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Use of herbal preparations in the prevention and treatment of udder diseases in organic dairy farms

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Introduction

There are 3087 dairy farms in Poland keeping in total 19,149 cows. Possession of so abundant dairy cattle population resulted in launching organic milk on the domestic retail market in 2015 simultaneously by two producers: OSM Piątnica and OSM Nowy Sącz. Organic dairy production in Poland is based on Polish breeds of dairy cattle which has a deep practical significance (Wójcik & Walczak, 2013). Since all classic, synthetic allopathic therapeutics and their prophylactic use are forbidden, farmers have to rely on the choice of the most useful breed and maintaining proper environmental conditions. Meeting the environmental requirements for organic dairy cattle farming, which include herd size, access to a yard, availability of sufficient space to move and feeding, guarantees reduction of environmental pressure, in comparison with classic cow farming methods, and thus a higher level of animal welfare and better health status (Walczak & Szewczyk, 2013). However, to be able to make use of this potential of health, farmers have to comply with some basic farming principles which are specified in pertinent regulations.

Rooms, pens, equipment and furnishings have to be properly disinfected in order to prevent transmission of pathogens. Besides hygienic requirements set for equipment and facilities, also farmworkers have to observe hygienic measures. Feces, urine, uneaten or spilt feed have to be removed as often as necessary in order to minimize smell and development of insects and rodents. However, when in spite of implementation of all these measures, cows become sick or get hurt, they should immediately be treated. Plant-derived drugs and homeopathic products have a priority over allopathic veterinary therapeutics and antibiotics, provided that their therapeutic action is efficient for a given species under conditions in which they are planned to be used. In the case when the use of the above-mentioned products is inefficient, to prevent suffering or stress of animals it is allowed to apply classical veterinary medicines. The withdrawal period between administration of the last drug dose to an animal and collection of products from it should be twice the legal withdrawal period or 48 h if the withdrawal period is not specified.

Obviously, the prohibition of the use of classical medicines does not apply to compulsory vaccinations, treatment of parasitic diseases and other compulsory disease control programs listed in veterinary regulations. In conventional dairy cow farming, mastitis is a heavy burden (Wójcik,

2013; Gardzina et al., 2004; Barłowska et al., 2003; Kamieniecki et al., 2000; Sawa et al., 2000). Understandingly, the risk of mastitis in organic farming is reduced compared to classical dairy cow farming. It results not only from a higher resistance of cows but also from a reduced milk yield and lower contribution of feed concentrates in cow feeding (Litwińczuk et al., 2006; Barłowska et al., 2003). Of course, as the whole etiology of mastitis is very complex, the risk of this disease cannot be entirely eliminated in organic farming (Sawa et al., 2000). However, incidence of mastitis increases while certified therapeutics are lacking on the domestic market. Hence, the use of alternative medical products becomes an other issue (Dudko, 2008). Efficacy of homeopathy is often questioned in veterinary papers. However, the use of herbal medicines does not raise such doubts as their biological activity is not limited to nutritional effects and to the cow body but also they can locally modify species composition and functioning of microflora, including pathogens (Biedrzycka, 2013; Bilik & Strzetelski, 2013).

The aim of the present studies was to develop practical methods and recommendations for organic dairy farms regarding prophylaxis and treatment of udder diseases, especially mastitis, in a subclinical and clinical phase based on herbal preparations.

Material and methods

The studies were conducted on 7 organic dairy farms each keeping a herd of not less than 10 cows. Each farm was encoded by the number, e.g. “farm I”, “farm II” etc.

Cows were housed in a free-stall system with milking in a milking parlor (farm I and II) and in a tie-stall system with bucket milking (III–VII). Cows were housed in deep-bedding system in farm I while the remaining farms had medium straw-bedded cubicles. In farms III–VII barns were cleaned once a day before morning milking. On farm I, manure was removed every second month. Housing conditions and welfare of animals were assessed to be very good. All animals were pastured in a vegetation season, i.e. from April 15, from 7.00 a.m. to 5.00 p.m. Morning milking was carried out at 5.00–6.00 a.m. and evening milking at 6.00–7.00 p.m.

After the evening milking cows remained in the barn. Animals were fed according to the same standards (IZ INRA) taking into account milk yield and regulations pertinent to organic dairy faming methods. With respect to geographical location, farm I was situated on the border of the Sandomierz Basin, farm II – in the Island Beskids, farms III and IV in the High Beskids, farms V and VI in the Sącz Beskids and farm VII in the Carpathian Foothills. All cows were subjected to evaluation of value in use, including detailed analysis of milk (Somatic Cell Count, SCC) carried out by PFHBiPM according to ICAR recommendations and regulations.

