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Productive Qualities of Holsteins with Different Levels of Somatic Cells in Milk

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ABSTRACT: A comparative analysis of the milk productivity and reproductive qualities of Holsteins with different levels of somatic cells in milk is carried out. The influence of genotypic and paratypic factors on productivity indicators and the incidence of cows with mastitis is determined. It is revealed that in the cases of subclinical mastitis, the yield of cows decreased by 7.6% and in the cases of clinical mastitis - by 11.7% (P>0.999), weight content of protein in milk - by 0.1 (P<0,95) and 0,16% (P>0.95) respectively. The fertility increased (by 54.9 and 57.4%). The service period is extended (by 61.5 and 64.6 days) and the calf yield decreased by 100 cows (by 22 and 23 heads, respectively) (P>0.999). Origin affects the susceptibility of Holsteins to mastitis. So, in the line of Reflection Sowering 198998 the highest milk yield and weight content of fat had daughters of the bull of Debut 1382 A1 with an average number of somatic cells, along the Vis Back Ideal 1013415 - Saturn 603 (high milk yield and weight content of protein, low number of somatic cells), along the line Yes Ideal 95679 - Oracle's daughter 546332223 (high milk yield, low number of somatic cell). The number of somatic cells in milk increases as the age and milk production of cows increases. Cows are most susceptible to mastitis in the first or second month of lactation, therefore, it is recommended to begin the determination of latent mastitis immediately after the colostrum. The season did not significantly affect the incidence of cows with mastitis.

Keywords: milk productivity, mass fraction of fat, mass fraction of protein, number of somatic cells, age of cows, clinical mastitis, subclinical mastitis, reproductive qualities, genetic factors, paratypic factors.

I. INTRODUCTION

Cow mastitis causes serious damage to dairy farming as it not only reduces the milk productivity of cows [1, 2], but also makes milk a product unsuitable for processing [3, 4], impairs the reproductive ability of cows [5], shortens their life industrial use [6].

Intensification of livestock use and increased load on the body of cows often leads to various diseases, including clinical and latent mastitis. In the structure of cow diseases in the Udmurt Republic, mastitis takes second place [7]. Therefore, a comprehensive study of this issue is relevant and practically significant.

II. METHODOLOGY

The aim of the study is conducting a comparative analysis of milk productivity and reproductive quality of -and-white cows with different levels of somatic cells in milk and determining the effect of genotypic and paratypic factors on the incidence of cows' mastitis.

The objectives of the study were assessing the negative impact of subclinical and clinical mastitis on milk productivity and the reproductive quality of Holsteins, as well as an analysis of the influence of origin, milk yield for the first lactation, age, stage of lactation of cows and season of the year on the milk productivity of Holsteins and level of somatic cells in milk.

For research, three groups of full-aged cows were formed according to the principle of analogues with 20 animals each. The control group (healthy cows) included animals in which, during lactation, the level of somatic cells in 1 cm^3 of milk did not exceed 200 th. cells in 1 cm^3.

The first experimental group included cows that had been ill with subclinical mastitis during lactation. The number of somatic cells in 1 cm^3 of milk of cows of this g black roup was at the level of 200-500 th. cells in 1 cm^3.

The second experimental group included cows with clinical mastitis with more than 500 th cells somatic cells in 1 cm^3 of milk and having clinically expressed signs of the disease.

Milk yield, weight content of fat and protein, the level of somatic cells (on the Somatos-M device), the amount of milk per lactation in terms of basic fat and protein, as

well as reproduction rates were determined during the 305 days of lactation of the control and experimental group cows. “Mastitan” devise was used in order to identify subclinical mastitis.

III. RESULTS

Studies have shown (Table 1) that the disease of cows with mastitis has led to a decrease in milk yield of cows that had subclinical mastitis by 428.53 kg or 7.6% and of cows with clinical mastitis by 661.8 kg or 11.7% (P>0.999).

