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ESTIMATION THE IMPACT OF THE INDIVIDUAL CONTROL ON RAW MILK YIELD, QUALITY AND SAFETY

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Abstract

Exceptionally productive management techniques are actualized all over in the dairy herds which make it possible to produce milk in large quantity also, in high quality. In this paper an attempt has been made to obtain some estimation of the milk yield and quality by using individual control at Holstein Friesian dairy cows. Individual and bulk tank milk samples have been taken from one local small Pelagonia's farm in R. Macedonia. The cows were held in an intensive stall keeping premises and never turned out to graze. We have recorded milk yield and number of SCC continuously for 3 months (August 2012 to October 2012) in the dairy farm. The aim of this study was to determine how an individual cow, positively or negatively affects the total bulk milk quality as well as to identify possible submastitis at lactating cows.

Key words: individual control, somatic cells, milk quality;

Introduction

In the last decades, one of the main benefits to which every modern and advanced farm tends is getting higher milk yield and milk quality **(O'Brien, B. et al., 2007)[1]**. The dairy industry's goal has always been to produce quality milk for the consumer market **(Oltenacu and Broom., 2010)[2]**. It might be achieved by proper farm management through modern breeding of dairy cows and monitoring of milk quality traits, as milk composition, somatic cell count (SCC) and bacterial content **(Elmoslemany et al., 2010)[3].** Among the standards employed in the evaluation of milk quality, somatic cell count (SCC) have been widely used recently as an indicator of the health status of the dairy herd **(Sharif and Muhammad., 2008)[4]** and specific hygiene requirements of milk **(Ogola et al., 2007) [5].** High bulk tank bacteria counts usually indicate improper milking machine sanitation or poor teat hygiene prior to milking unit attachment **(Bava et al., 2011),** whereas elevated bulk tank SCC indicates herd level infection status with mastitis pathogens **(Hamann et al., 2005).** The number of somatic cells obtained from the sample taken from each dairy cow or individual milk control, shows us the health condition of experimental cows **(Makarijoski, B., 2012).**

Material and methods

Milk samples from Holstein-Friesian lactating cows were taken at one dairy farm in the Bitola district in Republic of Macedonia. The dairy cows on the farm were fed ad libitum throughout the year as a total mixed ration, supplemented with concentrate according to standard practice and the cows were never turned out to graze. The milk samples were collected from the morning milking of the dairy cows (5.00 - 7.00 hours). In accordance with the rules for milk sampling, the milk samples were manually taken from the individual collector of the milking De Laval system in with a special sterile plastic cups (50ml). Samples were transported to the laboratory by movable

refrigerator and kept in at the same temperature < 10 °C during the determination of milk quality parameters **(Hristova K. V., 2014)**. We also wrote down the amount of day milk production and number of lactation for all cows. All examination process lasted three months. The number of somatic cells were examined using microscopic referent method and fluoro-opto-electronic method ISO 13366-3:1997 using the appliance SOMASCOPE, DeltaInstruments-Holland.

Results and discussion

The farm that was examined in this study had eight cows and each of them during the quarterly survey was in lactation. In the following **Table No.1** the first examination results have been shown.

Table 1: Determination of the parameters SCC, LN and DMY (first examination)

Cow (No.)	Somatic Cell Count SCC/ml	Lactation Number (LN)	Daily Milk Yield (liters/ day)
1	1 281 000	4	19.2
2	678 000	2	16
3	651 000	1	19.4
4	331 000	3	22
5	269 000	2	16.2
6	239 000	2	11
7	122 000	1	18.5
8	78 000	2	23
$\bar{x}$	**458 000**	**2.13**	**18.16**

- Note: Present somatic cell count (SCC) limit is 400,000 cells/ml, (National Mastitis Council, 2010)

According to the results from the tests taken directly from the udder, it is apparent that cows No.1, No.2 and No.3 had a number of somatic cells above the limit of 400,000 somatic cells/ml, such as: cow No.1 – 1,281,000 somatic cells/ml, cow No.2 – 678,000 somatic cells/ml, cow No. 3 – 651,000 somatic cells/ml, and the sample from the aggregate milk valued at 458,000 somatic cells/ml. The remaining five cows had normal values of somatic cells.Because of the high number of somatic cells found in the milk produced by these cows, a treatment to reduce the number of somatic cells was undertaken. The health condition of the cow No.1 at the beginning of the examination was poor. Apart from the high number of somatic cells (1,281,000/ml), there were changes in the milk consistency and swelling of the udder, which means that the cow had the appearance of clinical form of mastitis. They were put under healing treatment.

The condition of cows 2 and 3 was completely different. They gave milk with a high number of somatic cells, which had a negative impact on the quality of milk, but no clinical symptoms of mastitis. It is assumed that they had a subclinical form of mastitis (hidden mastitis). For confirmation or denial of the mastitis assumption a healing process at these two cows was undertaken.The healing process lasted for seven days. During that time the milk from them was not mixed with the milk from the other cows because of the antibiotics contained in their system.

After the seven days, the control of these three dairy cows was repeated. Milk samples were taken directly from the udder from each cow, and a sample from the aggregate milk. The healing process did not help cow No.1. The number of somatic cells present in the milk, after the healing process amounted to 1,511,000/ml, which had some increase since the last inspection, and the clinical symptoms remained.

