secretions	*Pseudomonas aeruginosa*
35	feline	M	3	European	otic secretions	*Staphylococcus pseudointermedius*
36	canine	M	1	Mops	balanita	*Streptococcus sp.gr.B, Enterococcus faecalis*
37	canine	M		Bulldog	feces	*Clostridium perfringens*
38	feline	M	3	Birman Cat	feces	*Clostridium perfringens*
39	feline	M	11	European	blister	*Staphy. pseudointermedius*
40	feline	F	1,5	Metis	stomatitis	*Moraxella cattharalis., Actinobacillus lignieresi*
41	canine	M	5	Bichon	pharyngeal secretions	*Bordetella bronhiseptica, Enterococcus faecalis*
42	canine	F	4	Bichon	skin scraping	*Staphylococcus pseudointermedius*
43	canine	F	0,6	Akita inu	skin scraping	*Staphylococcus pseudointermedius, Pseudomonas aeruginosa*
44	canine	F	3	Metis	pharyngeal secretions	*Haemophillus sp., Streptococcus sp.gr.G,*
45	canine	F	11	Bichon	conjunctival secretions	*Staphy. psedointermedius, Klebsiella pneumoniae, Actinobacillus sp.*
46	feline	F	0,9	Russian white	skin scraping	*Staphylococcus intermedius*
47	canine	M	5	Bichon	pharyngeal secretions	*Staphylococcus pseudointermedius*
48	feline	F	1,2	Metis	otic secretions	*Staphylococcus pseudointermedius, Bacillus cereus*
49	canine	F	4	Cocker	otic secretions	*Pseudomonas aeruginosa, Staphy. pseudointermedius*
50	canine	M	1	Bichon	feces	*Clostridium perfringens*
51	canine	F	3,5	Metis	otic secretions	*Staphylococcus pseudointermedius, Malassezia sp.*
52	feline	F	8	Persian siamese	pharyngeal secretions	*Staphylococcus pseudointermedius, Kokuria sp. Serratia marcescens*
53	canine	M	12	Cocker	otic secretions	*Pseudomonas aeruginosa*
54	feline	F	1,5	Norwegian Forest	gastrofeces	*Clostridium perfringens*
55	canine	F	1,5	Metis	feces	*Clostridium perfringens*
56	feline	F	2	Persian siamese	otic secretions	*Streptococcus sp. gr.D, Enterobacter aerogenes, Malassezia sp.*
57	canine	M	2,5	Bichon	otic secretions	*Malassezia sp.*
58	canine	M	9	Westie	fistula	*Staphylococcus pseudointermedius*
59	feline	F	10	Birman Cat	otic secretions	*Staphylococcus pseudointermedius*
60	feline	F	1	Metis	stomatitis	*Streptococcus sp.gr.A*
61	canine	M	4,5	Bichon	otic secretions	*Streptococcus sp.C*
62	feline	M	1,8	Siberian	urine	*Enterococcus faecalis,*
63	canine	F	3	Metis	skin scraping	*Staphylococcus pseudointermedius*

64	canine	F	3	Teckel	skin scraping	*Staphylococcus pseudointermedius*
65	canine	F	8	Bichon	skin scraping	*Staphylococcus pseudointermedius*
66	canine	F	2	Metis	otic secretions	*Staphylococcus pseudointermedius, Klebsiella sp.*
67	canine	M	5	German Shepherd	skin scraping	*Staph. pseudointermedius*
68	feline	M	1	Birmaneza	nasal/pharyngeal secretions	*Klebsiella pneumoniae*
69	canine	M	2	Husky	skin scraping	*Staphylococcus saprophyticus, Candida sp.*
70	feline	M	4	European	skin scraping	*Staphylococcus intermedius, Streptococcus gr.G*
71	canine	M	0,5	Metis	folliculitis	*Staphylococcus pseudointermedius*
72	feline	F	3	European	nasal secretions	*Pasteurella multocida, Streptococcus sp. gr.C Staphylococcus saprophyticus*
73	canine	M	3,5	Belgian Malinois	skin scraping	*Staphylococcus pseudointermedius,*
74	canine	M	2,5	Cane Corso	vaginita	*Corynebacterium sp., Streptococcus* sp. grup.G
75	canine	M	5	Samoyed	conjunctival secretions	*Streptococcus sp.gr,G*
76	canine	M	1,5	Metis	urine	*Enterobacter cloaceae, Escherichia coli*
77	canine	M	8	Bulldog francese	skin scraping	*Staphylococcus pseudointermedius*
78	feline	F	18	European	nasal secretions	*Corynebacterium sp.*
79	feline	F	1,3	British	urine	*Escherichia coli*
80	canine	F	4	Pekinez	skin scraping	*Staphylococcus aureus*
81	canine	F	2,5	Akita Inu	pharyngeal secretions	*Klebsiella pneumoniae, Streptococcus sp. gr.C*
82	canine	M	3	Metis	fistula	*Staphylococcus aureus*
83	feline	F	10	Birman Cat	skin scraping	*Staphylococcus pseudointermedius*

Anaerobic strains have been isolated much less frequently and the most important isolated bacterial species have been *Clostridium perfringens* (9,35%) and *Campylobacter sp.* (1,87%) (fig.1).

