

EXPLOITATION OF THE NURSE COWS FOR MEAT PRODUCTION ON DAIRY FARMS – ETHOLOGICAL ASPECTS **

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Abstract: The purpose of the study was to evaluate nurse cow's behaviour during the calves rearing. The experimental group consisted of five Holstein – Friesian nurse cows. The experiment takes 10 weeks of each circle. The calves were allotted to the nurse cows immediately after calving in the first circles. In the first circle was used 1 own calf and 2 foster calves in comparison with the second circle where were 3 foster calves. The calves were with nurse cows in the separate “habitual pen” during the first week of rearing. We made 24 hours lasting ethological observations. During ethological observation we evaluated the following activities: “Lying”, “Eating”, “Standing”, “Walking”, “Drinking”, “Licking calf”, “Standing and bellowing”, “Smelling calf”, “Sucking” and “Head knocking”. Our results show that the activity of “standing and bellowing” did not occur in the first circle in comparison with the volume 57,40 minutes in the second circle. These findings indicate that the nurse cows have more willingly accepted the calves in the first circle.

Key words: nurse cows, ethology, maternal behaviour, calves rearing, suckling

Introduction and literature review

Modern dairy farming has become an intensive industry. To produce maximum milk yields, dairy cows are pushed to their physiological limits through a combination of selective breeding, high-protein feeds, and the latest technology. Along with the production of pigs, chickens and eggs, milk production has become just another factory farm operation. To maximise production, each calf is taken from its mother within 24-48 hours of birth. Calves would naturally suckle for 6-12 months.

The high yielding and highly bred Holstein-Friesian, the ubiquitous black and white cow, now makes up 90% of the European's (EU) dairy herd (*Winter, M. et al., 1997*).

Calf rearing with dam or nurse cows insured supply of colostrum or milk directly from own mother or „foster mother“ to the calves in unlimited amount and time. Firstly, this have favourable effect to calves' growth and evolution, secondly the cows can apply maternal behaviour.

Quantifying social affiliations between cows and calves can help understand how behavioural differences affect survival of the calf. Maternal behaviour is important in determining neonatal survival (*Veissier et al., 1998*). The bond between the calf and its mother is developed following birth and is reinforced through suckling events (*Lidfors and Jensen, 1988; Houwing et al., 1990*). Studies have shown that on average calves spend between ten minutes and one hour per day suckling and the average number of suckling events can vary between less than one and nine per day (*Day et al., 1987*). The variation in both time spent suckling and total number of suckling events is dependent on the age of the calf, milk availability and the conditions under which the animals are kept (*Vitale et al., 1986; Day et al., 1987*). In addition to feeding, the cow and its calf will spend time socialising, grooming and resting together which will maintain and reinforce the maternal bonds (*Vitale et al., 1986*). Social interactions of cows and calves within larger groups of animals are more complex and will vary dependent on the age of the calf and the strength of the bond with the mother (*Hirata et al., 2003*). The bond between a cow and its calf can be prematurely weakened or broken if the calf is either mismothered or a second cow demonstrates a stronger maternal bond than its mother (*Illmann and Spinka, 1993*); this fostering arrangement is most significant in the hours and days immediately post-partum (*Illmann and Spinka, 1993*). The social interactions between individual cows and calves within a group of cattle are complex, however, behavioural observations of both sheep and cattle indicate successful maternal investment in neonatal survival is represented by longer and more frequent intimate social interactions (*Vitale et al., 1986; Day et al., 1987; Lidfors and Jensen, 1988; Dwyer and Lawrence, 1998; Veissier et al., 1998; Dwyer, 2003*). Recent advances in automated monitoring are providing new opportunities to explore animal behaviour (*Rutter et al., 1997; Fehmi and Laca, 2001*).

Materials and methods

The purpose of the study was to evaluate nurse cow's behaviour during the calves rearing. In experiment were used Holstein - Friesian calves and nurse cows (five cows). Cows were cast out from the high-milk-yielding herd. Their

utility was up around 6 000 kg per lactation and their udder was suitable for calf's sucking.

The experiment takes two circles. Duration of each circle was 10 weeks. Each circle contained five experimental groups. One experimental group consisted from three calves and one nurse cow.

The calves were allotted to the nurse cows immediately after calving in the first circles. In the second circle, calves were added to the nurse cows after period of colostrum nutrition at the age of 4 days. During period of colostrum nutrition calves were with cows post partum which produced colostrum.

