THE INFLUENCE OF MILKING PROCEDURES ON MILKING PERFORMANCES AND AND PRODUCTION OF DAIRY COWS

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Abstract

The effect of manual stimulation on milking performances and on milk production parameters have revealed that the average of milk production per milking was higher in animals with manual stimulation (12.3 kg) as compared to the average of milk production in animals without stimulation (12.0 kg). At the same time, time average per milking in animals with manual stimulation was 4,8 minutes, and in animals without stimulation was 5.3 minutes (extra 0.5 minutes). The quality of composition was not affected by the two treatments. There were no significant differences between the averages of fat or protein percentages. The average number of somatic cells of animals milk with manual stimulation was 197.000 cells/ml, and in the animals without stimulation was 246.000 cells/ml of milk. We notice a surplus of 49.000 cells/ml in the animals without stimulation, the difference in this case being significant ($p< 0.05$). The higher number of somatic cells in the animals without stimulation is the result of the failure to remove the first jets of milk that comprise the largest amount of bacteria and somatic cells. As far as the milk flow is concerned, this is 2.56 kg/minute (the average of milking 1 + milking 2) in stimulated animals and 2.26 kg/minute in animals without stimulation. The difference between the 2 averages was + 0,30 kg/minute, being distinctly significant ($p < 0.01$).

Key words: (*Milking, Milk, Milking Routine, Somatic Cells*)

Modern systems of raising dairy cows have to combine profitability with the responsibility of respecting animal, human health, animal and environmental welfare.

The purpose of this paper was to coordinate milk ejection with milking units attachment in order to get a high flow of milk and reduce the attachment time of milking units, as well as to determine the performance parameters of the milking room and milk production in order to implement a standard milking routine **(**Hoogeveen H., 2003**).**

MATERIAL AND METHOD

Researches were performed within Simnic Agricultural Research and Development Centre on Holstein Friza cows. They are characterized by a production potential of 9500-10000 litres of milk / lactation with a fat percentage of 4,0 % and protein of 3,45 %.

As far as the effect of manual stimulation on milking performances and on milk production parameters is concerned, 8 Holstein Friza cows were studied at Simnic Agricultural Research and Development Centre. The 8 cows were at 100-105 days of lactation (3 cows), 110-112 days of lactation (3 cows) and 120-130 days of lactation (2 cows). The selection criterion was that every animal had 4 operational quarters without any clinical signs of a disease.

All the cows were during the 2nd lactation and were distributed in 2 treatment groups in an ABA.BAB experimental design.

The 2 treatments consisted in:

- the first one: removing the first jets (2-3) of milk followed by the manual massage of the nipples and of the ventral part of the mammary gland for 30 seconds, after which the milking units were attached;

- the second treatment did not remove the first jets and did not comprise a manual massage, it only attached milking devices.

Experiments were performed in the 2x5 Herringbone milking room, every experiment lasted for 6 days, the data being recorded both for the morning milking (milking 1) and for the evening milking (milking 2).

We recorded milk production and the time of milking units attachment. Milking units uncoupling was made automatically with light signals.

Samples were collected and analysed in the laboratory for the content of protein and fat. Tests were made with the Ekomilk device.

Residual milk resulted in the 4th day of observation by injecting 10 ml UI of oxytocin at the end of milking. 1 minute after milking units were attached again and residual milk was measured,

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collecting samples for determining the percentage of fat and protein.

RESULTS AND DISCUSSIONS

The effect of manual stimulation on milking performances and milk production parameters. The average of milk production per milking was higher in animals with manual stimulation (12.3 kg) as compared to the average of milk production in animals without stimulation (12.0 kg). The difference between these averages was + 0.3 kg, being insignificant ($p > 0.05$).

The average of milk production in morning milking 1, in animals with manual stimulation is higher (14.3 kg) as compared with the average milk production of animals without stimulation (13.8 kg), noticing a difference of 0.5 kg being also insignificant ($p > 0.05$).

The average of milk production in the 2nd evening milking of stimulated animals was slightly higher as compared to the average of milk production of animals without stimulation (10.3 kg and 10.2 kg respectively), and in this case the difference was insignificant (table 1).

As far as the average of the time of milking units attachment is concerned, the results were:

- time average per milking in animals with manual stimulation was 4.8 minutes, and in animals without stimulation was 5,3 minutes (0,5 minutes extra); this difference is strictly insignificant ($p < 0.01$);
- time average per milking 1 was 5,1 minutes in stimulated animals and 5,5 minutes in non-stimulated animals, 0.4 minutes extra. This difference was significant ($p < 0.05$).