Udder health and milk quality were also estimated by California Mastitis Test (CMT) using the preparation Mastirapid. Milk samples were rated based on SCC according to a four point scale:

0 – 0<SCC<200,000,
1 – 200,000<SCC<400,000,
2 – 400,000<SCC<1,2000,000,
3 – 1,200,000<SCC<5,000,000,
4 – SCC>5,000,000

and milk quality criteria (× 1000/ml) were defined as:

1) healthy milk to 200,000 SCC,
2) subclinical state SCC from 200,000 to 400,000 SCC,
3) clinical state above 400,000 SCC.

Cows from different farms were treated with natural therapeutic and prophylactic preparation to test their efficacy which was estimated based on SCC.

Two forms of treatment with herbs and their extracts were used: ointment and feed supplements “A” and “B”. Herbal preparations were based on herb extracts. The used ointment was supposed to inhibit prostaglandin cyclo-oxygenase and lipooxygenase, and to suppress histamine release, thus producing analgesic, anti-inflammatory and anti-exudative actions. The ointment was composed of herbal extracts in the form of tinctures from sage, yarrow, arnica and calendula, and peppermint oil, camphor essential oil and creagel. The ointment was applied on the udder after evening milking for 8 days.

Herbal supplement „A” contained a composition of herbs, pasture plant extracts and essential oils possessing inflammatory action and

suppressing bacterial, fungal and yeast growth. Its active ingredients included: phytosterols, flavonoids, juglone, escin, vitamins A1, D3, E, K, C, beta-carotene, biotin, pantotenic acid, rutin, alpha-lipoic acid, linoleic acid, γ-linoleic acid, oleic acid esters.

The mixture was administered at a dose of 200 g/cow/day with morning feeding for 10 days. It was composed of alfalfa meal, algal extract, cumin, astragalus, fenugreek, barberry, chestnut, colza, meadowsweet, chamomile, *rhizoma curcuma*, bark of cinnamon tree, cloves, ginger, horsetail, oregano, calendula, among other things.

The second **herbal supplement „B"** contained a composition of herbs and plant extracts: rosemary, oregano, mint, thyme, sage and kumin. It was supplemented to feed at a dose of 10 g/cow/day for 20 days with morning feeding, added directly to feed.

The used ointment and feed supplements were prepared by a producer of herbal preparations according to accepted standards for this type of products. These products are authorized for marketing in Poland.

Based on test-day yield results, statistical analysis was performed using a three-way analysis of variance with accompanying variable with the use of SAS software package with GLM procedure (SAS v. 93).

Photo 1. Red-and-White cattle on organic pasture near Gładyszów

Results and discussion

In the study period, mean daily milk production on farm I was 15–17 kg with 4.20–5.13% fat content and 3.23–3.38% protein content. While mean milk production was constant and fat and protein levels were relatively stable, there were huge differences in somatic cell count. Mean monthly SCC was from 352,000 to 972,000 cells/ml. Decidedly worse milk parameters were observed in warmer months (Tab. 1).

Milk production on farm II was lower and amounted to 12.9–15.0 kg with 3.11–4.11% fat content and 3.11–3.52% protein content. Like on farm I, the beginning and middle of pasturing period was characterized by an

increase in the level of somatic cells in milk, in April to 651,000 cells/ml and in August to 636,000 cells/ml.

Farm III showed mean milk production at the level 11–18.9 kg and milk was characterized by considerable variations in fat (3.19–4.56%) and protein (3.04–3.30%) percentage. Like on the former farms the beginning of pasturing period coincided with a marked rise in SCC. Over a five-month study period, only once milk SCC was within regulatory limits, i.e. did not exceed 400,000 cells/ml.

With a wide variation of mean daily milk production (9.6–14.3 kg) on farm IV, a very good quality of milk obtained from April to June was documented. Somatic cell count was mostly below the regulatory limit and in spite of the beginning of pasturing period in May, no SCC increase was noted.

A significantly higher SCC level was observed in summer, in August and September, more than 1,000,000 cells/ml. Fat and protein percentages were at similar level as in the above-described farms (fat 3.92–4.24%, protein 2.72–3.38%).