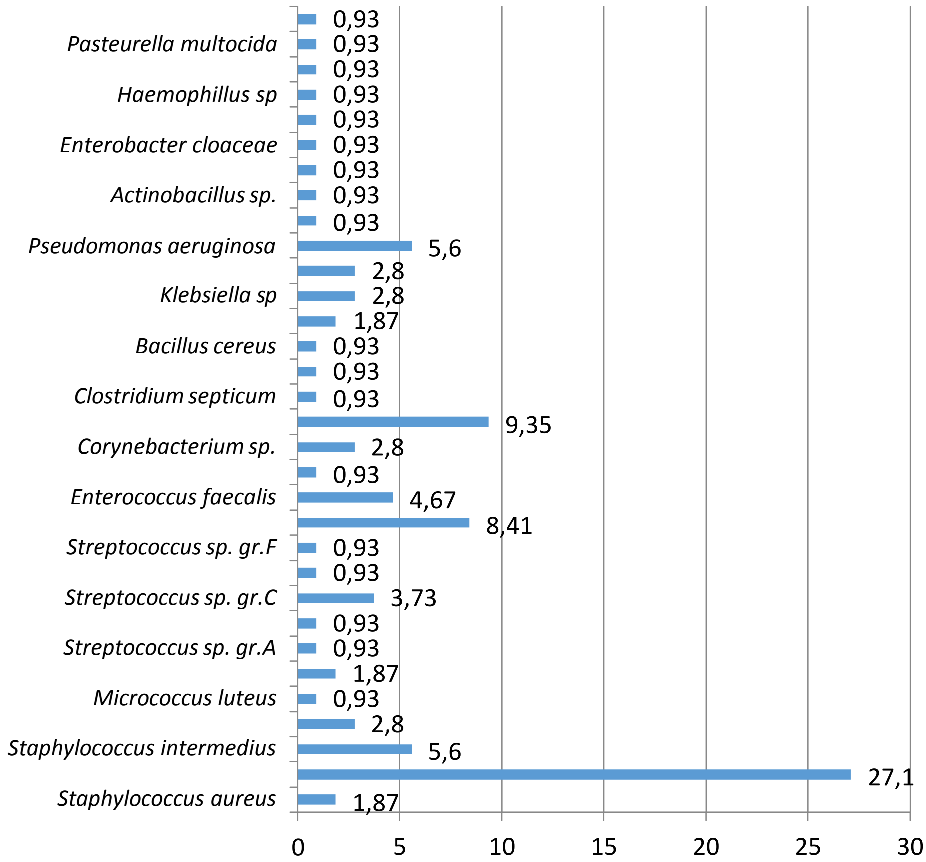

Fig.1. Ghraphical representation of the frequency of bacterial strains isolated from various diseases in dog and cats

Summarizing the data obtained, it is observed that there are no significant differences in terms of the etiology of a condition that has evolved in both dogs and cats (Table 2).

Table 2. The frequency of bacterial species isolated from different diseases

SPECIA	AFECTIUNEA	TULPINI	NR	%
canina	Conjunctivitis	*Staphylococcus psedointermedius,*	2	33,3
		Klebsiella pneumoniae	1	16,6
		Actinobacillus lignieresi	1	16,6
		Streptococcus sp.gr,G	2	33,3
felina	Conjunctivitis	*Staphylococcus pseudointermedius,*	1	33,3
		Kokuria kristinae	1	33,3
		Serratia marcescens	1	33,3
canina	Dermatitis	*Streptococcus gr.F,*	1	5,88
		Streptococcus gr.G	2	11,7
		Staph. pseudointermedius	10	58,82
		Pseudomonas aeruginosa	1	5,88
		Staph. saprophyticus	2	11,7
		Staph. aureus	1	5,88

felina	Dermatitis	*Staph. intermedius*	2	40,0
		Streptococcus gr.G	1	20,0
		Streptococcus gr.A	1	20,0
		Staph pseudointermedius	1	20,0
canina	Otitis	*Staphylococcus pseudointermedius,*	6	40
		Staphylococcus intermedius,	1	6,66
		Corynebacterium sp.	1	6,66
		Streptococcus sp.C	1	6,66
		Klebsiella sp.	1	6,66
		Pseudomonas aeruginosa	5	33,3
felina	Otitis	*Stapylococcus pseudointermedius*	3	50
		Bacillus cereus	1	16,6
		Streptococcus sp. gr.D,	1	16,6
		Enterobacter aerogenes,	1	16,6
canina	Lesions/fistules	*Staphylococcus intermedius,*	2	33,3
		Staphylococcus pseudointermedius,	2	33,3
		Klebsiella sp.	1	16,6
		Streptococcus gr.G,	1	16,6
felina	Lesions/fistules	*Staphylococcus pseudointermedius*	2	100
canina	Cistitis	*Enterococcus faecalis*	2	50
		Escherichia coli	1	25
		Enterobacter cloacae	1	25
felina	Cistitis	*Enterococcus faecalis,*	1	50
		Escherichia coli	1	50
canina	Enteritis	*Campylobacter sp.*	2	18,2
		Clostridium perfringens,	7	63,6
		Clostridium septicum	1	9,1
		Clostridium tetani	1	9,1
felina	Enteritis	*Campylobacter sp.*	2	33,3
		Clostridium perfringens	4	66,6
canina	Laryngitis/pharyngitis	*Staphylococcus pseudointermedius*	2	18,2
		Streptococcus sp. gr.C	2	18,2
		Streptococcus sp.gr.G,	2	18,2
		Micrococcus luteus	1	9,1
		Enterococcus faecalis	1	9,1
		Bordetella bronhiseptica	1	9,1
		Klebsiella pneumoniae	1	9,1
		Haemophillus sp.,	1	9,1
felina	Laryngitis/pharyngitis	*Streptococcus sp. gr.C*	2	28,6
		Staphylococcus saprophyticus	1	14,3
		Corynebacterium sp.	1	14,3
		Listeria monocytogenes	1	14,3
		Klebsiella pneumoniae	1	14,3
		Pasteurella multocida	1	14,3
canina	Vaginitis	*Corynebacterium sp.,*	1	50
		Streptococcus sp. grup.G	1	50
canina	Balanitis	*Streptococcus sp.gr.B,*	1	50
		Enterococcus faecalis	1	50
felina	Stomatitis	*Moraxella cattharalis.,*	1	50
		Actinobacillus lignieresi	1	50

Thus, in dermatitis in dogs the most closely involved bacteria species was *Staphylococcus pseudointermedius* (58,82%) and in cats, *Staphylococcus intermedius* (40%).

From purulent lesions and fistulas, taken from injuries and wounds, bacterial species were isolated, known for their more frequent involvement in dog dermatitis. From the samples collected from dogs, the species *Staphylococcus pseudointermedius* (33.3%) and *Staphylococcus intermedius* (33.3%) were isolated, *Klebsiella sp.* (16.6%) and *Streptococcus sp.* g. G (16.6%). From the samples taken from cats, the species *Staphylococcus pseudointermedius* (100%) was isolated.