In the first circles, there was one own calf and two foster calves of each experimental group (viz. each nurse cow), in comparison with the second circles where there were 3 foster calves.

The calves were with nurse cows in the separate "habitual pen" during the first week of rearing. In the next weeks they were connected with the other experimental groups.

We made 24 hours lasting etiological observations. During etiological observation we evaluated the following activities: "Lying", "Eating", "Standing", "Walking", "Licking calf", "Standing and bellowing", "Drinking", "Smelling calf", "Sucking" and "Head knocking". Calves and cows were observed continually by video-camera system. Duration of individual activities was registered in minutes.

Results of investigations and discussion

The cow-calf separation has been reported to be stressful to cows and calves and it seems that the longer the animals are allowed to stay together the stronger the behavioural response to separation is (*Lidfors, 1996; Weary, Chua, 2000; Stehulova, Lidfors, Spinka, 2003*).

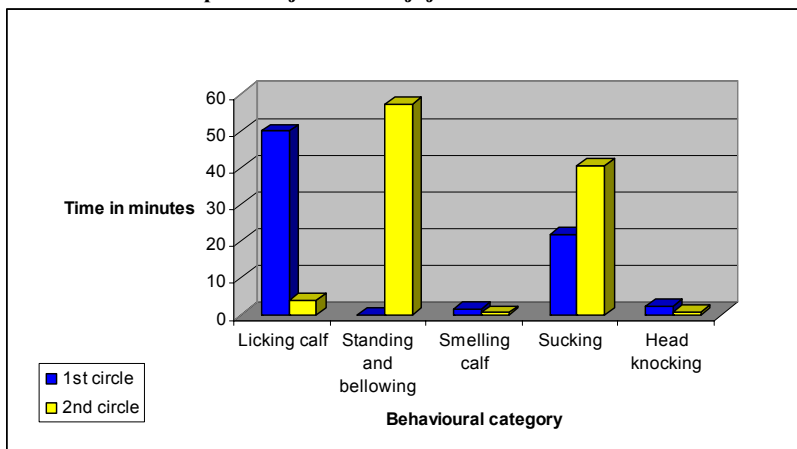
Maternal behaviour of nurse cows in categories as „Licking calf“ and „Smelling calf“ was markedly higher (49,90, or 1,60 minutes) in the first circle than in the second circle (3,93, or 0,60 minutes) as shown in the table 1 and graph 1. It means that, immediately after calving (1st circle), each of the nurse cows readily accepted foster calves, besides it's own calf, into the own experimental nursing group.

Table 1. Daily routine of nurse cows
Tabela 1. Dnevna rutina krava dojilja

Behavioural category in minutes/Kategorija ponašanja u minutima	1st circle/1.krug	2nd circle/2.krug
	x±s	x±s
Lying/Ležanje	859,20±377,29*	511,20±123,28
Eating/Hranjenje	164,00±108,95	341,00±66,74*
Standing/Stajanje	176,00±179,93	289,80±112,47*
Walking/Hodanje	25,80±53,27	88,20±82,96*
Drinking/Pijenje	5,00±7,07	19,80±2,49*
Licking calf/Lizanje teleta	49,90±43,65*	3,93±8,43
Standing and bellowing/Stajanje i mukanje	0,00±0,00	57,40±59,56*
Smelling calf/Njušenje teleta	1,60±3,58	0,60±1,34
Sucking/Dojenje	21,87±15,52	40,47±9,80*
Head knocking/Udaranje glavama	2,25±3,96	0,83±1,00

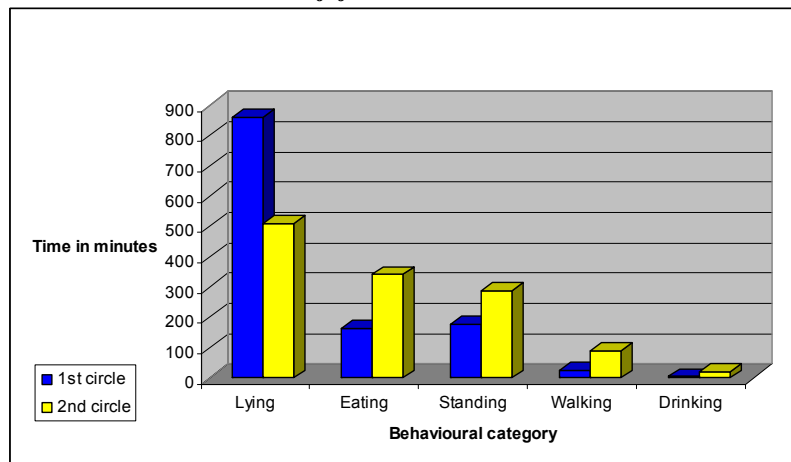
x: medium/srednja vred., s: standard deviation/stand.devijacija, *: P< 0,05