With increasing severity of mastitis, the weight content of fat in milk has increased by 0.02-0.04%, but the difference is inaccurate. At the same time, weight content of protein in milk of cows suffering from subclinical mastitis decreased by 0.1% (P<0.95), while those who had clinical mastitis it decreased by 0.16% (P>0.95). Loss of milk during 305 days of lactation in terms of basic fat and protein of cows of the 1st experimental group was 564.7 kg or 10.1%, as for the cows of the 2nd experimental group – 873.7 kg, or 15.5% (P>0.999).

Thus, cow disease with mastitis led to a decrease of milk yield and loss of milk in terms of basic fat and protein. Cows with clinical mastitis had the greatest decrease in productivity.

Table 1: Milk productivity of Holsteins with varying degrees of mastitis.

Experimental group	No. of animals	Criteria				
		Milk yield for 305 days of lactation, kg	Weight content of fat, %	Weight content of protein, %	Milk yield in terms of basic fat and protein, kg	Somatic cells, th.cells/ cm^3
Control group (healthy cows)	20	5643.07 ± 41.45	3.29 ± 0.05	3.09 ± 0.04	5624.32 ± 32.55	189.33 ± 4.68
1st group - cows with subclinical mastitis	20	5214.54 ± 51.24***	3.31 ± 0.03	2.99 ± 0.05	5059.59 ± 45.24***	339.23 ± 4.09***
2nd group - cows with clinical mastitis	20	4981.32 ± 41.86***	3.32 ± 0.1	2.93 ± 0.06*	4750.62 ± 42.56***	553.34 ± 3.19***

Note: * - P>0.95; ** - P>0.99; *** - P>0.999

Not only the number of productive animals and the volume of milk received, but also the ability to conduct effective breeding of livestock and the economic costs of milk production directly depend on the effective reproduction of the herd [8]. A decrease of the reproductive functions of livestock arising from exposure to adverse factors, including cow disease, leads to a reduction in livestock numbers and inefficient use of animals [9-11].

Evaluation of the reproductive qualities of Holsteins with varying degrees of mastitis showed that reproductive qualities of animals that had mastitis during lactation were deteriorating (Table 2).

So, the fertility of cows that had latent mastitis increased by 54.9%, in patients with clinical mastitis increased by 57.4% (P>0.999). The service period was extended by 63.3 and 66.4 days respectively (P>0.999).

The increase of the service period in turn led to an extension of lactation by 61.5 days of cows of the first group and 64.6 days of cows of the second experimental group compared to animals of the control group. At the same time the duration of the calving interval increased by 59.5 and 61.4 days respectively (P>0.999). According to the interlactation period no significant differences between the groups were revealed. The yield of calves per 100 cows of animals with mastitis was significantly lower than animals of the control group. Cows of the first and the second groups produced 22 and 23 animals less than animals received from healthy cows (P>0.999).

Table 2: Reproductive qualities of Holsteins with varying severity of mastitis.

Experimental groups	No. of animals	Reproductive qualities					
		Fertility	Service period, days	The number of milking days	Calving interval	Interlactation period, days	Yield of calves per 100 cows, animals.
Control group (healthy cows)	20	1.22 ± 0.14	104.51 ± 3.23	329.21 ± 4.21	390.82 ± 3.62	60.10 ± 1.24	91 ± 1.66
1st group - cows with subclinical mastitis,	20	1.89 ± 0.19**	167.84 ± 2.27***	390.75 ± 3.81***	450.32 ± 4.22***	62.04 ± 1.52	69 ± 2.03***
2nd group - cows with clinical mastitis	20	1,92 ± 0.16**	170.89 ± 3.19***	393.8 ± 4.03***	452.21 ± 4.37***	62.08 ± 2.01	68 ± 1.52***

Note: * - P>0.95; ** - P>0.99; *** - P>0.999

Thus, the disease of cows with mastitis led to a decrease in the reproductive functions of Holsteins: increase of fertility, lengthening of the service period, and significant decrease of the yield of calves per 100 cows. The most pronounced negative changes had cows with clinical mastitis.

For the most effective solution to problems with the incidence of cows with mastitis, it is necessary to comprehensively study the factors that cause this disease and somehow affect its development. These factors include the genetic potential of the animal, as well as paratypic factors, such as the age of the animals, the stage of lactation, health status, technology of milking and keeping cows, season of the year, etc. [12-16].