External otitis is an inflammation of the skin from the level of the ear canal and from the proximal portion of the ear flag. Therefore, their etiology is polymicrobial and similar to that of dermatitis. The bacterial species most commonly isolated from otitis was *Staphylococcus pseudointermedius* in both dogs (40%) and cats (50%). Other bacterial species were isolated from the otic exudates from dogs: *Pseudomonas aeruginosa* (33.3%), *Staphylococcus intermedius* (6.66%), *Corynebacterium sp.* (6.66%), *Streptococcus sp.*C (6.66%), *Klebsiella* sp. (6.66%) and from cats, the bacterial species were isolated: *Bacillus cereus* (16.6%), *Streptococcus sp.* gr.D (16.6%), *Enterobacter aerogenes* (16.6%).

From the conjunctival secretions from dogs were isolated: *Staphylococcus psedointermedius* (33.3%), *Streptococcus* sp.gr. G (33.3%), *Klebsiella pneumoniae* (16.6%), *Actinobacillus lignieresi* (16.6%), and from the samples from cats were isolated with a similar frequency, species: *Staphylococcus pseudointermedius* (33.3 %), *Kokuria kristinae* (33.3%), *Serratia marcescens* (33.3%).

The etiology of cystitis has been dominated by Gram-negative bacteria in both dogs and cats. The results of uroculture in dogs show the etiological role of *Enterococcus faecalis* (50%), *Escherichia coli* (25%) and *Enterobacter cloacae* (25%). Uropathogenic bacterial species in cats, isolated in pure or mixed cultures, were: *Enterococcus faecalis* (50%) and *Escherichia coli* (50%). Feces samples from dogs showed the role of anaerobic bacterial species: *Clostridium perfringens* (63.6%), *Campylobacter sp*. (18.2%), *Clostridium septicum* (9.1%) and *Clostridium tetani* (9.1%). In cats, the results were similar to those of dogs, with a different frequency with the species *Clostridium perfringens* (66.6%) and *Campylobacter sp.* (33.3%).

From the pharyngeal exudates taken from dogs and cats, a polymicrobial microflora was isolated. In dogs, the most commonly isolated bacterial species were: *Staphylococcus pseudointermedius* (18,2%), *Streptococcus sp*. gr. C (18,2%), *Streptococcus sp,* gr.G (18,2%) in association with *Micrococcus luteus* (9,1%), *Enterococcus faecalis*(9,1%),*Bordetella bronhiseptica* (9,1%), *Klebsiella pneumoniae* (9,1%), *Haemophillus sp*., (9,1%). From the pharyngeal exudates from cats were isolated: *Streptococcus sp.* gr.C (28,6%), *Staphylococcus saprophyticus* (14,3%), *Corynebacterium sp.* (14,3%), *Listeria monocytogenes* (14,3%), *Klebsiella pneumoniae* (14,3%), *Pasteurella multocida* (14,3%).

From purulent secretions taken from dogs with balanitis, only Gram-positive bacterial strains were isolated: *Corynebacterium sp.* (50%), *Streptococcus sp.* gr.G (50%) and from the females with vaginitis it was isolated: *Streptococcus sp.* gr.B (50%) and *Enterococcus faecalis* (50%).

After performing all the antibiograms, the results showed that the most effective antibiotics against bacterial strains isolated from dermal scrapers from dogs: were: gentamicin, enrofloxacin, marbofloxacin, neomycin, amoxicillin-clavulanic acid, cefovecin and fusidic acid.

As a result of frequent use of antibiotics, bacterial strains have been resistant to a wide range of antibiotics used in dermatitis therapy. Therefore, 6 (42.85%) of the 14 strains tested were resistant to enrofloxacin and marbofloxacin, to 6 (54.54%) of 11 strains resistant to cephalexin, to 4 (26.66%) of 15 strains resistant to amoxicillin. and clavulanic acid, in 4 (44.44%) of 9 clindamycin-resistant strains, 5 (71.42%) of 7 trimethoprim-sulfamethoxazole-resistant strains, 2 (66.66%) of 3 ampicillin-resistant strains. (fig.2).

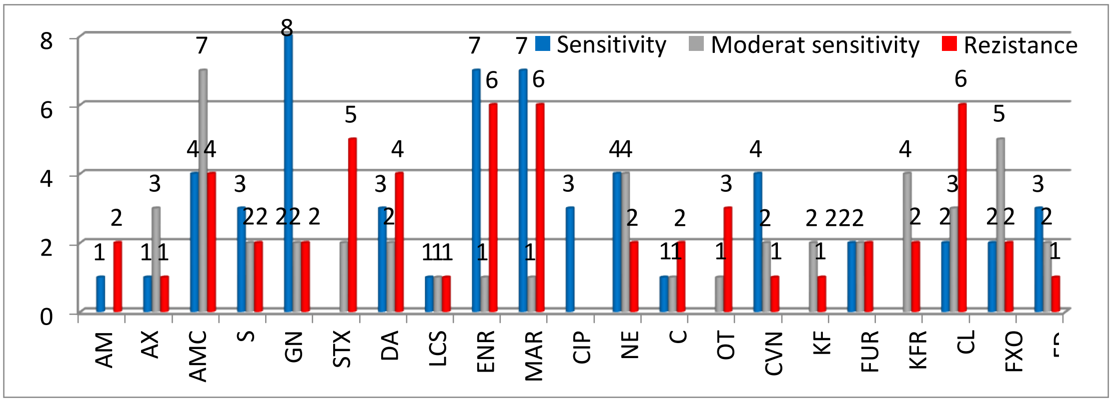

Fig.2. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from skin scraping, to dogs

In cats, the most efficient antibiotics against strains isolated from dermatitis have been: enrofloxacin, marbofloxacin and chloramphenicol, however, showed resistance to amoxicillin + clavulanic acid 2 (40%) from 5 tested strains, to neomycin 2 (50%) from 4 tested strains, to marbofloxacin 1 (33.33%) from 3 tested strains , to lincospectin 1 (50%) of 2 strains tested, to trimetoprim-sulfamethoxazole 1 (33.33%) of 3 strains tested, to ampicillin, amoxicillin and cephalexin, all strains tested were resistant (fig.3).