Photo 2. Polish Red cattle on organic pasture near Limanowa

The highest SCC of all studied farms was observed on farm V throughout the whole study period. On this farm, milk production per cow was the highest (17.2–22.1 kg) but the lactation period was the shortest which indicates a high percentage of cows in early lactation phase.

High and relatively stable fat (3.35–4.86%) and protein (2.81–3.61%) percentages were the hallmarks of this farm.

The best quality of milk as estimated by SCC was noted on farm VI. In all study months, SCC was below the regulatory limit. In spite of the beginning of pasturing period in April and associated increase in SCC in milk, the regulatory limit was not exceeded. In these months (June and August) disadvantageous changes in SCC were observed also on this farm. Mean milk production was 14.1–16.6 kg and fat (4.39–5.21%) and

protein (3.26–3.48%) percentages were high.

Mean daily milk production on farm VII fluctuated around 11 kg while fat and protein contents ranged from 4.30–4.92% and 3.47–3.80%, respectively.

Somatic cell count in milk on this farm was from 160,000 cells/ml to 617,000 cells/ml. The beginning of pasturing period had a beneficial effect on SCC level since it was the lowest in these months. The end of pasturing period was characterized by abrupt rise of SCC to 617,000 cell/ml.

All farms fulfilled requirements regarding welfare of animals in a wide sense, beginning from housing through handling and feeding. Of seven farms, only farm I and II utilized free-stall housing system while the remaining farms kept cows in a tie-stall system.

The present studies demonstrated that among cows housed in free-stall barns, 22.5–45.1% produced milk with SCC above the regulatory standard of 400,000 cells/ml on farm I and 24.3–32.4% on farm II, depending on the study month. The highest values were seen in August. Considering the number of milk samples collected per month, it should be stated that the percentage of high-SCC samples was not high, and ranged from 2.67% to 9.15% on farm I and from 3.75% to 4.0% on farm II.

Among farms utilizing tie-stall system, the percentage of cows producing milk with SCC exceeding the regulatory standard on two farms was decidedly higher compared with free-stall system. One of these farms (VI) had the best results throughout the whole experimental period ranging from 6.60 to 13.3% while the worst indices were noted for farm V which had significant problems with cows' health and SCC standard was exceeded in 77% of cows. Analysis of percentage share of milk samples with high SCC in all collected milk samples in individual months indicated that general percentage was quite low but mastitis intensity increased in summer months.

Interesting results were obtained after application of herbal ointment with composition described in Materials and Methods in cows on four organic farms. Each group consisted 10 cows.

Disease symptoms of each of udder quarters were examined and the most sick quarter was assigned to treatment with the herbal ointment. On the day of the treatment beginning, general number of somatic cells, including lymphocytes, granulocytes, macrophages and endothelial cells was determined. The ointment was applied for 8 days and then milk was sampled again and analyzed. Ointment was applied (embrocated) on the inflamed udder quarter every day during evening milking and milk quality was tested simultaneously (8 days) by CMT with the use of Mastirapid. After ointment application was finished, milk quality was analyzed by CMT for subsequent 20 days. SCC analysis in milk showed the highest titre in cows from farm III where over 2,000,000 cells were detected in diseased udder quarters (Tab. 2).

The lowest titre was noted on farm IV – at the level of 624,000 cells/ml. During ointment application on designated udder quarters in cows, SCC was observed to systematically increase in 3 of 4 farms studied. The increase amounted to 300,000 to 800,000 cells/ml within 8 study days. Only on one farm SCC decreased by over 1,000,000 cells/ml. Analysis of lymphocyte, granulocyte, macrophage and endothelial cell counts also showed their increase during ointment application.

Although no healing effect on the inflamed udder quarters was observed in the ointment treatment period, however, with time elapsing from the last treatment, health status of animals noticeably improved (Tab. 3). Undoubtedly, it was associated with the time which was necessary for response of the body to ointment to fight mastitis. Based on daily CMT, it was found that on farm II on the first day of ointment application, 29.4% of the examined udder quarters showed subclinical inflammatory changes and 23.6% presented clinical changes. On the last day of ointment treatment, the number of subclinical states was reduced by 5.9% while the number of clinical changes markedly increased. Twenty days after finishing ointment therapy on this farm, percentage of healthy quarters was high (88%) whereas subclinical states were strongly reduced and clinical forms were entirely eradicated.