Graph 1. Maternal behaviour of nurse cows
Grafikon 1. Materinsko ponašanje krava dojilja



As shown by *Hudson* (1977) the same kind of social interaction may occur when alien calves are introduced to the foster cows shortly after parturition and these cows might accept and develop a maternal bond towards the calves. We showed the same findings in our study.

Graph 2. Daily routine of nurse cows
Grafikon 2. Dnevna rutina krava dojilja



Introduction of the alien calves later in lactation does not seem to affect the acceptance of the alien calves by the foster cow. *Loberg & Lidfors* (2001) have recently shown that cows accept equally well alien calves regardless of the time after separation from their own calf (directly, 4, 26 and 178 days after). However, some problems may arise and the farmer might have to tie some cows to allow the calves to suckle for a few meals before they accept being suckled (*Hudson, 1977; Lidfors, 2000*). This is in keeping with our results in the table 1, graph 2.

Nurse cows were nervous in the second circle, because we made weaning calves in the first circle and we introduced calves of the second circle to them. In the daily routine, activity share rate was increased as follows: „Eating“ from 164,00 minutes to 341,00 minutes, „Standing“ from 176,00 to 289,80 minutes, „Walking“ from 25,80 to 88,20 minutes, „Standing and bellowing“ from 0,00 to 57,40 minutes. The greatest increase was in activity „Standing and bellowing“, it means that this activities are used as the compensation factor of psychological excitation and attempt for the remake calf-cow band of the past circle.

Conclusions

The results of the study indicate that the cows-calves band is very intensive right after calving. In the first circle nurse cows can accept foster calves easier than in the second circle. In the second circle nurse cows need

some time to accept new suckling group of calves, because past cow-calf band from the first circle was very strong, but this acceptance is successful at last. Similarly, measuring contacts between cows and calves could provide a unique insight into cow-calf affiliations and potentially be used to differentiate dam-calf relationships.

Eksploatacija krava dojilja u proizvodnji mesa na farmama za proizvodnju mleka – etološki aspekti

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Rezime

U tradicionalnim sistemima držanja zapata za proizvodnju mleka, telad se obično stavlja u pojedinačne bokseve i hrani mlekom iz kofa što može dovesti do abnormalnog ponašanja. U organskim zapatima, gde je cilj optimalna dobrobit za životinje, postoji sistem dojenja gde telad imaju mogućnost da ispoljavaju normalno društveno ponašanje.

Odvajanje je stresan proces jer majka i tele imaju veoma jaku materinsku vezu. Odvajanje teleta je potencijalno najstresniji incident u životu mlečne krave.

U ovom radu smo opisali rezultate etološkog posmatranja i opservacija krava dojilja holštajn-frizijske rase tokom prvog dana vraćanja teladi. Telad su priključena kravama dojiljama u dva vremenska perioda. Trajanje jednog perioda je bilo 10 nedelja. Krave dojilje su bile mnogo mirnije u prvom periodu. Aktivnosti materinskog ponašanja, npr. "lizanje teleta" ($49,90 \pm 43,65$ minuta), "mirisanje teleta" ($1,60 \pm 3,58$ minuta) su bile više prisutne u prvom periodu u poređenju sa drugim ($3,93 \pm 8,43$ minuta) odnosno ($0,60 \pm 1,34$ minuta). Krave dojilje su bile nervozne u drugom periodu. Ova reakcija je bila manifestovana povećanjem aktivnosti u okviru svakodnevne rutine: "hranjenje", "stajanje", "šetanje", i "stajanje i mukanje". Ove aktivnosti su bile faktor kompenzacije za fizičko uzbuđenje i pokušaj obnavljanja veze između krave i teleta iz prethodnog perioda. Slično tome, merenje kontakata između krava i teladi bi moglo dad a pruži jedinstven uvid u odnose krava-tele i potencijalno se koristi za razlikovanje odnosa majka-tele.

