



Examination of suckling frequency in beef cattle populations

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ABSTRACT

This paper was carried out to study the connection between the mother cows (sucklers) and their calves during the lactation period, by examining suckling as a form of ethological behaviour. The daily suckling frequency (NSM) observed in two beef populations, we constructed suckling curves depends from some measured variables. The dam's genotype, the age of cows, the sex of calves, and some environmental agent (e.g. temperature) were tested as factors to influence the suckling frequency of calves. Regressions were done between the NSM and the weaning weight of calves.

(Keywords: suckling frequency, beef cows and calves, Hereford, Red Angus)

INTRODUCTION

It is reasonable to assume that the knowledge of suckling behaviour contributes to optimal management of beef cattle. However there is little information about suckling behaviour of beef cattle breeds and about those effects which are relation to the suckling frequency. The differences in suckling behaviour seem to be produced by a complex combination of genetic and environmental factors, which result in a particular behavioural relationship within mother and offspring pairs. The aim of this study was to describe the suckling behaviour - investigated two livestock.

Review of relevant literature

In the beef cattle production there is a big importance to calf-rearing ability, this property affects the benefit of these branches. The index of this ability, is the weaning weight corrected to 205 days, and its heritability is moderate ($h^2=0,30-0,35$). The genetic influence dissolved two parts: the additive genetic effect, and the maternal genetic effect. The second one means the influence of mother's genotype to the maternal traits, which affects the vitality and growth of calves (e.g.: easy calving; milking ability) (Cameron, 1997). Consequently, the environmental factors comprising a total of 60–70% from the phenotypic variance. The environmental effects were separated also two parts. Maternal effect origins from environment, and other environmental effects. It is well known that we called the maternal effect origins from environment, which inherit from year to year, and from calving to calving by beef cows (Lengyel, 2005). Some traits to be ranked here by authors, as the nursing of newborn calves, the possibility of suckling to own calf, protection of calf, and the part of cows' milking ability influenced by environment. According to Kovács (2005) those complex forms of behaviour, which are in relation to the suckling comprising 2–7% from the phenotypic variance of weaning weight.

According to the references the grazing period depends on the yield of the grass. If the pasture stay in a good state the cows grazing in 4–5 period per a day. The late summer and autumn the number of period decrease but the grazing time should be longer inside a period. The grazing activity is strong in the early morning and during the evening hours. This grazing habit is very important in respect of calves, because they have only a chance to suckle their mother during the break of grazing (Márton, 2003).

Other authors published, that the suckling frequencies of calves rise after driving, during the midday rest and evening hours (Czakó, 1978).

Usually, the newborn calves suckle 5–7 times per day (Hafez and Lineweaver, 1968). The number of suckling decreased in relation with the age, but beef calves suckle more because the milkmass of cows decreased during lactation (Hafez, 1975). According to Houpt and Wolski (1982) the beef calves suckling 3–5 occasions per day till weaning. The most frequent suckling period is at dawn, but following periods separated between 9.00–11.00; 15.00–18.00 and 22.30–01.00 (Walker, 1962). Others described that the number of suckling fall to daylight a large extent (Shake and Riggs, 1969). Enyedi and Szurómi (1991) separated 5 suckling periods during day-time and one more typically period during night from each other in summer. The suckling frequencies were the most proportion at midnight and after 5.00 a.m. in the morning, when more of the 50 percent of calves suckle.

Vandenheede et al. (2001) examined the relationship between the calf and cow after the Caesarean section and they established that the maternal behaviour was influenced by parity of cows. The first calvers seem to be poor as nursing, compared the oldest ones. In the first experiment we can found that the first calvers suckling more, but allosuckling also were observed in that group. Alien calves should be suck to first calvers, that these cows not sure the best for nursing. In addition to Stookey (1997) whether the cows allow all of the calves to suckle them, only the oldest calves would survive the lactation period.

According to Lidfors and Jensen (2003) calf-cow pairs spent more time together if the calf was female and if the weaning weight was smaller.

