Determination of antibiotic susceptibility of infectious mastitis of cows and treatment

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Abstract. It was found that the overall effectiveness of the drug Mastisan in the treatment of serous, catarrhal, fibrinous, purulent and subclinical mastitis is 80% on average. It was found that the total effectiveness of the Masticide drug in the treatment of serous, catarrhal, fibrinous, purulent and subclinical mastitis is 85%, and milk yield is not completely restored in 14% of cows. Nineteen percent of serous mastitis cows treated with a masticidal drug recover in 10% to 20% of cases with incomplete recovery of milk yield due to pathological changes in the udder teats, while in purulent mastitis 65.60% of cows recover full milk yield, while the remaining 33% of cows recover. full recovery of milk productivity was observed.

1 Introduction

One of the main tasks is to increase the number of high-yielding cows, increase the period of their use, and grow ecologically pure and clean milk and dairy products. Among high-yielding cows, the incidence of infectious mastitis is on average 22-60%, as a result of which cows reduce milk yield and milk quality, increase the incidence of various diseases of calves born from them, as well as increase additional economic costs of farms due to other veterinary sanitary measures.

Timely diagnosis, effective treatment and prevention of mastitis and subclinical mastitis caused by conditionally pathogenic microorganisms: staphylococci, streptococci, Escherichia, Pseudomonas, and Pasteur Ella are among the urgent problems awaiting their solution [3, 5].

In most of the countries of the world, the incidence of mastitis in cattle breeding is 20-25% during manual milking and 35-40% of mammary gland disease in cattle farms [2, 4].

It occurs in 17.5% of weaned cows and 20-23.7% during the dry season. Due to these diseases, the total amount of milk obtained decreases by 15-20%, and its fat content decreases by 0.8-1%. In the US, 70% of economic losses among cows are due to mastitis. The period of use of highly productive animals in the farm is reduced to 6-8 years. The sanitary quality of milk decreases, which means that dairy products made from such milk will be of poor quality. Cows become barren. It causes dyspepsia (diarrhea) in young

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animals and scarlet fever (red shirt) when consumed by young children. It is caused by reduced milk productivity in cows, their forced slaughter or death, and increased veterinary costs.

In most cases, unfavorable environmental factors have a negative effect on the resistance of the livestock organism and allow the spread of mastitis pathogens. Diagnosis of infectious mastitis in cattle, the state of effective methods and means of treatment and prevention and the determination of the level of spread of diseases, early diagnosis, modern treatment and systematic measures of countermeasures, taking into account the ecological situation of the regions and the zoogenic requirements of animal husbandry, are one of the urgent tasks [1, 6, 7].

Infectious mastitis is widespread in all livestock farms of our Republic, and as it is known from scientific literature, in all regions of the Republic in the 80s and 90s of the last century, despite the fact that some researchers have studied the course of this disease and the importance of diagnosis, treatment, and drugs, the passage of time and the management of livestock now that the new system has appeared, it is an urgent task to study the epizootological condition of infectious mastitis of cattle with clear evidence and instructions, to develop measures for the treatment and prevention of the disease, and to introduce it into veterinary practice. the rate of infection of cows with infectious mastitis was found to be about 40% among 211 million head of cattle in all countries of the world, including 8% to 32% in cattle farms of our country. This disease has a negative effect on the milk yield in cows, the technological quality of milk, and often causes the dairy cows to become unusable due to atrophy of the mammary glands [8-14].

