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Table 1 Parameters of population dynamics in hares from selected localities of south-western Slovakia localities totally

	1987	1988	1989	1990	1991	1992	1993	1994
Localities	14	15	19	8	5	8	5	4
n	1451	1563	1593	977	491	686	474	394
PYB	49,2	57,73	55,2	44,52	48,27	51,31	40,77	54,48
R	0,97	1,37	1,23	0,85	0,95	1,25	0,76	1,2
r	1,86	2,48	2,37	1,99	2,03	2,65	1,82	2,51
SI	0,52	0,51	0,52	0,481	0,497	0,519	0,515	0,5

continuation of table 1

	1995	1996	1997	1998	1999	2000	Total (1987-2000)
Localities	5	-	2	2	3	3	37
n	391	-	141	193	177	237	8768
PYB	52,42	-	68,79	47,64	52,54	49,37	51,68
R	1,13	-	2,204	0,911	1,107	0,975	1,07
r	2,46	-	5,7	1,75	2,21	1,983	2,23
SI	0,502	-	0,52	0,52	0,51	0,498	0,51

PYB - proportion of young hares in bag, R - reproduction coefficient, r - reproduction factor, SI - sexual index.

EFFECTIVITY OF PREVENTION AND CONTROL IN MASTITIS CAUSED BY ENVIRONMENTAL PATHOGENS ON A DAIRY FARM WITH STANDARD ANIMAL CONCENTRATIONS

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Summary

In this work the effectivity of methods of mastitis prevention and control in reducing the occurrence of mastitis casued by environmental pathogens is described in a herd counting a mean of 220 dairy cows. At the start of the experiment 3 complete examinations were carried out. They revealed 38 dairy cows to have clinical mastitis, 84 to have a positive NK-test and 123 to have an infected mammary gland (S. agalactiae, S. aureus, betahaemolytical Streptococci and environmental pathogens in 31, 3, 1 and 88 cases, respectively). Intramammary cephalosporine treatment of 123 animals with udder infections was unsuccessful in 23 cases; these animals were aliminated and treated repeatedly. After treatment, the quality of the milk produced increased substantially (BT SCC under 400,000 per ml). This favourable condition could be maintained for 5 months after treatment. Afterwards, in consequence of omitting the antimastitis methods or the undue application of the latter (mainly in the field of hygiene) the number of cows with udder infections increased and reached about 78 – 88 animals towards the end of the observation period. However, this had no effect on the quality of the milk produced which still fulfilled the quality parameters required by the standard.

Key words: mastitis, dairy farm

Introduction

Increasing economic effectivity of milk production urges producers to constantly eliminate unreasonable costs. From this point of view mastitis is an important factor decreasing production profitability. Most cases of mastitis are due to an infectious agent. The basic principle of effective mastitis control is to reduce infection sources and transmission ways of the main mammary gland pathogens.

Due to the basic classification of mastitis agents two sources of infection are recognised:

- the milk gland infected with mastitis-causing agents, and
- the infected environment.

The so-called environmental pathogenic bacteria, designed as such because their source is

to be found in the environment where they survive and reproduce extremely quickly, are becoming the predominant pathogens of the mammary gland. Particularly the so-called environmental Streptococci (Enterococcus spp. Streptococcus uberis) and coliforms (mainly Escherichia coli) fall into this category.
It was the aim of this work to determine the effects of treatment of all animals on a farm who excreted bacterial agents of mastitis and of the subsequent introduction of antimastitic methods upon the quality of milk produced.

Materials and methods

The observations were carried out in a herd of 223 dairy cows chain-tied in two production stables on mid-long stances with litter (straw). In both stables milking was done on the stance into a pipeline. In the dry period, during parturition and the dairy cows are placed in a delivery parlor. For milking, the DZ 100 milking installation is used. After analyzing the causes of the unfavourable situation the hygienic shortcomings were eliminated, biotechnical control II was implemented, and since then a hygienic program of milking and of post-milking teat insertion into a 500 ppm digluconate chlorhexidin disinfectant solution has been carried out. Disinfection of the milking equipment is done according to valid standards with preparations containing 200 ppm chlorine. Non-selective treatment of the mammary gland by antimicrobials at the last milking – DCT (dry cow therapy; Vasiľ, 1988) with Cefa-Dri (Fort Dodge, USA) was introduced. In March 2000 the mammary gland secretions of all dairy cows in the herd were examined for patahogenic udder bacteria 3times in 14-day intervals. The bacteriological examinations were amended by the NK-test and clinical examination of the health state of the udder. Based on the results of the three bacteriological examinations (IDF Bulletin, No. 132, 1981) all animals excreting bacterial agents of mastitis underwent treatment (Vasiľ et al., 1993). Gamaret (Infuza, Czech Republic) was used to treat lactating cows. Treatment-resistant animals were re-treated with Cefa-Lak (Fort Dodge, USA) according to the manufacturer´s recommendation. The effectivity of all measures was estimated in monthly intervals by complex udder examinations including NK test of the secretion, clinical examination of the mammary gland (IDF Bulletin, No. 211, 1987) and bacteriological examination of secretion samples. The antibiotic sensitivity of each causative agent to 10 antibiotics was tested by the agar-diffusion test using standard antibiotic disks according to the method of Urbašková et al. (1985).