José et al. (2006) three behavioural traits were considered: number of suckling (NSM), duration of each suckling (DSM) and total suckling duration (TSD). Allosuckling was not observed. The calves suckled at any time during the daylight, and the overall means were NSM=2.57±0.05 meals/12 h; DSM=9.25±0.11 min., and TSD=23.76±0.47 min/12 h. There was an effect of dam's breed on NSM and DSM. The age of calf had significant effect on all traits. Males averaged higher NSM and TSD (2.60±0.03 and 25.05±1.37 min/12 h) respectively.

MATERIALS AND METHODS

Our investigations were done in different parts of the country, at Balatonfenyves (Hubertus Ltd.) and at Mezőfalva (Agricultural Cooperative) in the years 2002–2003 and 2005.

In Balatonfenyves result of the substitution crossing different genotype (Hereford; Hereford x Red Angus F1 and R1) were observed. The experimental groups represents pure blood Hereford cows (n=12; 11) crossing Hereford x Red Angus F1 cows (n=12; 11) and crossing Hereford x Red Angus R1 cows (n=10; 10) with their calves, in 2002 and 2003, respectively. The ethological investigation were done both year, 5–5 occasions (experimental day) in August.

In Mezőfalva the researching population contains three different aged dam's group, but genotype of these cows were similar to each other (Hereford x H. Simental F₁). First calvers were taken to the first group, second calvers were put in to the second group, and the oldest cows were taken to the third group (n=10; 10; 10), respectively. The researching period contains 10 experimental days in two terms (July and August).

On the experimental days the 24 hours long observation were applied (00.00–24.00.) During this time we observed the realization of suckling according to in every hours.

The influence of the two main factors (genotype and age) was tested by a nonparametric (Chi-square) test in every interval. Further genetic and environmental effects to the suckling frequency were examined by One Way Analysis of Variance. To clear up the relationship between measured valuables were used the linear regression. The statistical analyse were done by the software of *Microsoft Excel*, and *SPSS 11.5* under the *Windows*.

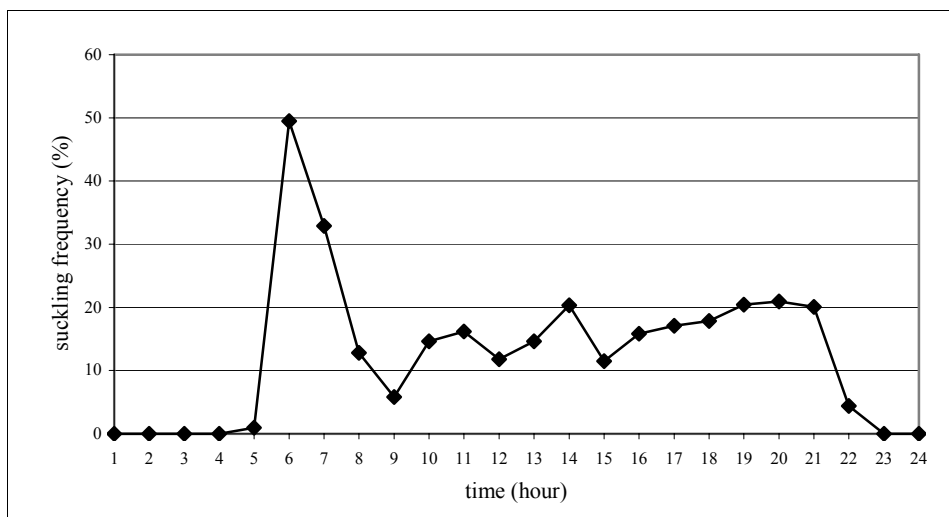
The meteorological data were collected (temperature; air pressure and rainfall) from the Countryside Meteorological Service of Siófok.

RESULTS AND DISCUSSIONS

In the first figure can be shown the suckling frequency in Balatonfenyves during a day without treatment. The average of number of suckling (NSM) was 3.06/day.