The genetic predisposition of cows to mastitis, due to the low suitability for machine milking and low resistance to diseases due to insufficiently effective immunity functions, creates all conditions for the development of the disease. Therefore, the selection of animals for further breeding purpose use should be carried out taking into account their genetic resistance to mastitis [17-19].

To determine the effect of the origin on the mastitis resistance of Holsteins, the milk yield was analyzed for 305 days of the first lactation, the weight content of protein and fat, and the level of somatic cells in the milk of daughters of bulls of the three main lines used in the farm.

The daughters of bulls of the Reflection Sowering 198998 line were evaluated: Debut 1382 A1, Dyuim 2619 and Patrick 51660096 A1, Vis Back Ideal line 1013415: Monaka 1092, Taller 2140 and Saturn 603, as well as Yes Ideal line 95339: Parol 13306, Parliament 730343432834 and Oracle 546332223.

15 daughters from each bull were evaluated in comparison with the indicators of their peers. The selection of animals was carried out according to the principle of analogues. The origin, age of the cows and calving date were taken into account while selecting. The data obtained are presented in Table 3.

Table 3: Productive qualities and the number of somatic cells of the cows, heifers of Holsteins of various lines.

Line	No.r of animals	Yield for 305 days of lactation, kg	Weight content, %		The amount of milk in terms of basic standards, kg	Somatic cells, th cells/cm^3
			Fat	Protein		
Reflection Sowering 198998	45	5920.39 ± 46.09***	3.31 ± 0.02	2.99 ± 0,02*	5744.46 ± 32.19*	402.71 ± 52.1
Vis Back-Ideal 1013415	45	5902.23 ± 35.23***	3.33 ± 0.02	2.99 ± 0.01*	5761.44 ± 34.02**	463.05 ± 53.4
Yes-Ideal 95339	45	5702.61 ± 31.26	3.35 ± 0.01	3.02 ± 0.01	5639.32 ± 35.82	388.75 ± 43.6

Note: * - P>0.95; ** - P>0.99; *** - P>0.999

A comparative analysis of the productivity of cows belonging to different lines showed that the animals belonging to the Reflection Sowering line 198998 and Vis Back Ideal 1013415 differed by the most milk yield. Their milk yield exceeded the milk yield of cows of the Yes Ideal line 95679 by 217.8 and 199.62 kg respectively (P>0.999). At the same time the first-calves of the Yes Ideal line 95679 exceeded the cows of the other two lines in the weight content of protein by 0,03% (P>0.95) and weight content of fat by 0.01-0.04%, but the differences in fat were statistically inaccurate.

The number of somatic cells in the milk of cows of all lines is quite high. So cows of the Yes Ideal line 95679 have the smallest quantity – 388.75 th.cells/cm^3, but it also exceeds the requirements of the highest grade (according to GOST R 52054-2003 "Raw cow's milk. Technical conditions") by 138.75 th.cells/cm^3 and for cows of lines of Vis Back Ideal 1013415 and Reflection Sowering 198998, the number of somatic cells in milk meets only the requirements of the second grade and exceeds the requirements of the first grade by 63.05 and 2.71 th.cells / cm^3 respectively.

The smallest amount of somatic cells in milk had cows with the lowest milk yield of the Yes Ideal line 95679, the largest amount had cows of the Vis Back Ideal line 1013415, but the differences were not statistically significant.

In terms of basic fat and protein, differences in the amount of milk obtained after 305 days of lactation between cows of different lines are less pronounced. The cows of the Vis Back Ideal line 1013415 are superior to animals of the line Yes Ideal 95679 by 122.12 kg (P>0.99), and the cows belonging to the line of Reflection Sowering 198998 by 105.14 kg (P>0.95).

Evaluation of the productivity of the daughters of various seed bulls and the number of somatic cells in milk (Table 4) showed that, according to the Reflection Sowering 198,998, the daughters of the bull of Debut 1382 A1 had the highest milk yield – 6002.17 kg. At the same time, they were distinguished by a high fat content of 3.45 %. The number of somatic cells in the milk of these cows was 435.72 th.cells / cm^3, which was close to the peers. With the further use of this bull, it is advisable to pay attention to the number of somatic cells in the milk of daughters.