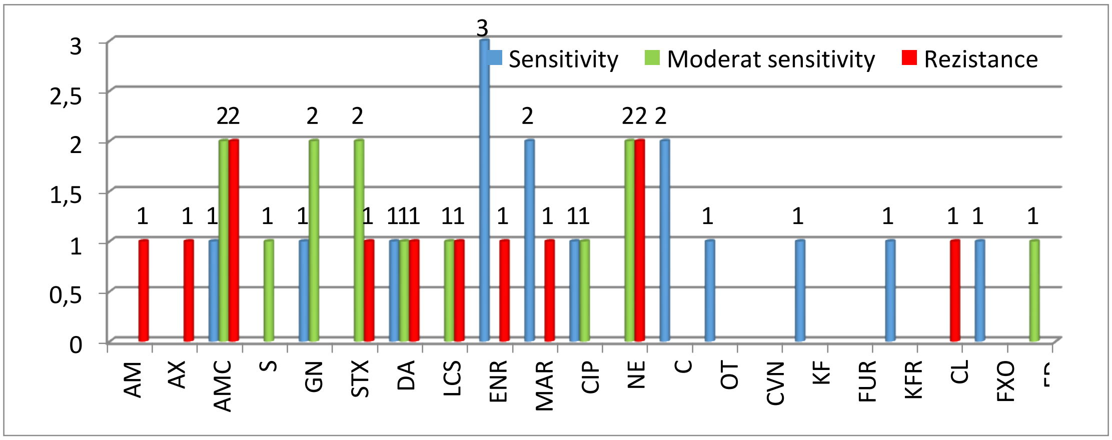

Fig.3. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from skin scraping, to cats

Synthesizing the results obtained from antibiograms performed on strains isolated from otic exudates, it was found that in dogs, the most active antimicrobial substances were: ciprofloxacin, marbofloxacin, gentamicin, chloramphenicol (florfenicol), enrofloxacin and streptomycin. About antibiotic resistance, 5 (41.66%) of 12 bacterial strains were resistant to chloramphenicol, 3 (33.33%) of 9 strains were resistant to amoxicillin-clavulanic acid, 4 (66.66%) of 6 strains were resistant to clindamycin, 2 (50%) of 4 to lincospecin, 3 (75%) of 4 to kanamycin and neomycin, 2 (50%) to 4 to cephalexin, 2 (18.18%) to 11 to marbofloxacin, 2 (75%) of 3 to cefoxitin and all strains tested against oxytetracycline, doxycycline and trimethoprim-sulfamethoxazole (fig.4).

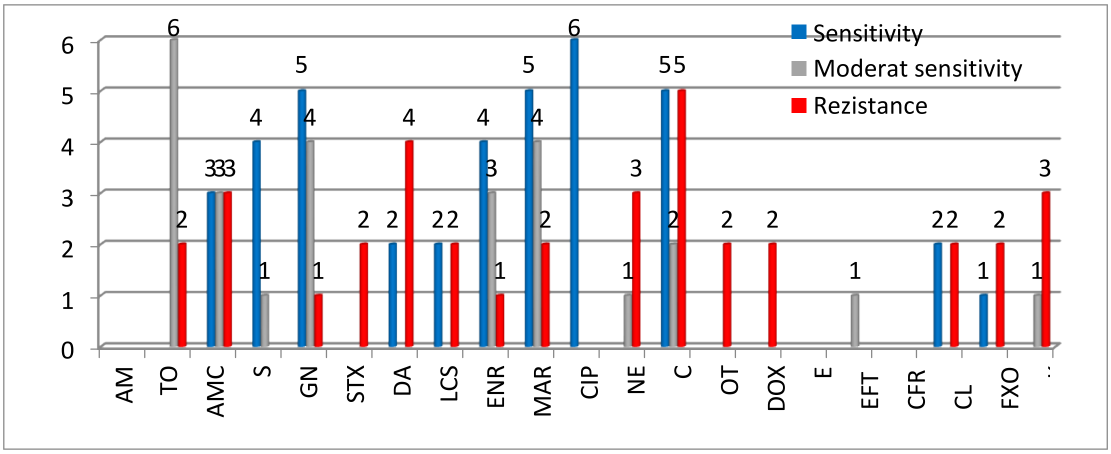

Fig.4. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from otic secretions, to dogs

In cats, strains isolated from ear exudates were sensitive to marbofloxacin, ciprofloxacin, chloramphenicol, clindamycin, oxytetracycline, streptomycin, gentamicin, enrofloxacin, trimethoprim + sulfamethoxazole and 1 (25%) of 1 gentamicin was identified (25%). 50%) of 2 strains resistant to ampicillin, 1 (33.33%) of 3 strains resistant to clindamycin, and all strains tested against cephalexin, cefadroxil, cefoxitin and kanamycin have been resistant. (fig.5).

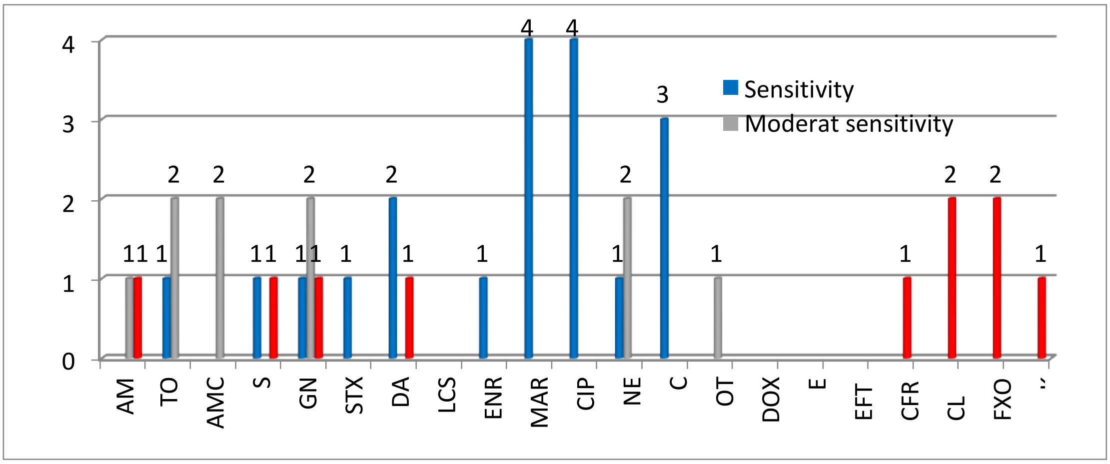

Fig.5. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from otic secretions, to cats

From the serohemorrhagic and purulent exudates taken from lesions and fistulas that evolved in dogs, bacterial strains were isolated that showed sensitivity to a small number of antibiotics: rifampicin and gentamicin but a multiple resistance was observed against a large number of antibiotics. Thus, 2 (66.66%) of the 3 bacterial strains tested were gentamicin and cephalexin resistant, 1 (33.33%) of 3 to amoxicillin-clavulanic acid, 1 (50%) of 2 to lincospectin, and all strains. tested for streptomycin, clindamycin, ampicillin, enrofloxacin, marbofloxacin, ciprofloxacin, neomycin, oxytetracycline, ceftiofur, cefadroxil, have been resistant (fig.6).