Figure 1

**Change of suckling frequency during a day (n=330/hour)
– Balatonfenyves –**



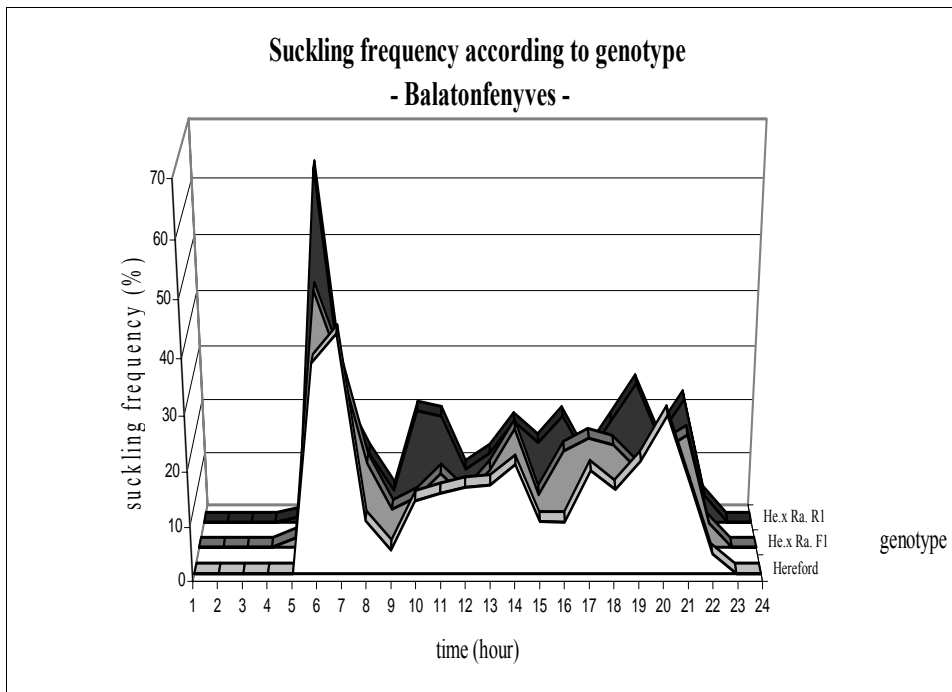
The suckling frequency rose after the animals woke up (5.00), and their (daily) peak reached between 5.30–6.30 a.m. After 8.00 a.m. the number of suckling decreased strongly. About at 9.00 a.m. the calves and the cows grazed, uniformly. We registered another two peaks duration of 10.00–11.00 a.m., and 13.00–14.30 p.m.. Afternoon,

between 14.30–15.30 we observed a second grazing period with the respect of cows. After the nadir (around 15.00 p.m.) the suckling frequency increased slowly from 15.30 till at late evening hours (21.00). The ratio of suckling was about 20% during this duration. The suckling and the grazing were done simultaneously. We agree with *Walker* (1962), who said that the most frequent suckling period is at dawn, and *Czakó* (1978), who described that the suckling frequency rise after driving, during the midday rest and evening hours. At night no suckling were detected - correspondingly to *Shake and Riggs* (1969).

Investigated the suckling frequency regard to genotype, we got a significant difference ($P < 0,01$). The Hereford x Red Angus R_1 cows suckle their calves much more (NSM=3.24/day), than the F_1 genotype or pure Hereford (NSM=2.98/day). The shape of suckling curve showed four peaks (R_1), opposite the other two genotypes (three peaks) (*Figure 2*).

Figure 2

**Suckling frequency according to genotype
- Balatonfenyves -**



José et al. (2006) also published that dam's breed was an effect on NSM. Because the R_1 genotype were first calvers simultaneously, the two effects (genotype and age) to separate from each other, was difficulty. Thus we decided, that the effect of dam's age should be examine independent from genotype. This purpose was appointed in the second research (Mezőfalva). *Table 1.* shown that there was not significant difference between the different age of dam.

Table 1**Influence of dam's age to the daily number of suckling (NSM)**

age of dam	n	$\bar{x} \pm s$	source	sum of squares	df	mean square	F
1 st calvers	100	3.72±0.73	age	0.26	2	0.13	0.238
2 nd calvers	100	3.74±0.70	error	161.99	297	0.545	P
3 rd calvers ≤	100	3.79±0.78	total	162.25	299		0.788

Respecting the number of suckling we got similar results with *Haupt és Wolski* (1982) who described that the NSM was 3–5/day. We examined is there any relationship between the sex of calves and the suckling frequency. Our results were shown in the *Table 2*.

