EVALUATION OF THE EFFICIENCY OF MECHANICAL MILKING OF DAIRY COWS

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Abstract

The milking preparation time of 1 minute is sufficient for good milk ejection for all animals regardless of lactation stage. The milk flow and milk production of the cow determine the milking time and have a significant impact on the efficiency of the milking parlour.
Based on the data obtained from these observations and measurements, the efficiency of the 2 x 5 Herringbone milking parlor was calculated in the 12 observations expressed in kilograms of milk per milking station and per hour.

As experience was gained and the milking routine standardized after 3 months, the amount of 50 kg of milk per milking post and hour was reached.
A strict milking routine in which teats are cleaned and dried within 30 seconds and the application of milking units 60 seconds after the start of stimulation increases milk production by 450 kg per lactation and brings an extra 320 l/ cow/lactation.

The access of the cows to the milking parlor was the activity for which long periods of time were recorded. Accustoming the animals to the new milking conditions took almost 3 months.
The average access time of a series of 5 cows to the milking stalls decreased from 6.8-7.0 minutes recorded in the first 2 observations to 2.5 minutes in the last observation
Key words: milking, milk, milking routine, protein, somatic cells

INTRODUCTION

The quality of milk and dairy products remains a problem that, although extremely important, is minimized in practice, when no effective means have been identified to solve it .

Achieving total quality in the dairy industry first requires full hygiene in all specific stages of milk production. It is essential to try to reduce the stress of the cows due to their being forced to adapt to an unfamiliar situation. It takes time and patience to accommodate the cows, not only for entering the milking stall, but also for getting used to the automatic attachment of the milking cups. This is inevitably transmitted to the cows, therefore it is better to introduce the new system gradually. If it is not possible to acquaint the cows with automatic milking before the first milking, if the cows are moved to the new system and are unable to introduce themselves to the old system, it is most important to proceed with patience on the first day of milking.

We must admit that the automated system does not lead to a considerable reduction in the volume of work, but changes its type and intensity. On the one hand, the physical work is reduced, but it is compensated by the processing and observation of the data provided by the computer. (Deutche Tierastliche Wochenscritt). The teats must be manually cleaned and milked a little in order to stimulate the oxytocin-based response. When this is done, the automatic procedure for attaching the cups can be initiated. Depending on the type of location of the technology used, it may be necessary to manually direct the cups to the teats for the first milking (Cola M, Florica, Cola., 2021, 2023).

A study, carried out in the Netherlands (Van der Vorst, 2002), based on data from 392 farms in 3 countries, also indicates the deterioration of the number of somatic cells and the total number of germs, the decrease of the freezing point and the level of fatty acids free This study indicates, for all 4 parameters, much greater damage

when using older automated systems, compared to newer ones. After an initial increase in the number of somatic cells and germs, a significant decrease was observed .

Genetic transformation can increase animals' resilience to climate-related stresses, and increases reproductive performance. The EU's import dependency is particularly high in the case of forage soybeans for the European livestock sector, as the production of bean soybeans in the EU states covers less than 5% of its own demand. The EU also imports significant quantities of GM maize to meet domestic demand (Bonciu, 2023 a). But the production of food and feed must also be taken into account in an environmentally sustainable way (Bonciu, 2023b, 2022).

In Denmark (Rasmussen MD. Et al., 2001) on a population of 69 farms confirmed that, on average, the number of somatic cells increases in the first months after the introduction of the automatic milking system. After this damage, the number of somatic cells decreases. Rasmussen could not provide a scientific explanation for this increase, but he suggests that a lot of attention should be paid during the settling-in period.

MATERIALS AND METHODS

The Holstein Friză breed within SCFenov SRL has the potential for milk production of around 9,000 liters per lactation, with a fat percentage of 4.0 % and 3.45% protein.

In 2022, another new Herringbone 2x5 milking parlor with 10 milking stations was put into use, thus increasing the capacity of centralized milking. The aim of this research was to monitor the efficiency of the 2 x 5 (10 milking stalls) Herringbone type milking parlor with the arrangement of cows at an angle of 30 ^{0} expressed in kilograms of milk milked per hour.