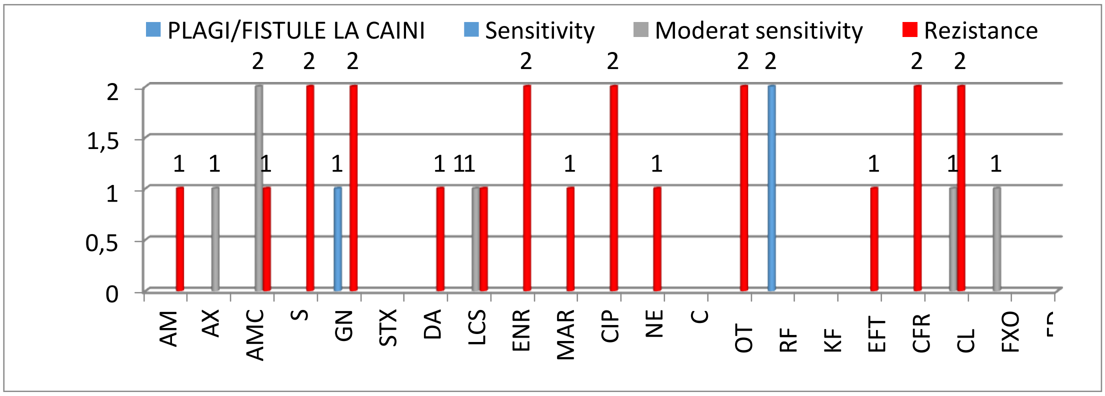

Fig. 6. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from lesions/fistules, to dogs

In cats, bacterial strains isolated from fistulas and lesions were sensitive to ampicillin and rifampicin and all strains tested for resistance to amoxicillin-clavulanic acid, clindamycin, oxytetracycline, ceftiofur and cefadroxil were resistant (fig.7).

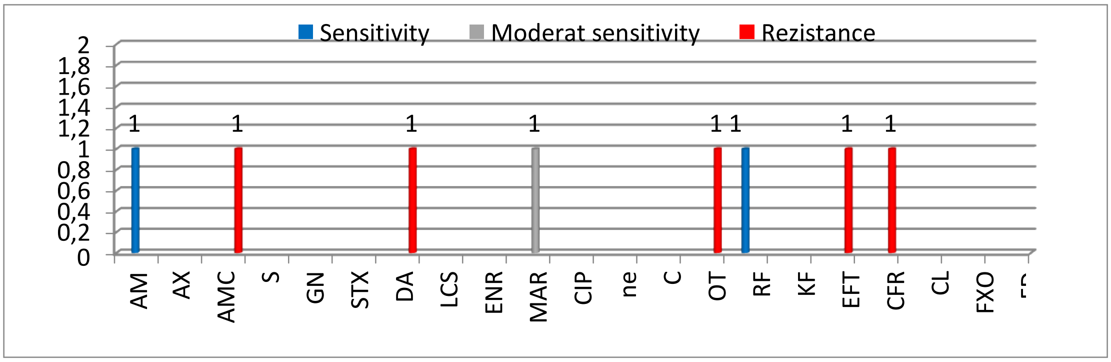

Fig. 7. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from lesions/fistules, to cats

Bacterial strains isolated from conjunctival secretions from dogs, were sensitive to amoxicillin-clavulanic acid, gentamicin, marbofloxacin, kanamycin, chloramphenicol and tobramycin and (50%) of 2 strains were resistant to kanamycin, 1 (33.33%) out of 3 to chloramphenicol and all strains tested against cephalexin, cephalothin and cefoxitin were resistant (fig.8).

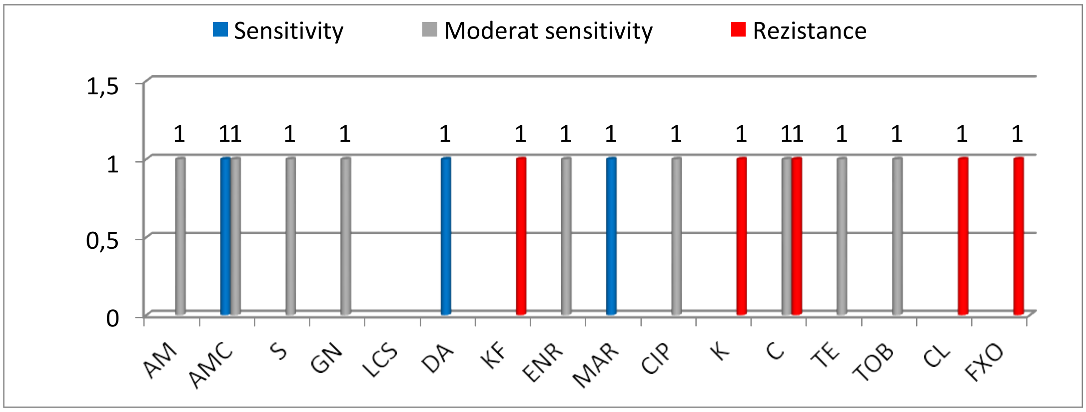

Fig. 8. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from conjunctival secretions, to dogs

Bacterial strains isolated from conjunctival secretions of cats with conjunctivitis, were sensitive to amoxicillin-clavulanic acid, gentamicin, clindamycin, marbofloxacin, kanamycin, chloramphenicol and tobramycin and 1 (33.33%) of 3 strains were resistant to chloram and all strains that were tested against cephalothin, cephaloxin and cefoxitin were resistant (fig.9).