Infectious diseases are treated with various antibiotics, sulfonamide and other drugs. But before using these drugs, it is necessary to determine the sensitivity of the pathogens to antibiotics and other antibacterial drugs. The use of infectious agents for the treatment of antibacterial drugs without studying their sensitivity is not effective. Therefore, before treating cows with infectious mastitis, we studied the sensitivity of their causative agents: staphylococci, streptococci, enterococci, escherichia, proteus, citrobacter and pseudomonads to antibacterial drugs. The sensitivity of staphylococci, streptococci, enterococci, escherichia, proteus, pseudomonads to penicillin, streptomycin, sulfadiazine, levomycetin, tetracycline, enrofloxacin, kanamycin, monomycin, polymyxin, erythromycin, oleandomycin, tylosin and anti-mastitis drugs: mastisan and masticide was studied by the indicator disc method. If the region of the limit of growth of the tested culture is between 15 mm and 25 mm, it means that it is moderately sensitive, if it is above 25 mm, it means that it is sensitive. The results of testing the sensitivity of the above-mentioned staphylococcus, streptococcus, enterococcus, escherichia, proteus and pseudomonads to antibacterial drugs.

2 Materials and Methods

Scientific research works in 2015-2024 Tashkent region "Rokhatoy breeding farm", Kibrai district "Rikhsiboy baraka breeding farm", Kuyichirchik district "Milk spring dairy farm", Yangi'ol district "Yuksalish dairy farm" as well as Testing and scientific research on infectious (clinical and subclinical) mastitis was carried out using milk samples taken from dairy cows fed in the households of residents living in Tashkent region in the experimental farm of the Tashkent State Agrarian University and the laboratory of the Department of General Zootechnics and Veterinary Medicine.

Experiments were carried out on a total of 280 cattle and 12 rabbits in scientific research.

Clinical examination of dairy cows was carried out by organoleptic observation of the general condition of the udder and its parts. Attention was paid to the color and shape of the

skin of the udder, condition of the teats, painful reaction, consistency of the udder, local temperature, condition of the lymph nodes above the udder. The tone of the suction channel, its permeability, the type of secretion, its uniformity, and the presence of iodine mass in its composition were determined.

In order to isolate the pathogen from a cow suspected of clinical and subclinical mastitis, before taking a milk sample, the udder teats were cleaned with 70% ethyl alcohol. 2 ml of pathological material or 4-5 ml of milk from the diseased part of the udder was milked into sterile eppendorf tubes.

The samples were placed in a thermos with ice and the pathological material was examined bacterioscopically and bacteriologically (separation of pure culture). During the separation of pure culture from pathological (abnormal) milk, staphylococci are transferred to mannitol and salt agar with phenol rot, salt agar with egg yolk, milk salt agar, sucrose agar, agar D and blood agar; streptococci broth with trypan blue or crystal violet (according to Shatoxin N.G. method), lactose broth, blood serum, broth with neomycin and bromcresol purple (according to Kartashova V.M. method), sugar broth to Chesbro-Ivens alkaline nutrient media; escherichia, pseudomonads, proteus, citrobacteria, enterobacteria were cultured in GPB, GPA, Endo, Ploskirev nutrient media.

After the examined pathological materials were planted in nutrient media, the seedlings were incubated in a thermostat at 37℃ for 1-3 days. Then the results of planting were observed, the growth characteristics and other characteristics of the culture were studied.

3 Results and Discussion

Scientific research in each quarter of 2015-2018, 120-125 dairy cows were examined using the drugs dimastin, mastidine, mastitodiagnost and mastoprim.

During 2015-2024, in the Tashkent, Qibray, Kuyichirchik, Yangiyol districts of the Tashkent region, during the period of 2015-2024, 300-450 cows were examined for infectious clinical and subclinical mastitis and during the treatment of those infected with infectious mastitis, the etiology of mastitis disease in 125 cows in dairy farms, including 25 clinical and 100 head was studied in subclinical mastitis. Inspections were carried out using the Maxtomer apparatus. When clinical mastitis was studied in 25 cows, 5 (25.00%) were fibrinous, 3 (11.43%) serous, 4 (20.41%) catarrhal, 3 (11.35%) hemorrhagic and 10 it was found that the head (40.00%) consisted of purulent mastitis.

During the bacteriological study of mastitis, 95 staphylococci (25 Staphulococcus aureus, 60 Staphulococcus epidermidis and 16 Staphulococcus saprophytieus strains), 80 streptococci (40 Streptococcus dusgalastiae, 23 Streptococcus agalactiae and 6 Streptococcus faecalis-enterococci) strains, as well as 27 biological and biochemical properties of other types of microorganisms (12 Pseudomonas aeroginoza, 2 Essherichia coli, 2 Proteus vulgaris, 5 Citrobacteria and 6 Enterobacteria) were studied.