Table 2**Influence of the sex of calves to the daily number of suckling (NSM)**

place	source	sum of squares	df	mean square	F	P
Balaton-fenyves	sex of calves	0.0097	1	0.0097	0.084	0.773
	error	7.428	64	0.116		
	total	7.438	65			
Mezőfalva	sex of calves	3.333	1	3.333	0.935	0.342
	error	99.867	28	3.567		
	total	103.200	29			

There wasn't got significant difference between the variables independent from the experimental place. According to *José et al.* (2006) described that bull calves averaged higher NSM. On the other hand, *Lidfors and Jensen* (2003) calf-cow pairs spent more time together if the calf was female and if the weaning weight was smaller.

Result from the above mentioned fact, we examined the connection between the suckling number of calves and their weaning weight. The results of linear regressions were shown on the *Table 3*.

Table 3**Relationship between the weaning weight and the number of suckling (NSM)**

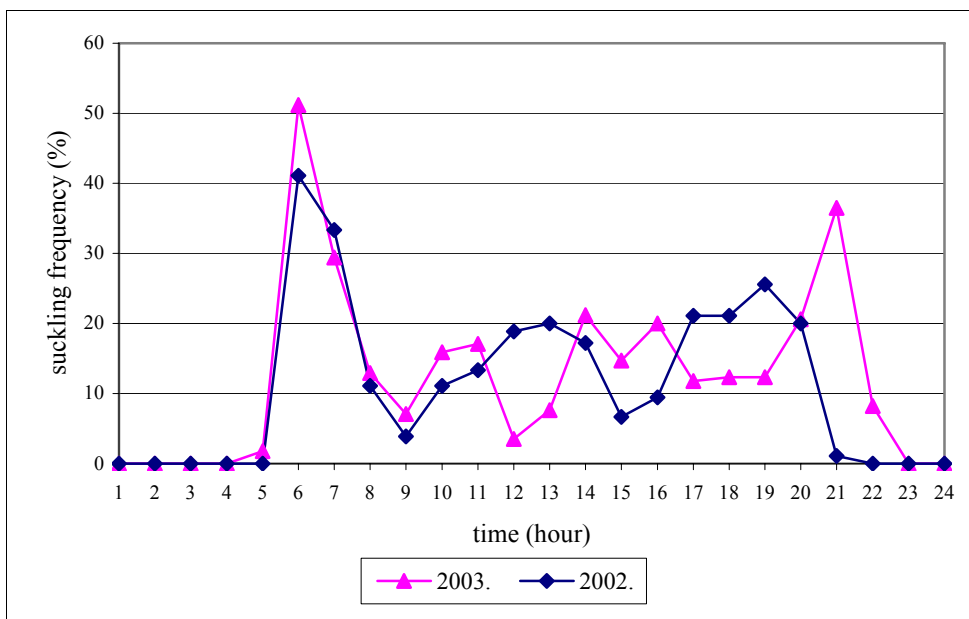
place	source	sum of squares	df	mean square	F	P
Balaton-fenyves	regression	0.315	1	0.315	2.816	0.098
	error	7.053	63	0.112		
	total	7.369	64			
					R=0,207	
					R ² =0,043	
Mezőfalva	regression	1.104	1	1.104	0.303	0.587
	error	102.096	28	3.646		
	total	103.200	29			
					R=0,103	
					R ² =0.011	

We got a slack and an obscure relationship with the two measured variables independent from the experimental place.

Relationship between the meteorological data (mainly the temperature) and the suckling frequency also were investigated. We got a significant difference ($P < 0.01$) between the years (2002 and 2003) in Balatonfenyves (Figure 3) and the months (July and August) in Mezőfalva (Figure 4).

