

Animal welfare, etológia és tartástechnológia



Animal welfare, ethology and housing systems

Volume 7

Issue 4

Különszám/Special Issue

Gödöllő
2011

INFLUENCE OF INTERVAL LENGTH BETWEEN MILKING ON MILK PRODUCTION OF CZECH FLECKVIEH COWS ON 1st AND 2nd LACTATION

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Abstract

The aim of this paper was to evaluate of influence of interval length between evening and morning milking on milk production of Czech Fleckvieh cows. Cows included in their 1st and 2nd lactation were included in the study. Experiment lasted three months and data were collected once per month (always in the day of milk recording). Dairy cows were divided into the four groups according interval length in minutes between evening and morning milking (1st group 640-670 min, 2nd group 671-700 min, 3rd group 701-730 min, 4th group 731-770 min).

More time (longer interval) between milking meant higher milk production ($p < 0.01$) both in cows in their first, and in their second lactation. Dairy cows which were in third and fourth groups, produced more milk than cows in first and second groups ($p < 0.01$). Also it was found that cows in 2nd lactation produced more milk with the same interval length, than cows in 1st lactation ($p < 0.01$).

Keywords: dairy cow, milk production, milking interval, lactation

Introduction

The purpose of dairy cattle husbandry is milk production. Milk plays an important and irreplaceable role in human nutrition having high nutritional value (*Frelich et al., 2001*). Milk production is characterized by the quantity and quality of milk produced for a certain time of period. The composition of cattle milk and its digestibility is very close to the ideal for human diet. Factors that

influence the quantity and composition of milk can be divided into internal and external ones (Vanek et al., 2002). Milk composition is influenced by breeding competence, the individual traits of certain cows, parity, number of lactation and length of interval between milking, etc. (Miksik and Žizlavsky, 2005).

The aim of this study was to observe and clarify the effect of interval length between milking on milk production of Czech Fleckvieh cows in 1st and 2nd lactation on a private farm (GenAgro Říčany, a.s.)

We have analyzed the correlation of interval length and milk production in dairy cows.

Material and methods

Data were collected in three following months at the Milk Recording Days (ICAR), namely 1.3., 9.2. and 26.4.2011. We've recorded the differences in intervals length between night and morning milking on daily milk production. Cows were kept under same conditions in free cowsheds in the private farm in Ricany (49°12'30.370''N, 16°23'43.092''E). All milked purebred Czech Fleckvieh cows in either their 1st or 2nd lactation, which were day milked in the given days were included in the analyses. Dairy cows was divided into four groups according to the interval length: **1st group** 640-670 min, **2nd group** 671-700 min, **3rd group** 701-730 min and **4th group** 731 – 770 min. MS Excel a Statistica 9.0 were used for the statistical analyses.

Results and discussion

The comparisons of measured values of milk yield and interval length during the monitored period for the 1st lactation are showed in *Table 1*. It is obvious that with interval length between milking increasing milk production also increased, in other words, longer time had a positive effect on milk production, which is shown in the correlation coefficient $r = 0.31$ ($p < 0,05$).

Table 1. Comparison of measured milk production values and interval length (1st lactation)

Interval length (minute)	n	Mean (min)	Mean (kg)	Min. (kg)	Max. (kg)
640-670	52	663.0	8.8 ^A	2.0	12.5
671-700	107	686.0	9.9 ^A	3.1	17.2
701-730	342	715.2	11.3 ^{Ba}	1.3	22.1
731-770	110	742.0	12.3 ^{Bb}	4.8	21.3
Sum	611	710.5			

A, B = $p < 0.01$; a, b = $p < 0.05$

In the first group of cows with an interval between evening and morning milking 640-700 minutes the average time was 663 minutes and an average production was 8.8 kg of milk was observed. In the second group (671-700 minutes) average interval between the milking was 686 minutes and average milk production 9.9 kg. In the third group (701-730 minutes) the average time between milking was 715.2 minutes and average production was 11.3 kg of milk. In the fourth group (731-770 minutes), the average interval between milking was 742 minutes and average production was 12.3 kg of milk.

Figure 1 shows the statistical analysis of differences between groups. There's a highly significant difference in the amount of milk between interval-divided groups from 640 to 670 minutes and from 670 to 700 ($p < 0.01$). Statistically significant difference was also found between groups from 701 to 730 and from 731-770 minutes ($p < 0.05$). We can conclude that the longer is the interval length between milking the higher is the milk production.