The smallest number of somatic cells equals to 339.23 th.cells / cm^3 was in milk of daughters of the Dyuim 2619 with average milk yield and fat content of milk.

Through Vis Back Ideal 1013415, the daughters of Saturn's bull 603 showed the best results: they had the highest milk yield equal to 6210.36 kg, high protein content in milk equals to 3.06% with the smallest number of somatic cells in the line which is 430.12 th.cells / cm^3.

The daughters of the Monac bull 1092 of this line had a rather high milk yield equal to 5863.27 kg and a high mass fraction of fat which is 3.41%. But, at the same time, they had the lowest protein equal to 2.9 %, and were characterized by the highest level of somatic cells in milk which is 495.6 th.cells / cm^3.

The daughters of bull named Taller 2140 of the Vis Back Ideal line 1013415 had the lowest milk yield of the line which is 5633.07 kg, which is less than the results of their peers by 208.67 kg (P>0.999). At the same time, they were distinguished by a rather low fat milk content equal to 3.28% and a high content of somatic cells in milk equal to 463.42 th.cells / cm^3.

On the line of Wes Ideal 95679, the daughters of the Oracle bull 546332223 had the highest productivity. Yield equals to 6043.95 kg, weight content of fat equals to 3,4% and protein in milk equals to 3.11%. At the same time, the daughters of this bull were characterized by the lowest number of somatic cells in milk (310.16 th.cells / cm^3), which makes its use promising.

The daughters of the Parol bull 13306 of the Yes Ideal line 95679 have had the largest number of somatic cells in milk which is 513.34 th.cells/cm^3, which exceeds the peers by 95.17 th.cells / cm^3, and also had a low milk yield (5420.33 kg) and average protein and fat levels in milk.

Table 4: Productive qualities and the number of somatic cells of daughters of various bulls.

Bulls' line	Bull's name	No. of animals	Yield for 305 days of lactation, kg	Weight content, %		Amount of milk in terms of basic standards, kg	Somatic cells, th. cells/ cm^3
				Fat	Protein		
Reflection Sowering 198998	Debut1382 A1	15	6002.17 ± 43.50**	3.45 ± 0.03***	3,09 ± 0,02***	6273.15 ± 44.31***	425.72 ± 49.3
	Dyuim 2619	15	5813.25 ± 53.10	3.25 ± 0.03*	3,00 ± 0,02	5556.7 ± 46.42**	339.23 ± 40.9
	Patrick 51660096 A1	15	5945.75 ± 44,05	3.22 ± 0.03***	2,89 ± 0,02***	5424.5 ± 50.04***	420,40 ± 46,7
Vis Back Ideal 1013415	Monack1092	15	5863.27 ± 31.40	3.41 ± 0.03*	2,90 ± 0,01***	5684.49 ± 42.1	495.6 ± 58.7
	Taller 2140	15	5633.07 ± 42.45***	3.28 ± 0.03	3,00 ± 0,02	5434.26 ± 46.51***	463.42 ± 40.1
	Saturn 603	15	6210.36 ± 34.64***	3.30 ± 0.03	3,06 ± 0,02**	6148.26 ± 42,07***	430.12 ± 40.2
Yes Ideal 95679	Parol 13306	15	5420.33 ± 28.22***	3.27 ± 0.04	3,06 ± 0,02**	5317.34 ± 32.21***	513.34 ± 33.9*
	Parliament 52800347 A3B3	15	5643.56 ± 43.15***	3.39 ± 0.02**	2,90 ± 0,02***	5439.39 ± 35.43***	342.75 ± 50.9
	Oracul 546332223	15	6043.95 ± 24.98***	3.40 ± 0.03*	311 ± 0.02***	6265.56 ± 31.56***	310.16 ± 49.3*
Heardmates		135	5841.74 ± 42.09	3.33 ± 0.03	3.00 ± 0.01	5721.47 ± 41.18	418.17 ± 45.5

Note: * - P>0.95; ** - P>0.99; *** - P>0.999

Thus, taking into account the analysis carried out, for the further reproduction of the herd in order to increase both the milk production of cows and reduce the level of somatic cells in milk, it is recommended to use the Oracle bulls 546332223 (Yes Ideal line 95679) and Saturn 603 (Vis Back Ideal line 1013415).