The activities taken into account and the timing of the time: the access of the cows to the milking stalls from the opening of the access gate to its closing (for 5 cows); immersing the teats in the pre-dip solution (timing for each cow); wiping and drying the skin of the teats and the ventral portion of the udder (timing for each cow); attachment of milking units and duration of attachment (timing per cow); checking complete milking and immersing the teats in the post-dip solution (timing for each cow); evacuation of animals from the milking stall (from the opening of the exit gate to its closing). Average times on each activity included in the milking procedure were calculated. Milk yield was measured after each milking series. The influence of the preparation time of the mammary gland for milking on the milk ejection was expressed by the average milk flow rates. The efficiency of the milking parlor was expressed in kilograms of milk milked per hour and per milking station.

RESULTS AND DISCUSSIONS

24 observations were made at different time intervals starting on 10.XII.2022 and ending on 15.III.2023 .

The 24 observations mean 12 observations at milking 1 (milking from 5:00 $^{a.m}$. to 6:30 $^{p.m.}$) and 12 observations at milking 2 (milking from 4:00 $^{p.m}$. to 5:30 $^{p.m.}$).

The herd milked at each observation ranged from 82 to 88 cows. Animals with non-functional quarters of the mammary gland were excluded, as were animals with excessively long times.

The results of timings specific to each activity are presented in table 1, graph 1.

The access of the cows to the milking parlor was the activity for which long periods of time were recorded. Accustoming the animals to the new milking conditions took almost 3 months.

The average access time of a series of 5 cows to the milking stations decreased from 6.8-7.0 minutes as recorded in the first 2 observations to 2.5 minutes in the last observation on 15.III.2023.

The milking preparation time of 1 minute is sufficient for good milk ejection for all animals regardless of lactation stage. By integrating an automatic system for detaching the milking units, overmilking is avoided, and the light signal marked the end of the period when the milking units were attached (table 2, graph 2). This time, from the attachment of the milking unit to the light signal, will be defined as the milking time.

Milking time decreased from 7.2 -7.3 minutes to 6.5 at the 12th observation.

Table 1. Timed average times

No. crt.	Specification	Average time per milking											
		The sequence number of the observation											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Cow access to the milking point (minutes/5 cows)	6.8	7.0	6.6	6.5	6.4	6.0	6.0	4.6	4.0	3.0	2.4	2.5
2	Removal of 3-4 jets from the teat (dry/cow)	20	20	20	20	18	18	16	16	14	12	10	10
3	Pre-dip immersion (sec/cow)	20	20	20	20	18	16	14	14	12	12	10	10
4	Wiping and drying teats (dry/cow)	40	40	40	30	30	30	30	25	25	25	25	20
5	Attachment of milking units (min/cow)	20	20	20	20	20	18	18	16	14	12	10	20
6	Average milking time (min/cow)	7.2	7.3	7.1	7.3	7.2	7.1	7.2	7.3	7.0	6.8	6,7	6.5
7	Post-dip check and dip (sec/cow)	50	50	50	50	40	40	30	30	30	20	25	20
8	Animal evacuation (sec/cow)	120	120	120	100	100	110	100	90	90	80	80	60
9	Other evening activities (min/cow)	1.5	1.4	1.5	1.5	1.7	2.0	1.5	1.4	1.5	1.6	1.5	1.5
10	Total milking time/series (minutes)	19.0	20.2	20.1	19.6	19.0	18.1	18.1	16.4	16.5	14.1	13.1	13.0
11	Milk milked per series (kg)	101	107	114	110	117	111	117	115	118	109	111	108