The average of time of milking units attachment in milking 2, in stimulated animals, was 4.6 minutes, and in animals without stimulation was 5.3 minutes (0.7 minutes extra). The difference between the two averages is significant ($p < 0.05$).

The quality of composition was not affected by the two treatments.

The average number of somatic cells of animals milk with manual stimulation was 197.000 cells/ml, and in the animals without stimulation was 246.000 cells/ml of milk. We notice a surplus of 49.000 cells/ml in the animals without stimulation, the difference in this case being significant ($p< 0.05$). The higher number of somatic cells in the animals without stimulation is the result of the failure to remove the first jets of milk that comprise the largest amount of bacteria and somatic cells (chart 1).

As far as the milk flow is concerned, this is 2.36 kg/minute (the average of milking 1 + milking 2) in stimulated animals and 2.26 kg/minute in animals without stimulation. The difference between the 2 averages was + 0.30 kg/minute, being distinctly significant ($p < 0.01$).

The average flow in milking 1 was 2.80 kg/minute in stimulated animals and 2.50 kg/minute in non-stimulated animals. The difference between the 2 averages was distinctly significant ($p < 0.01$).

The average flow in milking 2 was 2.24 kg/minute in stimulated animals and 1.92 kg/minute in non-stimulated animals . In this case, the difference was significant ($p < 0.01$).

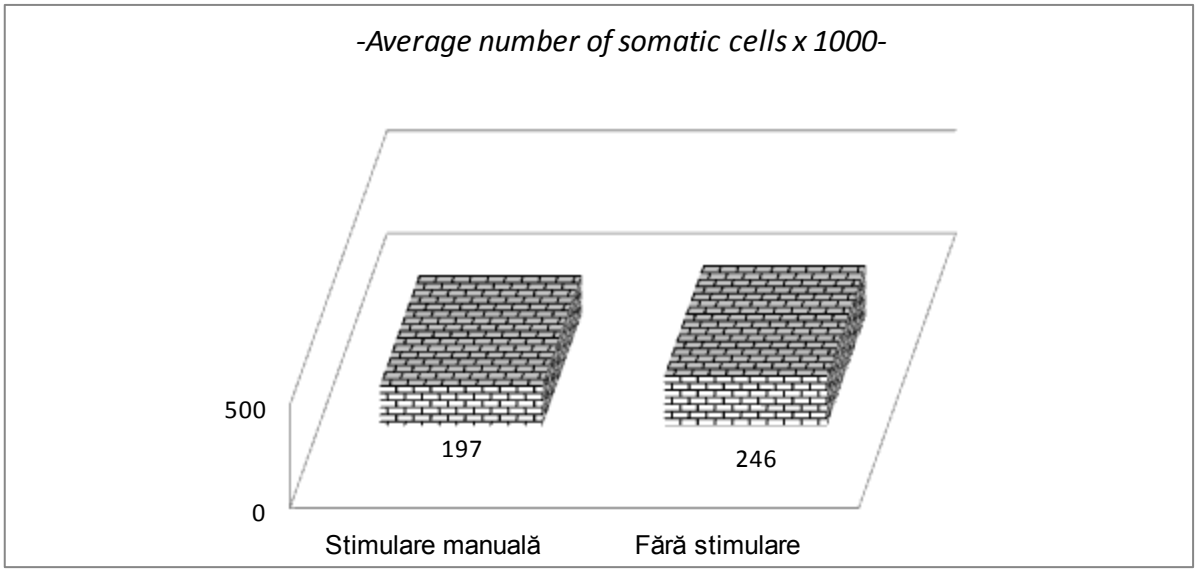

Figure 1 **Results of manual stimulation on milking performances**

Table 1

The results of manual stimulation on milking performances, milk production, fat, protein and the number of somatic cells

No.	Specification	Treatment				Differences	
		Manual stimulation		Without stimulation		±	Meaning
		$\overline{X}$	±	$\overline{X}$	±		
1	Milk production per milking						
	- milking 1 + milking 2	12.3	0.6	12.0	0.6	+ 0.3	Insignificant p>0,05
	- milking 1 (morning)	14.3	0.6	13.8	0.6	+ 0.5	Insignificant p>0,05
	- milking 2 (evening)	10.3	0.4	10.2	0.3	+ 0.1	Insignificant p>0,05
2	Time of milking units attachment (min)						
	- milking 1 + milking 2	4.8	0.2	5.3	0.2	- 0.5	Significant p < 0,05
	- milking 1(morning)	5.1	0.2	5.5	0.3	- 0.4	Significant p < 0,05
	- milking 2 (evening)	4.6	0.3	5.3	0.4	- 0.7	Significant p < 0,05
3	Average flow (kg/minute)						
	- milking 1 + milking 2	2.36	0.1	2.26	0.1	+ 0.30	p < 0,01
	- milking 1(morning)	2.80	0.2	2.50	0.2	+ 0.30	p < 0,01
	- milking 2 (evening)	2.24	0.2	1.92	0.1	+ 0.32	p < 0,05
4	Average fat percentage - % (milking 1+milking 2)	4.15	0.2	4.12	0.2	+ 0.03	Insignificant
5	Average percentage of protein - % (milking 1+milking 2)	3.34	0.1	3.33	0.1	+ 0.01	Insignificant
6	Average number of somatic cells x 1000 (milking 1+ milking 2)	197	15	246	14	+ 49	Significant p < 0,05