Figure 3

**Change of the suckling frequency according to years
- Balatonfenyves -**

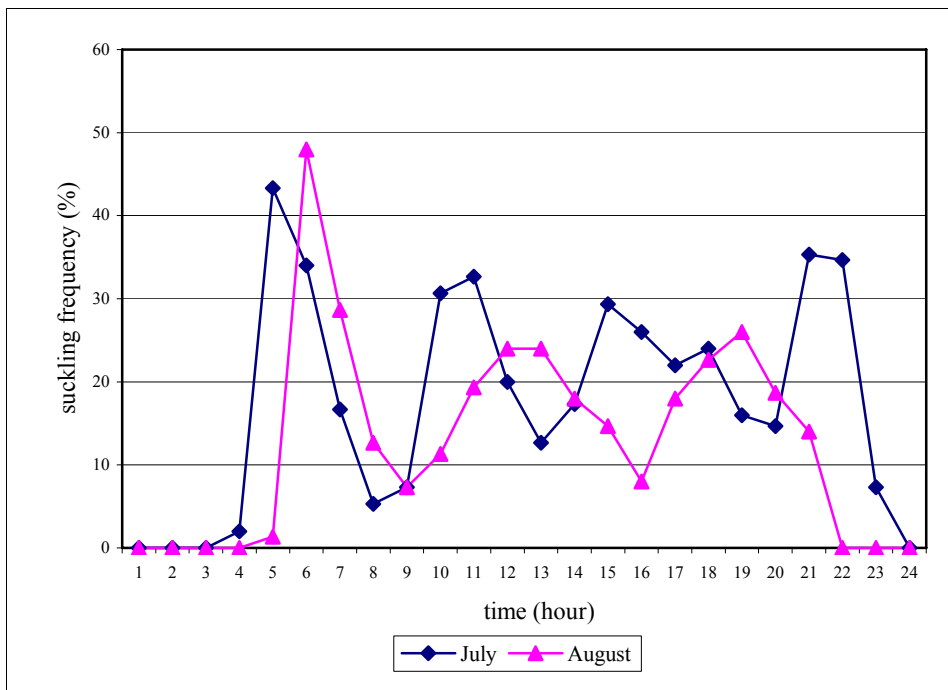


In duration of experiment the averaged daily temperature was 20.91 °C in 2002., and 25.17 °C in 2003. The high temperature divided two parts at the second suckling period about noon, and the number of suckling also increased (NSM were 2002=2.91; 2003=3.22).

Difference between the experimental days was analyzed only relation with year (Balatonfenyves) or month (Mezőfalva) in both cases (interaction). But while in Balatonfenyves the temperature stayed in background of difference, till in Mezőfalva may be the age of calves was responsible to the significant difference (NSM were July=4.33; August=3.16). The tendency of NSM relation to the months (Mezőfalva) similar with Hafez (1975), who published, that the number of suckling decreased in the respect with age. According to José et al. (2006) the all measured traits (e.g. NSM) were affected by the age of calf. There was not any connection between the change of the daily temperatures and the suckling frequency. That means when we progress to smaller interval (year/month→day→hour) decrease and at last leave off the direct influence of temperature to the suckling frequency. Strongly probable, that the temperature sensation stay at the background of this fact. Besides of actual (air) temperature the intensity of sunshine also plays role in hot sensation. It is not coincidence, that the resting of animals were observed in the early afternoon, but the peak of daily temperature was at 18.00 p.m. (2003=30.5 °C).

Figure 4

**Change of suckling frequency according to months
- Mezőfalva -**



CONCLUSIONS

The daily suckling frequency observed in two beef populations. Number of suckling (NSM) increased after the animals woke up, and their (daily) peak reached in the morning hours. Smaller peaks were registered about at noon and during the evening hours. At night no suckling were detected. In Balatonfenyves genotype of the dam significantly affected ($P < 0.01$) the suckling frequency. Because the small interaction between the dam's genotype and their age, we examined the influence of cows' age, in a separate trial (Mezőfalva). According to our results the age of the dam did not affect the suckling frequency significantly ($P > 0.05$). NSM was not affected by sex of calves and there was low correlation between the NSM and the weaning weight of calves. Besides, difference between the experimental days was analyzed only relation with year (Balatonfenyves) or month (Mezőfalva) in both cases ($P < 0.01$) (interaction).

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