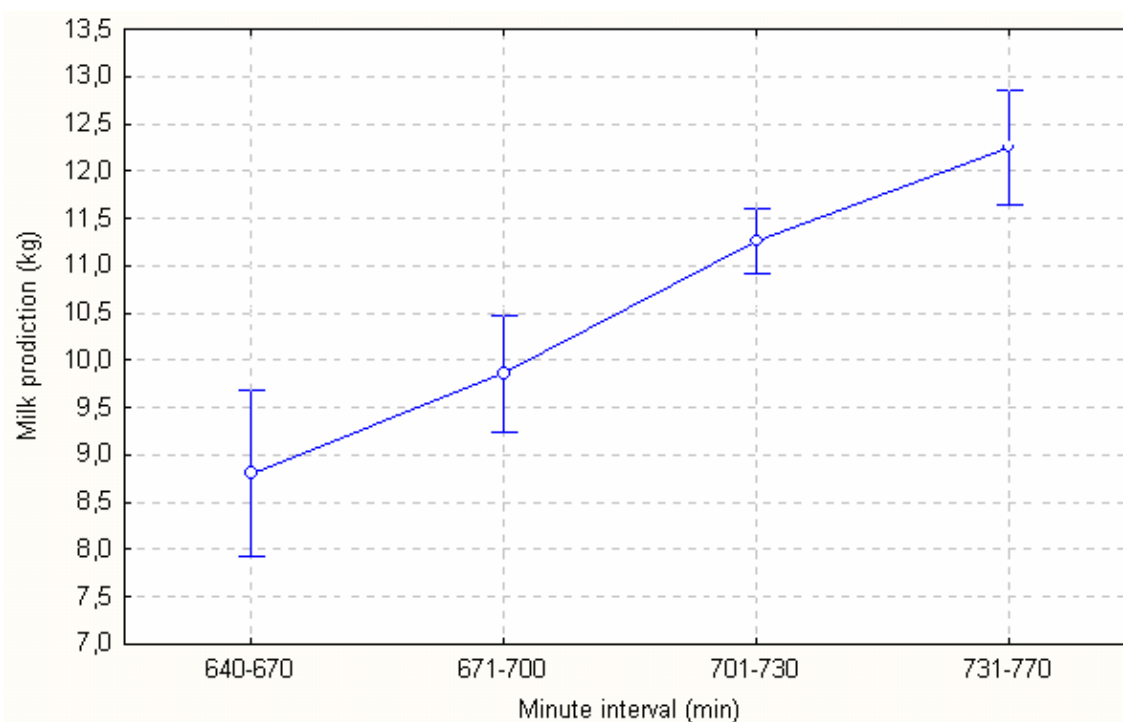


Figure 1: Statistical analysis of measured milk production values and interval length (in minutes) (1st lactation)

The comparison of measured values of milk yield and interval length during the monitored period for the 2nd lactation is showed in Table 2. It is visible that by increasing time between milking, milk production increases. The correlation coefficient $r = 0.30$ ($p < 0.05$) also indicates that.

Table 2. Comparison of identified values of milk production and length interval (2nd lactation)

Interval length (minute)	n	Mean (min)	Mean (kg)	Min. (kg)	Max. (kg)
640-670	21	661.8	7.7 ^{AB}	2.4	19.7
671-700	97	685.7	11.3 ^{BA}	3.1	33.5
701-730	317	716.4	13.8 ^{BB}	2.2	24.5
731-770	140	744.1	14.0 ^{BB}	2.7	25.7
Sum	575	716.0			

A, B = $p < 0.01$; a, b = $p < 0.05$

In the first group of cows, with an interval between evening and morning milking 640-700 minutes average time was 661.8 minutes, and average production was 7.7 kg of milk. In the second group (671-700 minutes) average interval between the milking was 685.7 minutes and average milk production was 11.3 kg. In the third group (701-730 minutes) the average time between milking was 716.4 minutes and average production was 13.8 kg of milk. In the fourth group (731-770 minutes), the average interval between milking was 744.1 minutes and average milk production was 14.0 kg.

Figure 2 shows the statistical analysis of differences between groups of cows in their second lactation. Highly significant differences ($p < 0.01$) were found in the amount of milk and time interval between the first group and the other three groups (2nd, 3rd and 4th group). Highly significant statistical differences were between the 2nd group and groups 3rd and 4th as well. No other differences could be detected. In both Figure 1. and 2. the evident trend of milk yield increasing by the interval between milking being longer is visible.

It is in concordance with the study of *Ouweltjes (1998)* who also indicated that the length of the interval between milking affect milk yield. When milking interval (12 and 12 hours) was the same, milk yield didn't differ either. But when cows are milked at unequal intervals - usually a longer night and shorter day interval - therefore the amount of milk is lower at the morning milking (*Hargrove, 1994*).