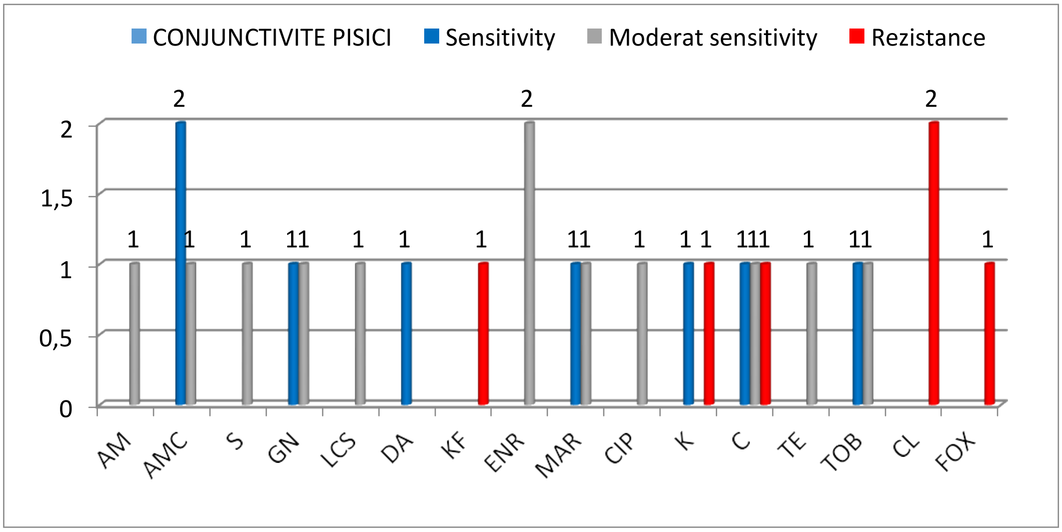

Fig. 9. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from conjunctival secretions, to cats

From the pharyngeal exudates taken from dogs, bacterial strains were isolated which, in a small number, were sensitive to amoxicillin-clavulanic acid, gentamicin, enrofloxacin, chloramphenicol, cephalexin, ciprofloxacin, marbofloxacin, streptomycin, trimethoprimol + trimethoprimol. Of the same samples, 7 (77.77%) of 9 strains isolated and tested were resistant to lincospectin, 4 (66.66%) of 6 to marbofloxacin, 3 (42.85%) to 7 to enrofloxacin, 1 (50 %) from 2 to doxycycline, 2 (40%) from 5 to gentamicin, 2 (33.33%) from 6 to amoxicillin-clavulanic acid, 2 (66.66%) from 3 to amoxicillin, 2 (66.66%) from 3 to trimethoprim-sufametoxazole, 1 (50%) from 2 to neomycin, 1 (33.33%) from 3 to chloramphenicol, 3 (75%) from 4 to cephalexin, 4 (80%)

to 5 to kanamycin, 1 (66.66%) of 3 to streptomycin and all strains tested against ampicillin, erythromycin, clindamycin, were resistant (fig.10).

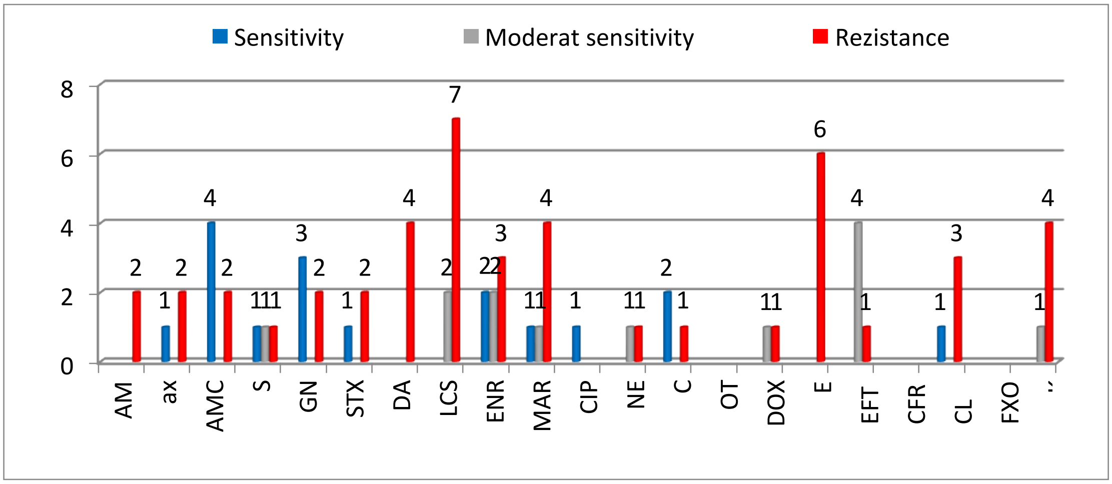

Fig. 10. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from pharyngeal exudates, to dogs

Bacterial strains isolated from pharyngeal exudates, collected from cats, had a good sensitivity to chloramphenicol, marbofloxacin, ciprofloxacin, enrofloxacin, amoxicillin-clavulanic acid, cephalexin, gentamicin. Also, 2 (66.66%) of the 3 bacterial strains tested were resistant to amoxicillin-clavulanic acid, 3 (60%) out of 5 to clindamycin, 2 (66.66%) out of 3 to cephalexin, 1 (50%) from 2 to kanamycin, cefoxitin, lincospectin and ampicillin and all strains tested against cefadroxil, erythromycin, streptomycin, were resistant (fig.11).