Photo 3. Black-and-White cattle on organic pasture near Mielec

Therefore, inflammatory changes in udder quarters decreased twice within 28 days. On farm III at the beginning of experiment, 21% of subclinical states and 14% of clinical states were identified. After the ointment treatment period, these proportions were reversed, like on farm II but after 20 days also 2- and 3-fold, respectively, reduction of diseased udder quarters was observed. Analysis of the results on farm IV demonstrated that the number of acute and subclinical disease states was similar. Directly after ointment application period, like on the earlier farms, the number of subclinical states decreased while that of clinical states increased, however, 20 days after completion of ointment treatment a 4-fold drop in acute inflammations was observed which were transformed into a subclinical state, easier for further treatment.

Table 1. Test-day yield results of dairy cattle in organic farms in 2016

Farm	Test-day yield month	Mean daily milk production (kg)	% fat	% protein	Milk somatic cell count (thous./ml)	Proportion of cows with above-normal SCC in milk (%)	Proportion of samples with high SCC (%)
I	IV	17.3	4.97	3.36	352	22.58	4.57
	V	17.4	5.13	3.38	854	32.25	8.49
	VI	17.6	4.47	3.29	391	29.03	2.67
	VII	16.3	4.20	3.23	404	25.80	5.22
	VIII	15.1	4.61	3.32	972	45.16	9.15
II	IV	13.6	3.57	3.14	651	27.02	4.16
	V	15.0	3.56	3.34	416	27.02	3.75
	VI	14.3	3.11	3.15	439	24.32	3.75
	VII	13.0	3.87	3.11	504	29.72	4.58
	VIII	12.7	3.65	3.29	636	32.43	5.00
	IX	12.9	4.11	3.52	502	24.32	3.75
III	IV	11.0	4.56	3.14	521	21.05	3.66
	V	18.9	3.19	3.27	400	21.05	3.66
	VI	13.6	3.93	3.20	1726	52.63	9.17
	VIII	15.9	3.60	3.04	1173	42.10	6.42
	IX	12.4	3.82	3.30	521	42.10	6.42
IV	IV	9.6	3.92	2.72	219	6.25	1.08
	V	13.5	4.23	3.21	241	18.75	3.26
	VI	14.3	3.95	3.34	290	31.25	5.43
	VIII	14.2	4.04	3.44	822	6.25	3.26
	IX	12.5	4.24	3.38	1033	25.00	5.43
V	IV	21.7	3.87	2.81	706	44.44	7.96
	V	18.3	3.47	3.31	661	44.44	5.76
	VI	22.1	3.35	3.05	602	55.55	9.61
	VII	18.5	3.41	3.07	937	77.77	13.46
	IX	17.2	4.86	3.61	706	44.44	7.96
VI	IV	14.1	4.39	3.37	323	13.33	2.27
	V	19.4	4.74	3.48	113	6.66	1.13
	VI	16.6	4.54	3.29	164	0.00	0.00
	VII	16.6	5.21	3.26	242	6.66	1.13
	IX	15.6	4.45	3.46	323	6.66	1.13
VII	IV	11.8	4.65	3.55	160	12.50	2.05
	V	11.8	4.72	3.54	195	18.75	2.60
	VI	11.2	4.30	3.62	309	12.50	2.06
	VII	10.2	4.48	3.47	327	25.00	4.30
	VIII	10.1	4.42	3.59	540	28.57	3.68
	IX	11.4	4.92	3.80	617	30.72	2.85

