

## STUDY REGARDING THE INFLUENCE OF THE CALVING INTERVAL ON MILK PRODUCTION IN ROMANIAN BLACK AND WHITE COWS

### STUDIU PRIVIND INFLUENȚA INTERVALULUI ÎNTRE FĂȚĂRI ASUPRA INDICILOR PRODUCȚIEI DE LAPTE LA VACILE DIN RASA BĂLȚATĂ CU NEGRU ROMÂNEASCĂ

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**Abstract:** *The aim of this paper was to study the influence of the calving interval on the days in milk and total milk production traits in Romanian Black and White cows raised in the Didactical Station farm. Researches were carried out on 125 lactations, divided into three classes according to the calving interval length. The classes were up to 350 days, from 351 to 450 days, and above 450 days. Total days in milk increased from 260.3±17.03 when calving interval was below 350 days to 331.6±5.28 when calving interval was 351-450 days. The maximum days in milk was obtained for a calving interval equal or longer than 450 days (431.3±8.55). Milk yield per whole lactation increased from 4823.4±368.18 kg when calving interval was up to 350 days to a maximum of 5280.4±129.35 kg for a calving interval between 351 and 450 days. For a calving interval over 450 days the milk yield was 5043.6±114.86 kg. In conclusion, lactation length was significantly influenced ( $p<0.001$ ) by the length of calving interval, while milk production indices were not ( $p>0.05$ ).*

**Rezumat:** *Scopul prezentei lucrări este acela de a studia influența intervalului între fătări asupra duratei lactației și a cantității de lapte la vacile din rasa Bălțată cu negru românească, din Stațiunea Didactică Timișoara. Cercetările s-au efectuat pe un număr de 125 lactații de la vacile din rasa Bălțată cu negru românească, împărțite în trei clase astfel: până la 350 zile, 351-450 zile și peste 450 zile. Durata lactației a crescut de la 260,3 zile când intervalul între fătări a fost de până la 350 zile, la 331,6 zile când intervalul între fătări a fost cuprins între 351-450 de zile, maximă fiind de 431,3 zile când interval între fătări a fost de peste 450 de zile. Cantitatea de lapte a crescut de la 4823,4 kg lapte atunci când durata intervalului între fătări a fost de până la 350 zile și a fost maximă, de 5280,4 kg, atunci când intervalul între fătări a fost cuprins între 351-450 de zile. La un interval între fătări de peste 450 de zile, cantitatea de lapte începe să scadă la 5043,6 kg lapte.*

**Key words:** *calving interval, days in milk, milk production, Romanian Black and White*

**Cuvinte cheie:** *intervalul între fătări, durata lactației, producția de lapte, Bălțată cu negru românească*

#### INTRODUCTION

Calving interval (CI) is a reproduction index that express the quality of the reproduction activity in cows calved twice or more. Calving interval has an effect on calving rate, number of offspring obtained during the lifetime and both lactation and lifetime milk yield [3].

Lactation is a critical component of the reproduction strategy of mammals and lactation physiology is close correlated with the reproduction physiology [2]. There is a convention that the normal length of lactation (normal lactation) should be 305 days, which is correlated with a high milk production and a proper reproduction activity of the cow [1].

Longer calving interval promotes a better milk persistency during the late lactation. But, if the lifetime milk production is considered, reduction of the calving interval leads to calving intensification, a higher number of calves and a higher lifetime milk production [4].

The aim of the study was to find out the effect of calving interval length on the milk production indices in a population of Romanian Black and White cows.

#### MATERIALS AND METHODS

Researches were carried out in the Didactical Station Farm, on Romanian Black and White cows. A total number of 125 lactations were studied. These lactations were divided into three classes according to the length of calving interval, as follows: up to 350 days (14 lactations), from 351 to 450 days (56 lactations) and over 450 days (55 lactations).

The studied traits were: days in milk, milk yield, butterfat yield, protein yield, lactose yield and total solids per total lactation. Milk production indices were obtained from monthly recording the milk performance and after modelling the lactation production using the Wood function with the following equation:

$$y = ab^t e^{-ct}$$

where  $y$  is the yield at time  $t$ ,  $a$ ,  $b$ , and  $c$  are parameters of the function and  $e$  is the base of natural logarithm.

After modelling, averages and dispersion indices were calculated and the data was statistically processed using ANOVA/MANOVA.

#### RESULTS AND DISCUSSION

Table 1 presents the averages and dispersion indices for total days in milk in respect with calving interval classes in Romanian Black and White cows. The average days in milk of the studied population were  $367.5 \pm 7.24$ , ranging from 190 days to 546 days.