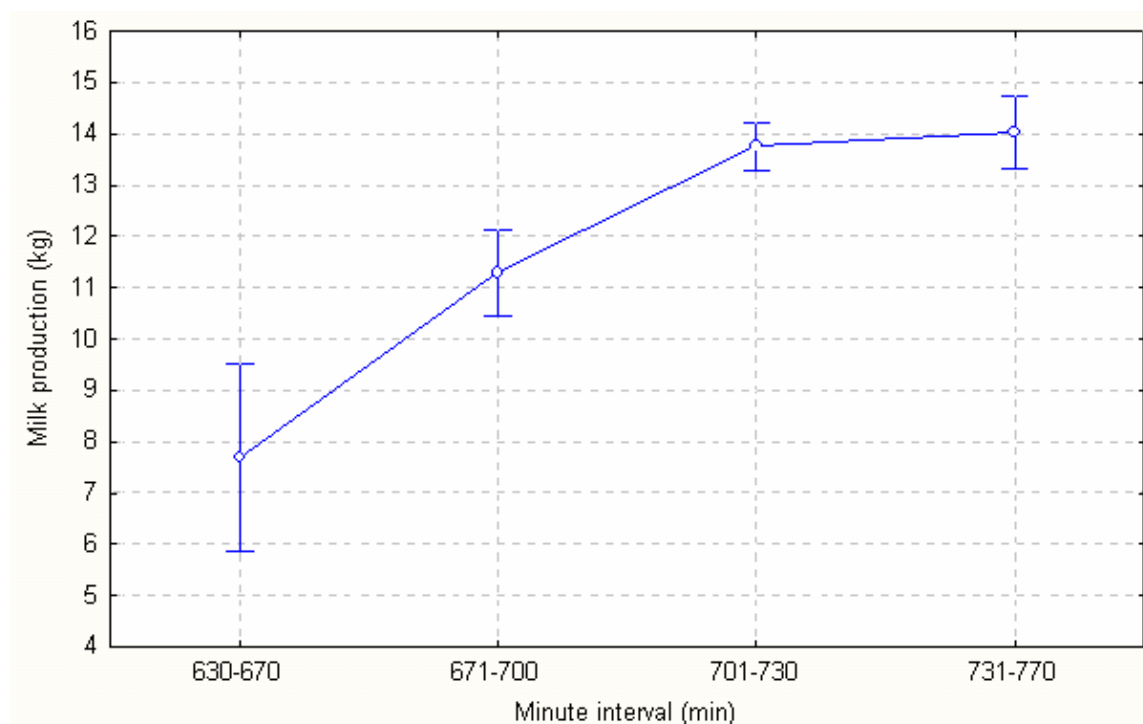


Figure 2: Statistical analysis of measured milk production values and interval length (in minutes) (2nd lactation)

Table 3 shows the differences in the amount of milk yield depending on the interval length comparing the first and second lactation. Highly significant statistically differences were found ($p < 0.01$) in milk production with milking interval 701-730 and 731-770. Statistically significant difference ($p < 0.05$) was also in cows with an interval 671-700.

Table 3: Comparison difference between 1st and 2nd lactation

Minute interval	Δ^1 Intervals (min) 2 nd vs. 1 st	Δ^2 Milk production (kg) 2 nd vs. 1 st	P Milk production 2 nd vs. 1 st
640-670	-1.2	-1.1	N. S.
671-700	-0.3	+1.4	*
701-730	+1.2	+2.5	**
731-770	+2.1	+1.7	**
Sum	+5.5	+2.2	

P = N. S. ($p > 0.05$); * ($p < 0.05$); ** ($p < 0.01$)

¹ difference between 2nd and 1st lactation in minute interval

² difference between 2nd and 1st lactation in milk production

From *Table 3* it's also visible that the cows on second lactation had longer interval length (+ 5.5 min) in average between milking and achieved higher milk yield (+ 2.2 kg). This could be caused by increased body weight, but especially seed formative udder (*Štolc et al., 1999*). *Chládek and Pyrochta (2004)* also confirmed that hypothesis by stated that the first lactation results in lower milk yield than others.

Conclusion

This research shows the highly statistically significant effect of the length of time between evening and morning milking on the milk yield in Czech Fleckvieh cows. There was a weak positive correlation between the length of the interval and milk production as well. It can be stated that if cows had more time between milking had produced more milk than a cows that had less time. Comparing the first and second lactation, we've found the cows in their second lactation produced more milk for the same length interval (in minutes) than cows in first lactation.

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Acknowledgements

This research was supported by the grant project AF MENDELU, TP 8/2011 and by research program No. MSM6215648905 "Biological and technological aspects of sustainability of controlled ecosystems and their adaptability to climate change" financed by Ministry of Education, Youth and Sports of Czech Republic.