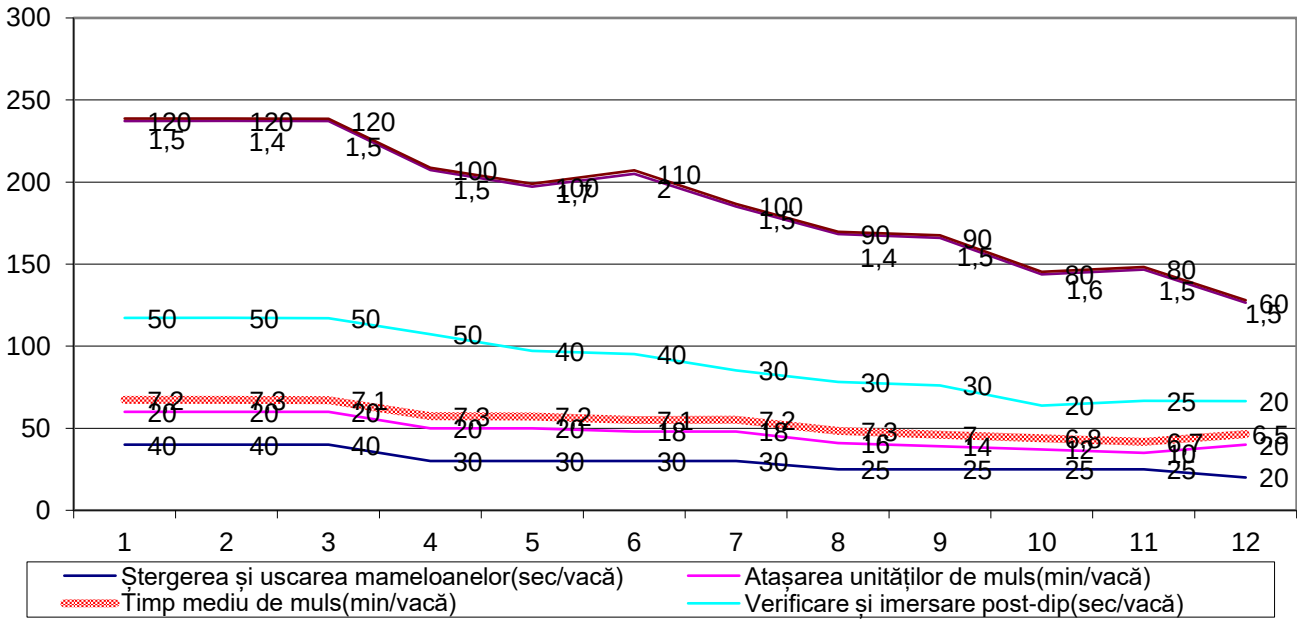

Figure 1. 2 x 5 Herringbone milking parlor efficiency

Table 2 Influence of stimulation time on milk ejection and milking efficiency

The sequence number of the observation	No. COWS	Preparation time (seconds)	Average milk production/milking (kg/cow)	Average milking time (minutes)	Average milk flow (kg/minute)	Milk production (kg/post/hour)
1	82	100	10.1	7.2	1.40	32
2	82	100	10.7	7.3	1.46	32
3	84	100	11.4	7.1	1.60	34
4	85	90	11.0	7.3	1.52	33
5	86	86	11.7	7.2	1.62	36
6	86	82	11.1	7.1	1.56	37
7	88	73	11.7	7.2	1.62	39
8	88	71	11.5	7.3	1.57	42
9	86	65	11.8	7.0	1.68	43
10	85	61	10.9	6.8	1.60	46
11	86	61	11.1	6,7	1.65	50
12	85	60	10.8	6.5	1.66	50