Results and discussion

In Table 1 the results of complex examinations carried out during the 8 months of observation are given. Prior to our intervention the farmer himself was providing for control and treatment of secretory damage of the mammary gland. He did not keep to the principles properly so that the numbers of somatic cells in pool samples of milk were gradually increasing and in March 2000 reached 780,000 BT SCC per 1 ml mil. At the initial bacteriological examination 123 dairy cows of 214 were positive which presented an infection level of 57.5%. In the NK-test 84 of 172 lactating animals proved to be positive; of the former 38 were clinically diseased. The bacteriologically positive 98 lactating and 25 dry-standing dairy cows were intramammary treated with Gamaret (Infuza, Czech Republic) and Cefa-Dri (Fort Dodge, USA), respectively. In this way the number of bacteriologically positive dairy cows was reduced to 23 (infection rate 10.9%), the frequency of positive reactions to the NK-test to 17.8% (28 positive animals) and clinical mastitis was only seen in two animals. The situation kept on til July when it worsened in all indices under observation. In September 2000 we already observed 88 bacteriologically positive dairy cows (infection level 39.8%), 55 animals with a positive reaction of milk to the NK mastitis test (26.8% of lactating animals) and 12 had clinical mastitis. With smaller changes this situation persisted also in October and November. In March 2000, high numbers of somatic cells were counted in pool samples of milk (780,000 BT SCC/1 ml). The actions taken at the end of March and beginning of April 2000 lead to a decrease so that the control examination in April revealed 259,000 BT SCC/1 ml. This level was retained till the end of the observation period with the exception of September when 411,000 BT SCC were counted per 1 ml. In the individual months, 85 to 95 % of all lactating cows were producing milk for public consumption.

Table 1 Results of complex examinations during 8 months of observation of mastitis infection rates on a dairy farm

Month of examination	Number of dairy cows examined		*Number of positive dairy cows*			BT SCC/ ml in thou-sands
	by NK-test and clinically	bakteriolo-gically	clinically	by NK-test	bacteriolo-gically	
March	172	214	38	84	123	780
April	177	210	2	28	23	259
May	134	215	3	24	26	320
June	174	221	2	27	21	295
July	173	214	4	29	32	365
August	185	220	10	48	59	395
September	205	221	12	55	88	411
October	176	205	14	52	83	390

November	173	204	11	49	78	378

The results document the preventive and control measures associated with environmental pathogen-caused mastitis to have their specific features. Mammary gland health can be maintained on a level that ensures production of milk of desired quality, however, under demanding conditions since the interactions of the biosystems concerned (dairy cow – environmental pathogens – environment) are not yet fully undrestood.
In Table 2 the level of bacterial agents in mastitis infection rates is given for the herd under observation. In March 2000, complex examination revealed the following shares of causative agents: Streptococcus uberis (71 animals), Streptococcus agalactiae (31), coagulase-negative Staphylococci (16), Staphylococcus aureus (3). Beta-haemolytical Streptococci and Enterococcus sp. were each found in one animal. Of 123 bacteriologically positive dairy cows treated with Gamaret (Infúza, Czech Republic) 81.3% were restored to health. In April 2000, twenty-three resistant cows were rteated with Linkomicin F (Lek, Slovenia); of these 8 revealed persisting agents (Streptococcus uberis, coagulase-negative Staphylococci and Staphylococcus aureus in 5, 2 and 1 animal, respectively). These animals were gradually culled. During May and June 2000 the occurrence of bacteriologically positive animals did not chage substantially, however, isolation of Streptococcus agalactiae in 3.7% of the animals between April and November 2000 was a substantial finding. According to Table 2 the infection rate decreased from July 2000 on, with environmental pathogens (Streptococcus uberis and coagulase-negative Staphylococci) being the main causative agents. Surprisingly Staphylococcus aureus had minimum occurrence and coul not be isolated at the end of the observation period.

Table 2 Share of bacterial agents in mastitis infection rates on the dairy farm under observation

Month of examination	*Share of bacterial agents in mastitis infection rates*						
	1	2	3	4	5	6	total
March	31	71	3	16	1	1	123
Apríl	7	5	1	5	2	3	23
May	7	5	1	7	3	3	26
June	7	5	1	5	1	2	21
July	8	14	1	6	1	2	32
August	5	27	0	14	5	8	59
September	5	27	1	39	8	8	88
October	8	40	3	26	2	4	83
November	6	65	0	5	1	1	78

1 - Streptococcus agalactiae; 2 – Streptococcus uberis; 3 – Staphylococcus aureus; 4 – Coagulase-negative Staphylococci; 5 – beta-haemolytic Streptococci; 6 – Enterococcus sp.

The success of the measures can be seen in the fact that the originally high numbers of somatic cells (780,000 BT SCC/1 ml) decreased below the required 400,000 BT SCC/1 ml. Production of highest quality milk is only possible with continuous control of mammary gland health in the herd by implementing effective programmes of mastitis prevention and control. This is especially true if environmental pathogens like Streptococcus uberis and coagulase-negative Staphylococci are involved.