Table 2. Effects of using ointment in organic farms – mean content per ml milk

Task	Farm	Somatic cell count ($\bar{x}$ /sd)	Lymphocytes ($\bar{x}$ /sd)	Granulocytes ($\bar{x}$ /sd)	Macrophages ($\bar{x}$ /sd)	Epithelial cells ($\bar{x}$ /sd)
Before ointment application	I n=26	**773 269.23** 1 165 943.76	84 331.48 111 009.66	201 535.44 223 996.19	81 066.68 94 418.66	332 947.20 419 009.65
After ointment application		**1 010 230.76** 1 528 793.31	120 308.79 163 234.24	334 624.16 494 967.87	126 882.87 184 329.57	501 350.83 738 852.18
Before ointment application	II n=18	**665 529.41** 822 068.36	79 800.41 108 507.01	192 300.65 223 210.09	77 078.18 93 243.00	316 350.18 407 945.70
After ointment application		**1 406 000.00** 3 199 490.24	172 992.24 412 313.97	422 447.59 893 582.39	169 439.82 367 510.30	727 061.53 1 617 786.39
Before ointment application	III n=16	**2 042 687.50** 5 097 194.95	271 648.00 685 528.21	584 185.60 1 361 757.09	242 028.66 577 278.80	1 069 537.73 2 628 408.86
After ointment application		**1 045 437.50** 2 123 624.19	78 954.92 129 024.51	169 198.28 259 783.89	68 592.21 107 669.09	332 897.42 479 784.85
Before ointment application	IV n=16	**624 571.50** 86 077.39	74 410.69 115 271.64	213 394.30 235 427.80	82 452.84 97 742.55	297 742.23 443 066.88
After ointment application		**1 724 333.33** 3 479 403.64	213 911.17 455 525.76	474 695.16 904 325.67	192 536.58 381 940.46	843 190.41 1 741 912.30

Only on farm I where at the beginning of the experiment 42% of subclinical states and 14% of clinical states were detected in the examined quarters, after ointment therapy (8 days) and within further 20 days no improvement of health status was noted. The number of healthy quarters (42%) was maintained, subclinical states declined while clinical states rose. Herbal supplement „A" was administered to morning feed of dairy cattle at a dose of 200 g/day for 20 days as a mastitis prophylactic measure in a wide sense and as a therapeutic to control existing mastitis symptoms. The supplement was mixed with the morning feed ensuring that each animal ate the whole prescribed dose. At the beginning, some aversion to eat the new feed may be expected but within 2 days animals get used to the herbal smell and are eager to consume it. Milk samples of 50 ml from morning milking were collected before supplement administration and immediately after treatment completion to determine SCC and lymphocyte, granulocyte, macrophage and endothelial cell counts. Results of analysis of these samples for each farm separately are presented in Tab. 4.

Table 3. Health status of the udder quarter examined in the experiment involving ointment based on CMT tests

Farm	First day of ointment application (%)			Last day of ointment application (%)			20 days after the end of ointment application (%)		
	healthy	subclinical	sick	healthy	subclinical	sick	healthy	subclinical	sick
I	42.8	42.8	14.4	35.7	35.7	28.6	43.0	28.5	28.5
II	47.0	29.4	23.6	64.7	5.9	29.4	88.2	11.8	0.0
III	64.2	21.4	14.4	64.2	14.4	21.4	85.8	7.1	7.1
IV	23.2	38.4	38.4	53.8	15.5	30.7	23.0	69.2	7.8

It was found that on three farms before beginning the experiment, SCC in milk exceeded 1,000,000 cells/ml, while in one of them over 3,500,000 cells/ml were noted. Milk on one farm complied with the regulatory standard, i.e. 400,000 cells/ml. After treatment with herbal supplements, a distinct reduction of SCC was observed on all farms. On three farms SCC decreased below 400,000 cells/ml while on one farm, despite a drop in SCC by 2,000,000 cells/ml, milk still did not comply with the standard. The studies showed that mostly epithelial cell count and granulocyte count impacted on the total somatic cell count.

After supplement treatment, the contribution of both these cell types to total SCC decreased. Therefore, a positive effect, i.e. SCC reduction in milk was observed in the first period of supplement administration. It should be concluded that herbal supplement administration to selected cows in this experiment had a positive effect of their udder health status (Tab. 5). On farm I 58% cows showed clinical form of mastitis at the beginning of therapy. After finishing the therapy, no clinical states were detected and all of them were transformed into subclinical states. Longer observation beyond supplement treatment period indicated again a rise in clinical mastitis states. Therefore, cessation of supplement administration caused relapse of inflammatory states. Similar tendency towards abatement of clinical states during herbal treatment was noted on farm V (reduction from 17% to 0), however, after a longer no-treatment period inflammation reappeared. However, a drop of incidence of udder inflammatory subclinical states was observed simultaneously. Different results were obtained on farm VI and VII where administration of the herbal supplement improved udder health status (reduction of clinical states) which was maintained for the next 10 days post-treatment.

In conclusion, it can be stated that herbal supplementation markedly reduced incidence of udder diseases and mostly increased their health for at least 10 days after treatment.

In another variant of application of herbs in the treatment and prevention of mastitis, cows were administered herbal supplement „B" containing a composition of herbs and plant extracts: rosemary, oregano, cumin, mint, thyme and sage. Two organic farms were selected for studies, in which herbal supplement "B" was given to groups of 5 cows on each farm. It was added directly to feed during morning feeding at a dose of 10 g/cow daily for 20 days.