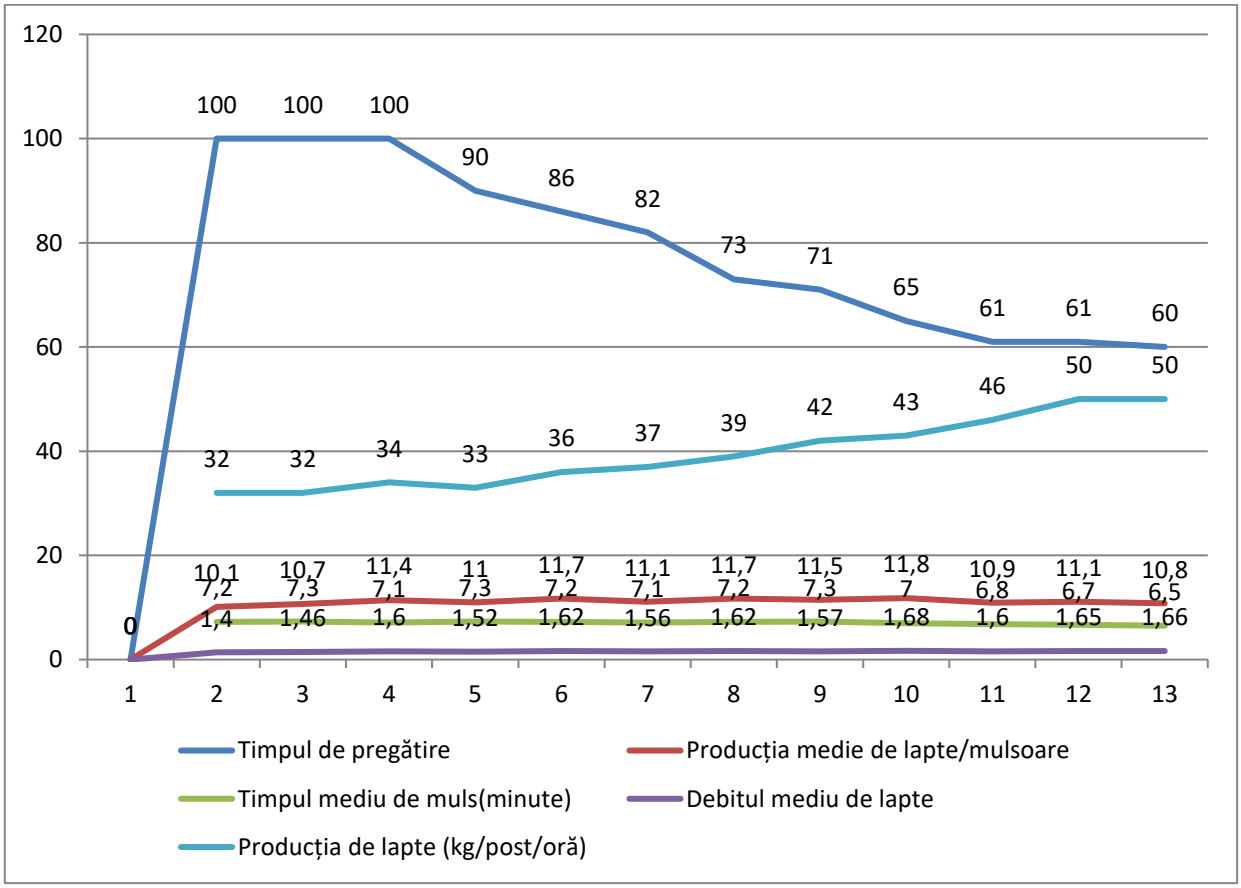

Figure 2 Influence of stimulation time on milking efficiency

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Based on the data obtained from these observations and measurements, the efficiency of the 2 x 5 Herringbone milking parlor was calculated in the 12 observations expressed in kilograms of milk per milking station and per hour .

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CONCLUSIONS.

Following the study carried out within SC FENOV, the following conclusions emerge:

1.By introducing the Herringbone centralized milking system, the functionality of an efficient milking was ensured .

2.Filtration was ensured by using mechanical filtration during milking with disposable filters.

3.Mammary stimulation of the nipples and ventral pressure of the mammary gland for 30 seconds before attaching the milking units is sufficient to achieve effective milk ejection.

4.Coordinating the ejection of milk with the attachment of the milking units resulted in a high milk flow and a reduction in the time the milking units were attached.

5.Sanitizing the teats and the ventral portion of the mammary gland reduces the risk of infections between milkers.

6.By removing the first 3-4 jets of milk before attaching the milking units, abnormal milk is identified, which must not end up in the raw milk.

7.The standard milking routine ensures the same treatment for each cow at each milking regardless of stage of lactation, number of lactations or person performing the milking.

8.The average time the milking units were attached was under 6 minutes, being an optimal time, without implications on the integrity of the teat canal. Prolonged milking is the cause of stretch marks and infections of the tissues of the teat ducts.

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