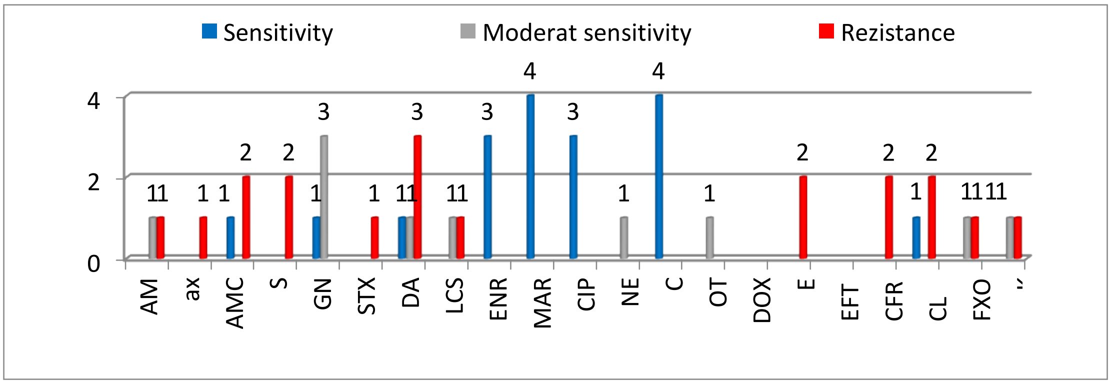

Fig. 11. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from pharyngeal exudates, to cats

From feces samples in dogs, have been isolated pathogenic bacterial strains with multiple sensitivity to lincospectin, amoxicillin-clavulanic acid, enrofloxacin, marbofloxacin, vancomycin, ampicillin, ampicillin-acloxacillin, streptomycin, clidamycin,doxycycline, chloramphenicol, gentamicin, cefaclor, cephalexin and cefadroxil. Antimicrobial resistance was reported in 2 (66.66%) of 3 oxytetracycline resistant strains, 3 (75%) of 4 gentamicin resistant strains, 1 (20%) of 5 streptomycin resistant strains, 1 (33.33 %) of 3 strains resistant to chloramphenicol, 1 (50%) from 2 to cephalexin, 1 (11.11%) from 9 to lincospectin and one strain resistant to colistin and norfloxacin. (fig.12)

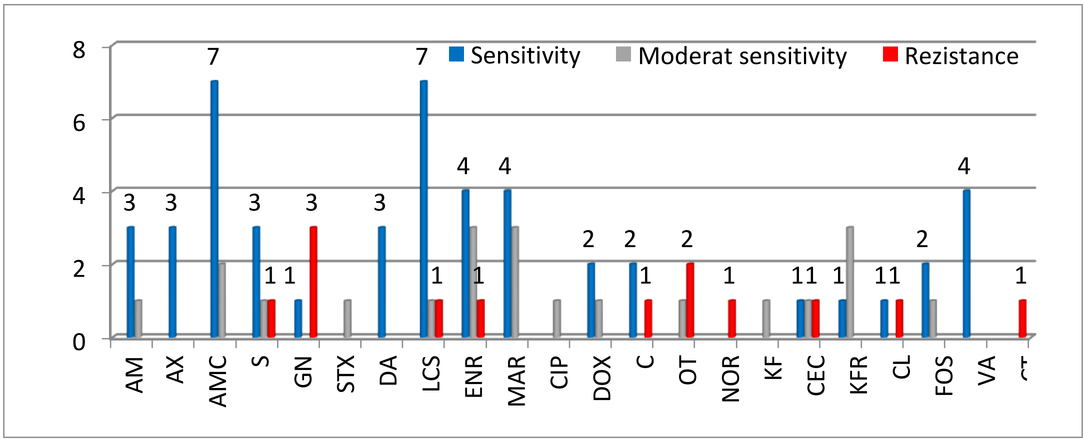

Fig. 12. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from feces samples, to dogs

Comparing the results of antibiograms performed to dogs, with those performed to cats, it was found that the bacterial strains isolated from the feces samples, had a good sensitivity to most of the antibiotics tested: amoxicillin-clavulanic acid, clindamycin, vancomycin, colistin, amoxicillin, streptomycin, gentamicin, lincospectin, marbofloxacin and ciprofloxacin. Antimicrobial resistance was reported in 1 (50%) of 2 strains compared to lincospectin and an ampicillin-resistant strain (fig.13).

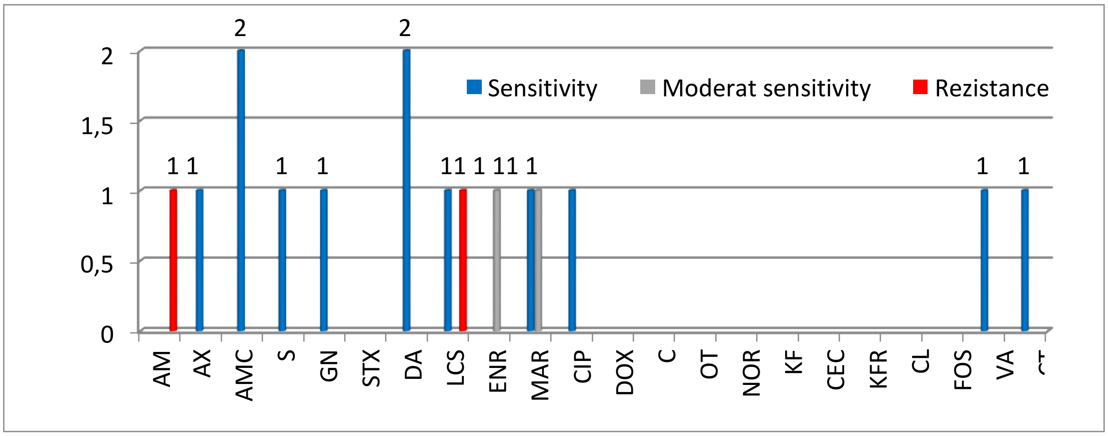

Fig. 13. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from feces samples, to cats

The urinalysis performed on samples taken from dogs, showed bacterial strains that are resistant to antibiotics. Thus, 1 (33.33%) of 3 strains resistant to amoxicillin-clavulanic acid and cephalexin were identified and all strains tested against ampicillin, trimethoprim +sulfamethoxazole, enrofloxacin, marbofloxacin, norfloxacin, cefadroxil have been resistant. The sensitivity of the isolated bacterial strains was sporadic, the most active antibiotics were amoxicillin-clavulanic acid, spectinomycin, gentamicin and chloramphenicol (fig.14).