It is not recommended to use the bulls of Taller 2140 of the Vis Back Ideal line 1013415 and Parol 13306 of the Yes Ideal line 95679 in further work with the herd, so their use will lead to decreasing of milk yield, weight content of fat in milk and decreasing of the daughters' resistance to mastitis.

To estimate the weight content of fat, protein, and the number of somatic cells in the milk of cows with different levels of milk productivity, first-born cows were divided into four experimental groups, taking into account the age, origin and date of calving with milk yield increase for 305 days of lactation. The first group included cows with a milk yield of less than 5000 kg, the second group included cows with milk yield within the interval 5001 - 6000 kg, the third - from 6001 to 7000 kg and the fourth - more than 7000 kg. All animals during the study were in the same conditions of feeding and content.

As studies have shown (Table 5), with increasing milk yield, the number of somatic cells in milk rises from 351.7 th.cells/cm^3 (when milk is 4674.27 kg) to 529.31 th.cells/cm cm^3 (when milk is 7025.43 kg), that is, by 171.61 th.cells/cm^3 (P>0.999). This means that more highly productive animals are more likely to become ill.

The smallest weight content of fat in milk, which is 3.34 %, had cows with a milk yield of 5001 - 6000 kg, which is more than weight content of fat in milk of cows with a milk yield of 6001 - 7000 kg per 0.11 kg (P>0.99).

Table 5: Indicators of productivity and the number of somatic cells in the milk of first-calf cows with different levels of milk yield.

Experimental groups depending on milk yield for 305 days of lactation, kg	No. of Animals	Criteria			
		Yield for 305 days of lactation, kg	Weight content of fat, %	Weight content of protein, %	Number of somatic cells, th.cells / cm^3
Less than5000	66	4674.27 ± 43.25	3.40 ± 0.03	3.10 ± 0.02	351.5 ± 4.42***
5001 - 6000	95	5641.38 ± 47.31	3.34 ± 0.03**	2.98 ± 0.02***	423.09 ± 5.02***
6001 - 7000	25	6234.71 ± 50.21	3.45 ± 0.03	2.91 ±0.02***	486.11 ± 3.25***
More than7000	7	7025.43 ± 33.26	3.42 ± 0.04	2.88 ± 0.02***	529.31 ± 4.27
Average	193	5893.95 ± 52.09	3.40 ± 0.04	2.97 ± 0.02	422.50 ± 5.85

Note: * - P>0.95; ** - P>0.99; *** - P>0.999

The weight content of protein in milk decreased with milk yield increased. So, when yield equals to 4674.27 kg, the weight content of protein has been 3.10 %, which is less by 0.12 % when yield equals to 5641.38 kg, when yield is 6234.71 kg it is less by 0.19%, and when yield is 7025.43 kg it is less by 0.22% (P>0.999).

To assess the milk productivity and the number of somatic cells in the milk of cows of different ages, these indicators were analyzed by cows of 1, 2, 3, 4 of lactation and older. Each experimental group included 10 cows.

As studies have shown (Table 6), with age, the yield of cows has increased. So cows of 2 lactation exceeded the performance of first-calf cows by milk yield by 365,28 kg, cows of 3 lactation - by 954.48 kg and cows of 4 lactation and older - by 1247.6 kg (P>0.999).

Table 6: Productivity and the number of somatic cells in the milk of cows of different ages.