Mastisan and masticide preparations were tested by the test tube method. According to the instructions, the sensitivity of penicillin, streptomycin, monomycin, tylosin, sulfadiazine, tetracycline, kanamycin, levomycetin, oleonomycin, enrofloxacin, polymyxin, erythromycin to the antibiotics Mastisan and Masticide was checked by the diffusion method of the secretion extracted from the udder of cows with mastitis.

A total of 180 cows infected with infectious mastitis in households living in the above-mentioned areas were treated with antibiotics, 100 cows with Mastisan, and 80 cows with masticide, and their effectiveness was studied.

Table 1. Sensitivity of bacteria isolated from milk samples of cows with mastitis to antibiotics, Mastisan and Masticide

Type of microbes	Number of strains	Susceptibility of microorganisms							
		Sensitive		Medium sensitive		Medium durable		Durable	
		piece	%	piece	%	piece	%	piece	%
1	2	3	4	5	6	7	8	9	10
Ampicillin (HIMEDIA SD077)									
Staphylococcus	120	75	61,53	38	29.85	6	5,02	2	1,6
Streptococcus	89	33	38,35	32	28,90	13	12,10	19	18,09
Enterococcus	35	-	-	-	-	2	5,40	35	93,60
Escherichia	4	-	-	-	-	1	15,70	5	82,55
Proteus	8	-	-	1	10,11	2	21,26	6	64,77
Pseudomonas	30	6	21,42	4	09,88	7	24	12	41,88
Streptomycin (SD091)									
Staphylococcus	120	11	7,85	45	34,60	33	25,33	37	28,89
Streptococcus	89	56	54,47	36	33,45	75	68,88	2	1,08
Enterococcus	35	-	-	-	-	3	9,01	34	89,08
Escherichia	4	-	-	-	-	2	31,44	4	64,86
Proteus	8	-	-	-	-	3	32,25	6	63,78
Pseudomonas	30	-	-	6	20,42	7	23	15	52,48
Sulfadiazine (SD092)									
Staphylococcus	120	-	-	-	-	2	1,44	124	96,55
Streptococcus	89	-	-	-	-	5	4,89	94	92,99
Enterococcus	35	-	-	-	-	-	-	37	98,95
Escherichia	4	-	-	-	-	-	-	6	97,99
Proteus	8	-	-	-	-	2	21,04	7	76,44
Pseudomonas	30	-	-	-	-	-	-	28	97,65
Levomycetin (SD006)									
Staphylococcus	120	74	56,44	29	22,44	20	13,56	3	1,99
Streptococcus	89	11	11,11	31	31,31	21	21,21	36	35,56
Enterococcus	35	-	-	-	-	11	29,72	26	68,77
Escherichia	4	6	98,76	-	-	-	-	-	-
Proteus	8	7	75,88	2	21,82	-	-	-	-
Pseudomonas	30	9	29,77	8	26,99	5	16,85	6	20,89
Tetracycline									
Staphylococcus	120	-	-	-	-	10	7,93	116	92,06
Streptococcus	89	13	12,56	31	30,11	43	42,22	12	11,12
Enterococcus	35	-	-	-	-	5	11,99	32	85,44
Escherichia	4	6	99	-	-	-	-	-	-
Proteus	8	4	43,34	3	32,35	1	10,22	1	10,31
Pseudomonas	30	-	-	-	-	2	6,77	26	92,85
Enrofloxacin (SD150)									
Staphylococcus	120	105	83,12	10	7,13	6	3,99	4	3,01
Streptococcus	89	82	80,89	8	6,99	7	7,01	2	1,99
Enterococcus	35	28	74,66	5	12,55	3	8,01	1	2,10
Escherichia	4	6	100	-	-	-	-	-	-
Proteus	8	7	76,67	1	10,01	1	10,71	-	-
Pseudomonas	30	23	81,44	2	6,44	1	3,01	2	6,14
Kanamycin									
Staphylococcus	120	88	68,11	25	18,01	7	4,90	6	4,06
Streptococcus	89	67	66,66	20	19,20	8	7,78	5	4,99
Enterococcus	35	32	84,48	4	10,01	-	-	1	1,70
Escherichia	4	4	65,67	2	32,22	-	-	-	-
Proteus	8	6	64,65	3	32,93	-	-	-	-
Pseudomonas	30	10	33,71	6	20,42	8	27,57	4	13,88
Monomycin									
Staphylococcus	120	115	91,66	4	2,97	4	2,97	2	1,18