References

- DAY M.L., IMAKAWA K., CLUTTER A.C., WOLFE P.L., ZALESKY D.D., NIELSEN M.K., KINDER J.E. (1987): Suckling behaviour of calves with dams varying in milk-production. *J. Anim. Sci.* 65, 1207–1212.
- DWYER C.M. (2003): Behavioural development in the neonatal lamb: effect of maternal and birth-related factors. *Theriogenology* 59, 1027–1050.
- DWYER C.M., LAWRENCE A.B. (1998): Variability in the expression of maternal behaviour in primiparous sheep: effects of genotype and litter size. *Appl. Anim. Behav. Sci.* 58, 311–330.
- FEHMI J.S., LACA E.A. (2001): A note on using a laser-based technique for recording of behaviour and location of free-ranging animals. *Appl. Anim. Behav. Sci.* 71, 335–339.
- HIRATA M., NAKAGAWA M., FUNAKOSHI H., IWAMOTO T., OTOZU W., KIYOTA D., KUROKI S., FUKUYAMA K. (2003): Mother–young distance in Japanese Black cattle at pasture. *J. Ethol.* 21, 161–168.
- HOUWING H., HUMIK J.F., LEWIS N.J. (1990): Behaviour of periparturient dairy-cows and their calves. *Can. J. Anim. Sci.* 70, 355–362.
- HUDSON S. J. (1977): Multiple fostering of calves onto nurse cows at birth. *Appl. Anim. Ethol.*, vol. 3, 1977, no. 1, p. 57-63.
- ILLMANN G., SPINKA M. (1993): Maternal-behavior of dairy heifers and suckling of their newborn calves in group housing. *Appl. Anim. Behav. Sci.* 36, 91–98.
- JUNG J., LIDFORS L. (2001): Effects of amount of milk, milk flow and access to a rubber teat on cross-sucking and non-nutritive sucking in dairy calves. *Applied Animal Behaviour Science*, 72: 201-213.
- LIDFORS L. M. (1996): Behavioural effects of separating the dairy calf immediately or 4 days post-partum. *Applied Animal Behaviour Science* 49, 269-283.
- LIDFORS L. M. (2000): Behavioural studies of keeping dairy calves on foster cows. In: 34th International Congress of the International Society for Applied Ethology (Eds: Ramos, A., Pinheiro, L. C. & Hötzel, M. J.). Florianópolis, Brazil, pp. 95.
- LIDFORS L., JENSEN P. (1988): Behavior of free-ranging beef-cows and calves. *Appl. Anim. Behav. Sci.* 20, 237–247.
- LOBERG J., LIDFORS L. (2001): Effect of stage of lactation and breed on dairy cows' acceptance of foster calves. *Applied Animal Behaviour Science* 74, 97-108.
- RUTTER S.M., BERESFORD N.A., ROBERTS G. (1997): Use of GPS to identify the grazing areas of hill sheep. *Comput. Electron. Agric.* 17, 177–188.

- STEHULOVA I., LIDFORS L. M., SPINKA M. (2003): Response of dairy cows to separation from calves: Effects of calves' age and visual/auditory contact. In: 37th International Congress of the International Society for Applied Ethology (Eds: Ferrante, V.). Edito a Cura Della, Abano Terme, Italy, pp. 163.
- VEISSIER I., BOISSY A., NOWAK R., ORGEUR P., POINDRON P. (1998): Ontogeny of social awareness in domestic herbivores. *Appl. Anim. Behav. Sci.* 57, 233–245.
- VITALE A.F., TENUCCI M., PAPINI M., LOVARI S. (1986): Social-behaviour of the calves of semiwild Maremma cattle, *Bos-Primigenius-Taurus*. *Appl. Anim. Behav. Sci.* 16, 217–231.
- WEARY D. M. CHUA B. (2000): Effects of early separation on the dairy cow and calf. 1. Separation at 6 h, 1 day and 4 days after birth. *Applied Animal Behaviour Science* 69, 177-188.
- WINTER M., FRY C., CARRUTHERS P. (1997): *Farm animal Welfare and the Common Agricultural Policy in Europe. Compassion in World Farming Trust.* Petersfield: Hampshire