The cows No.2 and No.3 went through a successful treatment. The number of somatic cells in their milk decreased. The cow No.2 reached 308,000/ml from 678,000/ml before the treatment, while the cow No.3 had 651,000/ml from 350,000/ml before the treatment. This leads to a conclusion that the previous statement was correct. These two cows had hidden mastitis, found thanks to this individual control. This improves the quality of milk produced, and the health of the

dairy cows. The number of somatic cells in the sample from the aggregate milk after the successful treatment of cows 2 and 3 is reduced compared to the previous time, 407,000 after, from 458,000 before the treatment. The reason of a number of somatic cells over the limit is the milk from the cow No.1. Therefore, the treatment continued and the condition was followed till the next month.

Since a quite high number of somatic cells was found at the cow No.1, a mathematical calculation was done to see how much the average number of somatic cells would reduce if the cow is excluded from production. If we excluded cow No.1 the average number of somatic cells would be 236,000 somatic cells / ml. By excluding this cow, the farmer can produce milk with good quality. The results obtained from this second examination on the farm are given in the **Table No. 2.**

Table 2: Determination of the parameters SCC, LN and DMY (second examination)

Cow (No.)	Somatic Cell Count SCC/ml	Lactation Number (LN)	Daily Milk Yield (liters/day)
1	1 632 000	4	13.7
2	296 000	2	14.5
3	321 000	1	21.7
4	337 000	3	17
5	666 000	2	15.1
6	307 000	2	14.3
7	185 000	1	22.1
8	103 000	2	23.4
$\bar{x}$	**429 000**	**2.13**	**141.80**

According to the data obtained in the second month of the implemented individual control on the farm, a slight increase in the number of somatic cells in the sample from the aggregate milk is noticed, compared to the number of somatic cells after the treatment of both critical cows last month. That number was 429,000 somatic cells/ml. The main reason was the cow No.1. Despite the treatment with means to treat mastitis, no positive result was obtained. For a second month in a roll, the cow had a high number of somatic cells in the produced milk and this number increased despite the measures taken. Increase of the number of somatic cells at the cow No.5 was noted in comparison to the previous time. The previous month, the value of somatic cells was 269,000/ml and the second month that number increased and went up to 666,000 somatic cells/ml. Besides the increase of the number of somatic cells, swelling of the udder was noted. That was enough to conclude the presence of mastitis. The healing treatment continued with the cow No.1, and at the cow No.5 measures were taken to prevent mastitis to enlarge. After one week, increase in the number of somatic cells (1,841,000/ml) was noted at the cow No.1. That points to a failed healing treatment of the cow. Unlike the cow No.1, the case with the cow No.5 was different, the treatment was successful. There was a decrease of the number of somatic cells (377,000/ml) and withdrawal of the small swelling that had appeared on the udder. The successful healing treatment of the cow No.5 had a positive impact on the reduction of the number of somatic cells in the aggregate milk sample (415,000 somatic cells/ml). The number of somatic cells in the aggregate milk was still high and above the limit. The reason was the cow No.1. The healing process did not help, and the cow again had the highest share in the total number of somatic cells. If the cow No.1 would be excluded of production the result would be a big reduction in the number of somatic cells in milk and the quality of the produced milk would improve significantly.

Using the previous mathematical calculation, the number of somatic cells can be calculated in a case of exclusion of cow No.1. With the calculations, value of 262,000 somatic cells/ml was reached. With the exclusion of cow No.1 the average number of somatic cells was reduced by 153,000, compared to the last state (after the treatment of the critical cow No.5). Therefore, the treatment of cow No.1 continued and the condition was again followed till the next month. The results obtained from the third examination on the farm are given in table 3.

Table 3: Results of the tested parameters (third examination)

Cow (No.)	Somatic Cell Count SCC/ml	Lactation Number (LN)	Daily Milk Yield (liters/day)
1	2105000	4	11.5
2	216000	2	14.8
3	317000	1	19.2
4	351000	3	16.5
5	328000	2	17.6
6	309000	2	14.5
7	234000	1	20.2
8	176000	2	24.1
$\bar{x}$	**425000**	**2.13**	**138.40**

According to the results, all cows (except cow No.1) had good values for the number of somatic cells. The biggest problem was the cow No. 1. Despite the large number of treatments, no reduction in the number of somatic cells was reached rather that number was constantly increasing. In the period of three months of this examination, the value of the somatic cells went up to 2,105,000 somatic cells/ml. The number of somatic cells in the aggregate milk was 425,000 (25,000 above the limit of 400,000). The assumption was that the cow No.1 had developed chronic type of mastitis that needs a longer period of healing treatment. Therefore, the milk producer was advised to completely isolate the cow No.1 from milk production and not to mix its milk with the milk from the other dairy cows since it will significantly impair the quality of the aggregate milk. With the exclusion of cow 1, the average number of somatic cells would decrease by 155,000 (from 425,000 to 270,000 somatic cells/ml). That would bring a great benefit to the milk producer.

In continuation hygiene in farm must to be maintained at high levels in order to produce milk with high quality. Hygiene is also important for the health condition of the herd.

Conclusion

Using this individual control of milk, in this examined farm we found out two cows with subclinical mastitis, one cow with clinical mastitis and one cow with chronic type of mastitis. We can see the positive site of using this individual milk control from the results which we've got during our process of examination: In this diary farm, at the beginning the number of the somatic cells in the milk group sample was 458 000/ml, and after three months that number was reduced to 270 000 somatic cells/ml. By reducing the number of somatic cells in milk, respectively, is increased the amount of produced milk per cow. According to that individual milk control represents a significant part in the process of production of high quality and hygienic correct milk.

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