Streptococcus	89	95	95,95	3	2,73	-	-	1	1,01
Enterococcus	35	34	90,89	2	5,40	1	2,50	-	-
Escherichia	4	4	65,65	2	33,03	-	-	-	-
Proteus	8	7	76,99	1	10,09	1	10,08	-	-
Pseudomonas	30	23	79,89	3	09,96	-	-	2	6,77
Polymyxin									
Staphylococcus	120	-	-	2	1,58	3	2,22	121	95,47
Streptococcus	89	45	43,52	32	31,44	19	17,87	3	3,03
Enterococcus	35	-	-	2	5,40	3	8,10	32	84,57
Escherichia	4	-	-	-	-	-	-	6	99,89
Proteus	8	-	-	-	-	-	-	9	98,33
Pseudomonas	30	-	-	1	3,57	5	16,85	22	77,64
Erythromycin (SD013)									
Staphylococcus	120	119	92,11	6	4,76	-	-	1	0,79
Streptococcus	89	95	91,44	3	3,03	-	-	1	1,01
Enterococcus	35	32	86,48	3	8,10	-	-	2	5,40
Escherichia	4	-	-	-	-	2	31,24	4	63,67
Proteus	8	-	-	2	21,28	2	21,26	5	54,48
Pseudomonas	30	12	41,85	8	27,67	-	-	8	27,67
Oleandomycin									
Staphylococcus	120	11	7,73	9	7,14	5	3,96	101	79,45
Streptococcus	89	56	53,64	8	8,08	15	14,15	20	19,85
Enterococcus	35	-	-	-	-	-	-	37	95,79
Escherichia	4	-	-	-	-	-	-	6	95,79
Proteus	8	-	-	-	-	-	-	9	95,82
Pseudomonas	30	1	3,57	3	10,71	-	-	24	83,93
Tylosin (SD013)									
Staphylococcus	120	2	1,58	11	8,73	10	7,93	103	80,74
Streptococcus	89	28	28,28	17	17,17	9	9,09	46	44,46
Enterococcus	35	-	-	-	-	-	-	37	95,00
Escherichia	4	-	-	-	-	-	-	6	95,03
Proteus	8	-	-	-	-	-	-	9	95,06
Pseudomonas	30	2	7,14	-	-	4	13,28	21	73,00
Mastisan									
Staphylococcus	120	118	92,65	8	6,34	-	-	-	-
Streptococcus	89	81	80,89	18	18,18	-	-		-
Enterococcus	35	31	82,78	6	16,21	-	-	-	-
Escherichia	4	4	64,67	2	32,33	-	-	-	-
Proteus	8	5	53,56	4	41,44	-	-	-	-
Pseudomonas	30	26	91,85	2	7,14	-	-	-	-
Masticide									
Staphylococcus	120	124	92,51	2	10,68		-	-	-
Streptococcus	89	81	83,87	18	17,18	-	-		-
Enterococcus	35	32	85,74	5	12,51	-	-	-	-
Escherichia	4	4	64,69	2	31,43	-	-	-	-
Proteus	8	6	61,67	3	31,37	-	-	-	-
Pseudomonas	30	26	89,83	2	7,14	-	-	-	-

Mastisan and masticide drugs and antibiotics were used to protect 214 cows from infectious mastitis during the period of lactation in cows (Table 1).