Table 4. Effects of using herbal supplement "A" in organic farms – mean values

Task	Farm	Somatic cell count ($\bar{x}$/sd)	Lymphocytes ($\bar{x}$/sd)	Granulocytes ($\bar{x}$/sd)	Macrophages ($\bar{x}$/sd)	Epithelial cells ($\bar{x}$/sd)
Before administration of herbs	I n=26	**1 460 142.86** 1 846 516.31	187 793.14 241 785.23	396 869.14 501 736.68	157 957.28 205 427.79	717 523.30 900 039.30
After administration of herbs		**160 142.85** 142 883.90	13 994.71 15 402.56	50 102.00 63 883.11	23 394.00 29 342.93	72 652.14 50 854.15
Before administration of herbs	V n=20	**1 821 666.67** 299 5761.12	220 308.66 396 507.02	553 007.66 80 7928.85	233 120.33 319 020.21	815 230.00 1 478 280.00
After administration of herbs		**395 000.00** 333 125.20	34 780.16 37 494.54	141 992.83 139 460.36	61 885.33 68 256.94	156 341.70 96 179.86
Before administration of herbs	VI n=20	**415 833.33** 447 390.84	44 933.83 57 448.20	137 860.00 162 067.98	57 205.16 65 316.88	175 834.30 175 385.70
After administration of herbs		**114 666.66** 114 838.43	9 830.66 11 328.23	36 925.00 46 650.55	15 280.16 22 263.11	52 630.83 46 823.20
Before administration of herbs	VII n=10	**3 678 000.00** 2 884 756.06	478 146.20 375 012.92	1 013 368.00 773 214.13	404 582.00 317 321.78	1 781 904.00 1 420 615.00
After administration of herbs		**1 094 400.00** 1 120 662.88	128 213.80 152 581.94	400 082.00 301 745.90	154 042.80 108 618.89	412 061.40 587 790.50

Table 5. Health status of the udder quarter examined in the experiment involving supplement "A" – time of administration 20 days

Farm	First day of herbal administration (%)			Last day of herbal administration (%)			10 days after the end of herbal administration (%)		
	healthy	subclinical	sick	healthy	subclinical	sick	healthy	subclinical	sick
I	42	0	58	57	43	0	42	16	42
V	17	66	17	50	50	0	66	17	17
VI	50	33	17	66	34	0	80	20	0
VII	0	0	100	0	80	20	75	0	25

Table 6. Effects of using herbal supplement "B" in organic farms – mean values

Task	Farm	Somatic cell count ($\bar{x}$/sd)	Lymphocytes ($\bar{x}$/sd)	Granulocytes ($\bar{x}$/sd)	Macrophages ($\bar{x}$/sd)	Epithelial cells ($\bar{x}$/sd)
Before administration of herbs	III n=16	1 050 333.33 1 567 531.58	133 028.33 205 111.07	297 319.89 405 388.27	137 108.78 198 719.43	482 876.33 761 611.62
After administration of herbs		803 333.33 1 338 087.63	96 938.11 173 860.15	254 576.44 378 486.89	110 727.00 148 365.00	341 094.00 646 074.77
Before administration of herbs	VII n=10	1 788 200.00 2 272 845.95	223 567.00 301 666.04	533 333.00 614 385.59	217 480.20 236 200.01	813 819.80 1 122 091.92
After administration of herbs		602 800.00 433 666.58	67 912.60 58 670.29	207 141.00 119 698.61	90 716.80 48 342.23	237 029.60 220 712.25

Analysis of the effects of herbal supplement „B" application demonstrated that in cows showing a high SCC in milk at the beginning of feeding with supplement "B", cell count in milk markedly decreased after 20 days. The spectacular positive changes were noted on farm VII where SCC was reduced from 1,300,000 cells/ml to 200,000 cells/ml in milk after treatment.

It is worth noting that health status of inflamed udders changed as they were healed after administration of the supplement. On farm III over two-fold improvement of cow health was observed. These results are presented in Tab. 6.

Application of herbal supplement „B" in feeding of cows in two experimental herds demonstrated that after a longer treatment period (20 days) and also after a total period of 30 days, considerable changes in udder health and reduction of clinical cases of mastitis can be expected. On farm II, percentage of diseased udder quarters decreased from 33% to 12%. During herbal supplement treatment period, the number of cows in subclinical phase of mastitis increased which were further cured in the next period.