It is to be observed that lactation length increased with the length of calving interval. Thus, the shortest total days in milk was observed for calving interval up to 350 days ( $260.3 \pm 17.03$  days), and the longest for calving interval over 450 days ( $431.3 \pm 8.55$  days).

Variability for this trait was within the limits (22%), being higher for first calving interval class (up to 350 days,  $v\% = 24.47\%$ ), probably because of the low number of individuals taken into account ( $n=14$ ).

*Table 1*

Averages and dispersion indices for days in milk according to calving interval length in Romanian Black and White cows

Calving interval	n	X $\pm$ SEM (days)	SD	v%	Min.	Max.
Up to 350 days	14	260.3 $\pm$ 17.03 <sup>a</sup>	63.71	24.47	256	472
351-450 days	56	331.6 $\pm$ 5.28 <sup>b</sup>	39.52	11.91	218	525
Over 450 days	55	431.3 $\pm$ 8.55 <sup>c</sup>	63.44	14.70	190	546
Total	125	367.5 $\pm$ 7.24	80.99	22.0	190	546

Averages with different letter superscript differ at  $p < 0.001$

Differences between calving interval classes were highly significant ( $p < 0.001$ ), and increased with difference for calving interval. Thus, the lactation was 71.3 days longer ( $p < 0.001$ ) when calving interval increased from 350 to 450 days and 171.3 days in milk more ( $p < 0.001$ ) if the calving interval exceeded 450 days. When calving interval increased from 351-450 days to over 450 days lactation was about 100 days longer (99.7 days,  $p < 0.001$ ).

Averages and dispersion indices for the total milk production traits are presented in Table 2. On average, the studied cow population produced 5125 kg milk with 3.87% butterfat

(198.46 kg butterfat), 3.19% protein (163.48 kg), 4.74% lactose (242.70 kg), and 12.62% total solids (646.87 kg). Generally, the variability for all the milk production traits were moderate (variability coefficient varied between 19.06% for milk yield and 20.84% for protein yield).

*Table 2*

Averages and dispersion indices for milk production traits per total lactation according to calving interval length in Romanian Black and White cows

Trait		Calving interval			
		Up to 350 days (n=14)	351-450 days (n=56)	Over 450 days (n=55)	Total (n=125)
Milk yield (kg)	X±SEM	4823.4±368.18	5280.4±129.35	5043.6±114.86	5125.0±87.39
	SD	1377.62	968.00	851.81	977.08
	v%	28.56	18.33	16.89	19.06
Butterfat yield (kg)	X±SEM	182.14±13.584	205.64±5.267	195.31±4.859	198.46±3.559
	SD	50.825	39.413	36.036	39.788
	v%	27.90	19.17	18.45	20.05
Protein yield (kg)	X±SEM	151.38±12.001	169.62±4.741	160.30±3.838	163.48±3.047
	SD	44.903	35.478	28.460	34.066
	v%	29.66	20.92	17.75	20.84
Lactose yield (kg)	X±SEM	228.31±17.820	250.26±6.326	238.65±5.701	242.70±4.285
	SD	66.675	47.337	42.282	47.906
	v%	29.20	18.91	17.42	19.74
Total solids yield (kg)	X±SEM	579.73±36.562	674.57±18.108	635.75±15.306	646.87±11.534
	SD	136.801	135.508	113.510	128.950
	v%	23.60	20.09	17.85	19.93

The highest values for the milk production traits were obtained for a calving interval length between 351 and 450 days. The maximum production was 5280.4 kg milk with 3.89% butterfat (205.64 kg), 3.21% protein (169.62 kg), 4.74% lactose (250.26 kg), and 12.77% total solids (674.57 kg).

The lowest milk production was obtained when calving interval was below 350 days long. In this case, cow produced 4823.4 kg milk with 3.78% butterfat (182.14 kg), 3.14% protein (151.38 kg), 4.73% lactose (228.31 kg), and 12.02% total solids (579.73 kg).

For calving interval longer than 450 days, the milk production traits had intermediate values. Thus, cows produced 5043.6 kg milk with 3.87% butterfat (195.31 kg), 3.18% protein (160.30 kg), 4.73% lactose (238.65 kg), and 12.61% total solids (635.75 kg).

Variability for milk traits was within the normal limits, with higher values for the first group (under 350 days), where the variability coefficient exceeded 23%.

Differences between calving interval classes for milk production traits were around 10% and did not reached statistical significance ( $p>0.05$ ).

### CONCLUSIONS

Calving interval had a stronger influence on days in milk than on milk production traits.

Days in milk increase significantly ( $p<0.001$ ) as calving interval gets longer.

The maximum milk production was obtained when calving interval varied between 351 and 450 days. The lowest milk production was obtained when calving interval was shorter than 350 days. When calving interval was longer than 450 days the milk production had intermediate values. All these changes were not showed to be significant.

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