Lactation	Number of animals	Yield for 305 days of lactation	Weight content of fat, %	Weight content of protein, %	Number of somatic cells, th./cm^3
1	10	4758.12 ± 40.28***	3.20 ± 0.03***	3.02 ± 0.03	362.9 ± 7.36***
2	10	5123.40 ± 42.58***	3.40 ± 0.05	2.99 ± 0.02	412.5 ± 4.46***
3	10	5712.60 ± 68.17***	3.35 ± 0.04	2.98 ± 0.02	450.91 ± 6.71***
4 and older	10	6005.72 ± 52.12	3.30 ± 0.04	3.02 ± 0.02	491.41 ± 4.74
Average	40	5399.86 ± 48.92	3.31 ± 0,03	3.00 ± 0.02	429.43 ± 5.73

Note: * - P>0.95; ** - P>0.99; *** - P>0.999

The weight content of fat increases and reaches a maximum to the second lactation (3.4%), which is 0.2% more than weight content of fat of the first-calf cows (P>0.999). The weight content of fat is reduced in the milk of cows older than the third lactation but the differences are not statistically significant.

According to the weight content of protein of cows of different ages, no significant differences have been noted.

The number of somatic cells in milk increases with the age. The number of somatic cells of milk of cows of the second lactation increased by 49.6 th.cells / cm^3 compared to the first-calf cows, and as for the third lactation - by 88.01 th.cells/cm^3, and as for the fourth lactation and older - by 128.51 th.cells / cm^3 (P>0.999).

It should be noted that in all groups of animals the number of somatic cells in milk corresponded to the requirements of TR CU 033/2013 "On the safety of milk and dairy products" (not more than 750 th.cells/cm^3). But, nevertheless, the content of somatic cells at the level of 200-500 th.cells/cm^3 is a rather alarming indicator. It is believed that if the number of somatic cells in milk exceeds 200 th.cells/cm^3 up to 30% of cows in the herd have a sick udder. There is also evidence that changes in the composition and properties of milk become noticeable when the content of somatic cells exceeds 200 th.cells / cm^3.

The first grade can only be assigned to milk obtained from the first-calf cows. Milk obtained from the cows of other ages corresponds to the second grade.

The incidence of cows with mastitis is also affected by the stage of cows lactation. To determine the effect of the lactation stage on the incidence of mastitis, two samples of 40 animals each from cows who have had latent and clinical mastitis over the last 4 years have been taken. Then the proportion of diseased in each month of lactation has been determined among the cows of the sample.

As the obtained data showed (Table 7), the largest number of diseased cows occurred in the first month of lactation. So, the proportion of cows with subclinical mastitis in the first month of lactation was equal to 35.5 %, in the second month of lactation it was equal to 12.6 %. Then, up to 5 months of lactation the proportion of diseased cows decreased, and at the 5th months of lactation only 3.8 % of cows with subclinical mastitis were detected.

By the 9th month of lactation, the proportion of cows with latent mastitis increases to 10.4%, and on the last month of lactation proportion of animals with subclinical mastitis equals to 4.9%.

Cows were often sick with clinical mastitis in the first half of lactation (up to 6 months). At the same time, the largest number of cows with obvious mastitis was also in the first month of lactation – 19.7%. In the first two

months of lactation, almost a third (33.5%) of the detected clinical mastitis occurs.

From the 7th month until the end of lactation, the number of cows that have had obvious mastitis decreases from 8.9% to 2.1%.

Table 7: The Effect of the stage of lactation on the incidence of cows mastitis.

Month of lactation	Subclinical mastitis,		Clinical mastitis,	
	Animals	%	Animals	%
1	14	35.5	8	19.7
2	5	12.6	6	13.8
3	4	7,.9	4	11.4
4	2	5.7	5	13.3
5	1	3.8	4	10.8
6	2	4.3	5	12.1
7	3	6.6	4	8.9
8	3	8.3	2	5.4
9	4	10.4	1	2.5
10	2	4.9	1	2.1
Total	40	100.0	40	100.0

Thus, studies have shown that with increase of milk productivity, the susceptibility of cows to diseases increases, and, accordingly, the number of somatic cells in milk also increases. With each subsequent lactation, the level of somatic cells in milk also rises, which may be explained by an increase in the productivity of cows with age.