On farm VII, the group of cows in clinical phase of mastitis was also markedly reduced in favor of subclinical forms of the disease. A part of studied cows was completely healed which is presented in Tab. 7.

Table 7. Health status of the udder quarter examined in the experiment involving supplement "B" – time of administration 20 days

Farm	First day of herbal administration (%)			Last day of herbal administration (%)			10 days after the end of herbal administration (%)		
	healthy	subclinical	sick	healthy	subclinical	sick	healthy	subclinical	sick
III	33	33	33	45	45	10	66	22	12
VII	0	60	40	0	80	20	10	70	10

Conclusions

The present studies on the use of herbal preparations in the prevention and treatment of udder diseases on organic dairy farms permit the following conclusions and practical recommendations:

1. Prophylaxis and control of mastitis on organic farms requires systematic monitoring of health of udder quarters of cows based on a simple CMT. It is recommended to carry out analyses every second day with the use of a plate and the popular reagent for analysis of somatic cells Mastirapid. In this way, identification of subclinical inflammatory states will allow for complete healing with the used herbal preparations.

2. CMT should be conducted in the morning before milking and pasturing. Results should be recorded and systematically analyzed individually for each cow. In cows suffering from recurrent mastitis, herbal ointments and preparations should be used regularly.

3. In the course of prophylaxis and treatment of mastitis based on the herbal ointment, it is necessary to apply it also on udders in subclinical states. Ointment application for 8 days does not bring immediate improvement but improvement of health status can be achieved in a majority of cases within 20 days post-treatment. The best is to use ointment after evening milking when animals are in the barn, by rubbing it into the skin of the diseased quarter.

4. Systematic prophylaxis of mastitis should include feed supplementation with herbal preparation "A" which strengthens the body's immune defense system. For this purpose, it is suggested to use this supplement in the period of stable herd health for at least 20 days at a dose of 200 g/cow/day. The supplement should be mixed with feed supplied in the morning ensuring that each animal eats the whole dose prescribed.

5. The present studies showed a marked reduction of SCC in milk on all four farms after treatment with herbal supplement "A". On three of them, SCC decreased to the level below 400,000 cells/ml. Only on one farm the decrease was slight which suggests the need of longer use of this supplement or addition of herbal ointments in selected cows suffering from acute mastitis.

6. The use of herbal supplement "B" allowed for reduction SCC in the studied cows even by 1,000,000 cells/ml. When it is administered for a longer period (20 days), noticeable changes in udder health and reduction of clinical states of mastitis in favor of subclinical forms of the disease can be expected. Some cows were completely healed.

7. It is suggested to use herbal supplement „B" at a dose of 10 g/cow/day for at least 20 days, added directly to the morning feed. If no SCC decline is noticed, after a month the therapy with the supplement should be repeated. It is necessary to constantly monitor udder health by CMT.

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USE OF HERBAL PREPARATIONS IN THE PREVENTION AND TREATMENT OF UDDER DISEASES IN ORGANIC DAIRY FARMS

Summary

The aim of the study was to develop practical methods and recommendations for organic dairy farms, concerning the prevention and treatment of udder diseases, in particular subclinical and clinical mastitis, based on herbal preparations. The methodology was based on research in 7 organic farms of dairy cattle of four breeds: Polish Black-and-White (zb), Polish Holstein-Friesian of the Black-and-White variety (hf), Polish Red (pc) and Polish Red-and-White (zr). Cows from each farm were tested for the efficiency of the natural medical and prophylactic preparations. SCC measurements were used to determine the efficacy of the preparations. Two forms of treatment with herbal supplements and extracts were used: ointments and herb supplements "A" and B". The herbal preparations were based on herb extracts.

The present study showed that the use of herbal ointment does not bring immediate improvement within 8 days, although in most cases improved health should be expected within 20 days after the end of treatment. The use of herbal supplement "A" caused a marked decrease in milk SCC in all farms. Likewise, the administration of herbal supplement "B" reduced SCC levels in the investigated cows by 1 million cells/ml of milk per milking. Longer use (20 days) is expected to produce clear changes in udder health and to reduce the incidence of clinical mastitis in favour of the subclinical forms. Some of the investigated cows were completely cured.

Key words: cattle, mastitis, organic farm, herbs