Table 2

The influence of standard milking routine on some milking performances and on milk production parameters

Nr. crt.	Specification	The preparation average time of the mammary gland	
		Group 1 – 35 seconds -	Group 2 - 64 seconds -
1	Observations	18	22
2	Average time with attached milking units (minutes)	5.75	5.76
3	Average milk flow (kg/minute)	2.05	2.05
4	Milk average production per milking (kg)	11.81	11.82
5	Fat percentage (%)	4.06	4.08
6	Protein percentage (%)	3.42	3.43
7	Residual milk (kg)	1.98	2.04
8	Fat percentage of residual milk (%)	9.38	9.42
9	Total milk + residual (kg)	12.79	13.86
10	Residual milk of total milk (%)	15.48	14.72
11	Total fat of milk + residual (kg)	0.664	0.674
12	Residual fat of total fat (%)	27.86	28.48

The influence of standard milking routine on milking performances and milk production parameters.

By preparing the mammary gland before milking, the following aspects are taken into consideration: mammary gland hygienization, identification of abnormal milk and subclinical mammites; stimulation of milk ejection (Lollivier Vanessa, Guinard Flament J., Ollivier-Bousquet M., Marnet P.G., 2002)

40 observations were made regarding the average times of mammary gland preparation. These times were divided in two groups depending on their duration: group 1 with a preparation time average of 35±7 seconds and group 2 with a preparation time average of 64±12 seconds. 18 observations were made in group 1 and 22 observations in group 2 (table 2). The average milk production per milking was 11.81 kg in group 1 of animals and 11.82 kg in group 2 of animals.

Based on these productions of milk the average flow of milk was calculated as follows: we divided these average productions to the average time when the milking units were

attached. The average milk flow was 2.05 kg per minute in both groups of cows. Almost 15-25 % of the total milk secreted by the mammary gland is the residual milk also called complementary milk. The milk remained in the udder increases the risk of mammary infections, because residual milk is an excellent environment for microorganisms development.

In the researches made in animals from the first group, residual milk was 15.48 % of the total milk produced by the mammary gland and 14.72 % in the animals from the second group.

The fat percentage of residual milk was 9.38 % in the animals from the 1st group and 9.42 % in the animals from the second group.

Researches revealed the fact that residual milk is in larger amount in animals with smaller milk production than in those with high productions.

CONCLUSIONS

The researches developed at Simnic Agricultural Research and Development Centre on Holstein Friza cows reveal the following conclusions:The functionality of efficient milking was provided by introducing the Heringbone 2 x 5 milking system with 10 milking positions. Mammary stimulation of nipples and ventral pressure of the mammary gland before attaching milking units, for 30 seconds is enough to get the actual ejection of milk.Coordination of milk ejection with milking units attachment resulted in a high flow of milk and in the decrease of milking units attachment time. 4. Hygienization of nipples and of the ventral part of the mammary gland reduces the risk of infections between milking.By removing the first 3-4 jets of milk before attaching the milking units, the abnormal milk is practically eliminated, which does not have to reach the feedstock milk.The standard milking routine provides the same treatment for every cow, in every milking irrespective of the stage of lactation, the number of lactation or the person performing milking(Stelwagen K., 2001) The average time while milking units were attached was below 6 minutes, being an optimal time, without implications on the integrity of the nipple channel. Extended milking is the cause of cones and infections of the nipple channels tissues. Correct application and maintenance of milking units in normal position are essential elements for the complete discharge of the mammary gland (Stelwagen K., Knight C.H, 2001). The effects of incomplete milking are the decrease of milk production and occurrence of mammary infections. A variable that affects the duration of milking is the setting of the final point of the milk flow to which the milking units are detached. The flow of the milking plant at Simnic Agricultural Research and Development Centre is of 0,200 kg/minute.

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