Cows are most susceptible to mastitis in the first or the second month of lactation, therefore it is better to start the diagnosis of mastitis immediately after the colostrum period (7-10 days after calving) and, then, during the first or the second month of lactation, to determine the latent mastitis at least 1 time in 10 days. It will help to identify the disease in the early stages, which will increase the effectiveness of treatment, reduce milk loss and help to prevent the transition of latent mastitis into clinical form. To reduce the content of somatic cells in milk, it is often necessary to diagnose mastitis in highly productive and full-age cows and provide these animals with the most comfortable feeding and keeping conditions.

According to the studies of many authors, the season of the year affects the incidence of cows with mastitis.

So in the studies of Asimova (1999) [14] revealed that most of the cows get sick in the spring and autumn season.

Korelskaya [16] revealed that the greatest number of somatic cells was noted in the milk of spring and winter periods. Korotkov (2006) reports that the largest number of somatic cells in milk occurs in summer [15]. On the contrary, the analysis carried out by Bychkova and Manuilova (2014) showed that the season of the year had almost no effect on the incidence of cows with mastitis [20]. An analysis of the incidence of cows with latent and obvious mastitis throughout the year (Table 8) revealed that there were no significant fluctuations in the incidence of cows with mastitis throughout the year.

During the year, 12.88% of the milking herd was ill with a hidden and obvious form of mastitis, including subclinical mastitis which is 10.3%, and clinical mastitis which is 2.59%. Considering the dynamics of the incidence with mastitis of all forms during the year, we can say that in summer and spring seasons there is a slight increase of the number of sick animals up to 14.25% and 13.08% respectively. The smallest number of cows with mastitis is observed in the winter season which is 11.5%.

Table 8: The incidence of cows with mastitis in different seasons, %.

Mastitis form	Winter	Spring	Summer	Autumn	Yearly average
Mastitis of all forms, including:	11.5 ± 2.13	13.08 ± 2.32	14.25 ± 2.24	12.70 ± 2.16	12.88 ± 2.21
Subclinic mastitis	9.09 ± 1.89	11.64 ± 2.01	10.55 ± 1.75	9.91 ± 1.83	10.3 ± 1.87
Clinic mastitis	2.42 ± 0.24	1.44 ± 0.31	3.71 ± 0.49	2.79 ±0.33	2.59 ± 0.34

The smallest number of cows with subclinical mastitis was noted in winter which is 9.09%. Most hidden mastitis was detected in the spring and summer which is 11.64 and 10.55% respectively.

The smallest number of cows with clinical mastitis was noted in the spring which is 1.44%, most of the cows with an obvious form of mastitis were noted in summer, which is 3.71 %.

Thus, the season of the year does not significantly affect the incidence of cows with mastitis. More often cows get sick in summer and spring.

IV. CONCLUSION

A comparative analysis of the milk production of Holsteins with different levels of somatic cells in milk revealed that cow disease with mastitis led to a decrease in milk yield and loss of milk, converted to basic fat and protein.

The greatest decrease in productivity had cows with clinical mastitis. Cows with subclinical mastitis had milk yield decreased by 7.6%, as for cows with clinical mastitis milk yield decreased by 11.7% (P>0.999), weight content of protein in milk decreased by 0.1 (P<0.95) and 0.16% (P>0.95) respectively.

The reproductive functions of Holsteins are deteriorate while the level of somatic cells in milk increases. Cows that had subclinical and clinical mastitis, have increased fertility (by 54.9 and by 57.4%), the extended service period (by 61.5 and by 64.6 days), the decreased calf yield per 100 cows (by 22 and by 23 animals respectively) (P>0.999).

The origin affects not only the milk production of Holsteins, but also susceptibility to mastitis. So, in the Reflection Sowering 198998 line, the daughters of the bull Debut 1382 A1 had the highest milk yield and weight content of fat with an average number of somatic cells, in the line of Vis Back Ideal 1013415 - Saturn 603 (high milk yield and low protein, low amount of somatic cells), along the line of Wes Ideal 95679 - the daughter of the Oracle 546332223 (high milk yield, low level of somatic cells).

The number of somatic cells in milk increases as the age and milk production of cows increases. Cows are most susceptible to mastitis in the first or second month of lactation, therefore, it is recommended to begin the determination of latent mastitis immediately after the colostrum.

The season did not significantly affect the incidence of cows with mastitis.

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