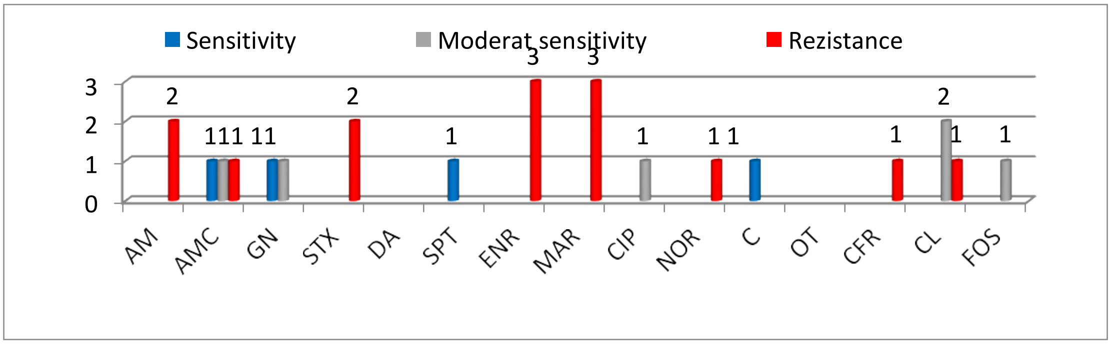

Fig. 14. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from urine samples, to dogs

The results obtained in antibiograms performed on bacterial strains isolated from urinalysis from cats, were different from those obtained in dogs. Most of the antibiotics tested (gentamicin, ampicillin, clindamycin, enrofloxacin, marbofloxacin, ciprofloxacin, norfloxacin, chlorfenicol, oxytetracycline, cefadroxil) had very good antimicrobial action. A single bacterial strain was resistant to trimethoprim + sulfamethoxazole (fig.15).

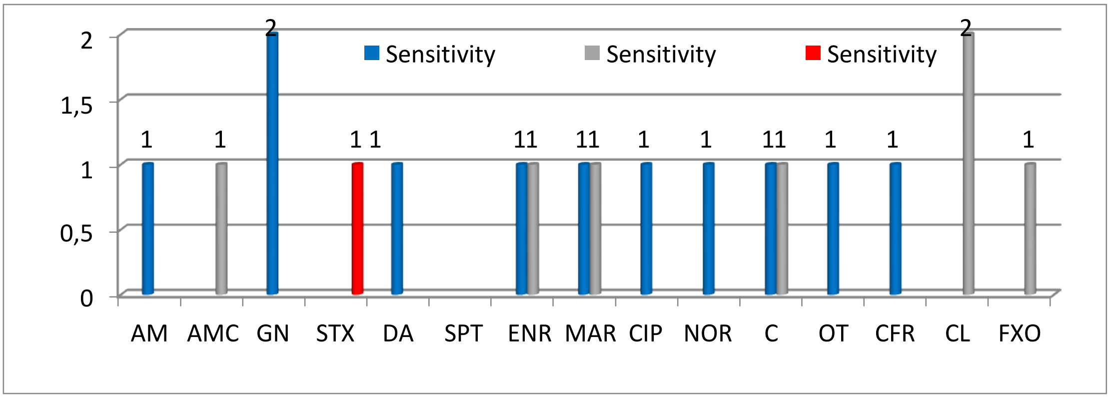

Fig. 15. Graphical representation of the results obtained on the antibiogram, performed on bacterial strains isolated from urine samples, to cats

Analyzing the data obtained from performing the antibiograms, we found a very varied sensitivity and resistance to antibiotics, which advocates the need to establish the therapeutic treatment based on the antibiogram. The results of the microbiological examinations revealed the same spectrum of bacterial species, pathogenic or conditioned pathogens, which are more frequently involved in the pathology of pets. The wide variety of potential bacterial infections that pets can contract leads to a wide variety of symptoms. Their clinical presentation reflects the interaction between the host organism and the opportunistic microorganisms, the symptomatology being influenced by the immune status and the microbial virulence factors. In general, bacterial infections can be treated by the administration of antibiotics but these must be prescribed on the basis of antibiotics in order to achieve real therapeutic success. In current practice, veterinarians apply first-line therapies with broad-spectrum antibiotics.

However, the results obtained in the testing of bacterial strains against these antibiotics show that the microbial resistance has obviously been installed in the antimicrobial substances most used in the therapies.

Conclusions

The results of the antibiograms revealed a wide variability of sensitivity and resistance of the isolated strains to the antibiotics.

Bacterial strains isolated from dermatitis, had high resistance to: enrofloxacin, marbofloxacin, cefalexin (dogs), amoxicilina+ac.clavulanic and neomicine (cats).

Bacterial strains isolated from otitis, had high resistance to: clindamicin and cloramphenicol (dogs), cefalexin and cefoxitin(cats).

Bacterial strains isolated from lesions/fistulas, had high resistance to: gentamicin, streptomycin, enrofloxacin, ciprofloxacin, oxitetracicline, cefadroxil and cefalexin (dogs), amoxicilin+ac.clavulanic, doxicicline, oxitetracicline, ceftiofur, cefadroxil (cats).

Bacterial strains isolated from conjunctivitis, had high resistance to: cefalexin (dogs and cats).

Bacterial strains isolated from cystitits, had high resistance to: lincospectin, eritromicine (dogs), clindamicine (cats).

References

1. Whitley R. D.,2000- Canine and feline primary bacterial infection; Vet. Cli. Nor. Am. 2000. Vol. 5. 1151–1167.
2. Rîmbu Cristina, Guguianu Eleonora, Horhogea Cristina, Carp-Cărare C., Mariana Grecu, Raluca Rusu, Carmen Creţu, 2018 - *Clostridium perfringens Enterotoxigen involved in hemorrhagic diarrhea at dogs*, Lucrari ştiintifice Medicină Veterinară Iaşi, vol. 61 (4) on -line ISSN 2393 – 4603, ISSN–L 1454 – 7406
3. Carp Cărare C., Guguianu Eleonora, Rîmbu Cristina, 2015 – *Special bacteriology- practical Guide,* Ed. USAMV Iasi,
4. Grecu Mariana, Anton Alina, Rîmbu Cristina, Ciocan Oana, Mares M., Năstasa V.2016 **–** *Evaluation of the antimicrobial effect of the two substances used in otitis extern in dog.* Lucrări Științifice USAMV Iasi , seria Medicina Veterinara, vol.59 (nr.4)
5. Solcan Gh., Boghian V., Rollin F., 2005–Internal Medicine Pathology and Clinic, Ed. "Ion Ionescu de la Brad", Iasi
6. Predoi, Gh., Dărăbuș, V. Cozma, Gh Solcan, L. Mitrea, V. Igna, T. Leau, 2011- Managementul calității actului terapeutic medical veterinar, Ed Dobrogea, Constanța, 190 pag., ISBN 978-606-565-032-9