The results of scientific research revealed that staphylococci and streptococci, which are the causative agents of infectious mastitis in cows, have different sensitivities to antibiotics, Mastisan and masticide drugs, 90% are sensitive to antibiotics and have moderate sensitivity, while sensitivity to ampicillin, streptomycin, sulfadiazine, levomycetin, tetracycline, oleandomycin, tylosin is low.

For the treatment and prevention of cows with infectious mastitis, the drug mastisan was tested in the above-mentioned cattle farms. Mastisan was used to treat 170 staphylococcal and streptococcal mastitis and to prevent 152 cows from post-partum mastitis.

The drug Mastisan was treated with a dose of 5-10 ml every 24-36 hours for 7-8 days with the help of a special catheter.

Table 2. Results of treatment with the drug Mastisan

№	Types of mastitis	Treated animals (head)	Mastisan treatment results		
			Animal recovery (%)		
			Productivity recovery (%) (heals)	Productivity (%) loss	
				10%	20%
1	Serous	35	32/80,00	3/7,50	5/12,5
2	Catarrhal	13	13/75,45	3/17,64	1/6,88
3	Fibrinous	20	15/65,21	4/17,39	4/17,39
4	Purulent	12	9/50,00	4/22,22	5/27,77
5	Subclinical	90	86/90,50	5/5,31	3/3,19
Total		170	155/80,72	19/9,90	18/9,38

In the conducted scientific studies, the full treatment efficiency of mastisan drug in cows with serous mastitis was 80.00%, 75.45% in catarrhal mastitis, 50.00% in purulent mastitis. This indicator showed 90.50% in subclinical mastitis. It was found that the full treatment efficiency of the drug Mastisan is the highest in subclinical mastitis and the lowest in purulent mastitis.

In the course of treatment, twenty percent of serous mastitis cows treated with Mastisan drug were observed to recover with incomplete recovery of milk yield due to pathological changes of udder teats in 10% to 20% cases. In this case, 50% of cows were found to have a full recovery of milk production, while the remaining 50% of cows did not have a full recovery of milk production.

It was found that the overall effectiveness of the drug Mastisan in the treatment of serous, catarrhal, fibrinous, purulent and subclinical mastitis is 80% on average.

For the treatment and prevention of cows infected with infectious mastitis, the masticide drug was tested in the above-mentioned cattle farms (Table 3).

Table 3. Results of treatment of cows with infectious mastitis with a masticidal drug

№	Types of mastitis	Treated cows (head)	Masticide treatment		
			Number of animals recovery rate (%)		
			productivity recovery	loss of productivity	
				10%	20%
1	Serous	21	17/80,80	2/9,40	2/9,52
2	Catarrhal	10	8/80,10	1/10,00	1/10,00
3	Fibrinous	9	6/65,66	2/21,20	1/11,9
4	Purulent	6	4/65,60	1/14,60	1/14,60
5	Subclinical	44	42/95,45	1/2,27	1/2,27
Total		90	77/85,55	7/7,72	6/6,67

In cows with serous mastitis, the full treatment efficiency of the masticide drug was 80%, in catarrhal mastitis 80.10%, in fibrinous mastitis 65.66%, and in purulent mastitis 65.60%. This indicator showed about 85.55% in subclinical mastitis. Therefore, it was found that the full treatment efficiency of masticide is the highest in subclinical mastitis, and the lowest rate is in purulent and fibrinous mastitis (65.60%).

4 Conclusion

Nineteen percent of serous mastitis cows treated with a masticidal drug recover in 10% to 20% of cases with incomplete recovery of milk yield due to pathological changes in the

udder teats, while in purulent mastitis 65.60% of cows recover full milk yield, while the remaining 33% of cows recover. full recovery of milk productivity was observed.

It was found that the overall effectiveness of the masticide drug in the treatment of serous, catarrhal, fibrinous, purulent and subclinical mastitis is 85.55% on average, and 14% of cows do not fully recover milk yield.

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