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### EFFECTS OF HABITUATING HEIFERS TO THE MILKING PARLOUR ROUTINE PRIOR TO CALVING AND EFFECTS OF THE REARING METHOD ON HEART RATES OF HEIFERS DURING MILKING

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**ABSTRACT** One of the aims of this study was to investigate changes in heart rates in the first days of lactation during the milking procedure as a result of habituating heifers to the milking parlour environment prior to calving. The other was to evaluate the influence of the rearing method. A group of five heifers (group TF) was exposed to the full milking parlour routine once daily (afternoon milking) on three subsequent days about one week prior to calving. Ten heifers routinely entered the milking parlour the first time for the afternoon milking after calving. Five of these heifers (group F) were reared with an automatic teat feeder, five (group FKK) were reared naturally by suckler- or foster cows. The control group consisted of two cows (group K), entering the milking parlour routinely the first time for the afternoon milking after calving. Heart rate was evaluated with a POLAR heart rate monitor on day one and nine of lactation during the milking procedure. The respective heart rates could be assigned to the events in the milking parlour via videoanalysis. On the first day of lactation group F and group FKK displayed nearly the same heart rates. TF had lower heart rates compared with the two other heifer groups. On day one of lactation the lowest heart rates were recorded for group K. During the first nine days of lactation the differences between the heifer groups diminished. Only group K showed lower heart rates on day nine compared with the heifers. The differences in heart rates between day nine and one of lactation showed similar values. The greatest differences were found in F and FKK, TF showed lower differences and in group K the differences were minimal.

**Keywords:** dairy cows, heifers, milking parlour, heart rate, rearing method, organic farming

**INTRODUCTION** Primiparous cows, that are brought to the milking area for the first milking, are often very nervous or agitated due to novelty of the surroundings and new type of sensations arising from close human contact, especially the handling of udder and teats (Das and Das 2004). Studies show, that stress during milking (e.g. milking in an unfamiliar room) leads to higher plasma cortisol concentrations, lower oxytocin secretion, lower milk yield and higher residual milk (Rushen et al. 2001). Stressful situations during milking lead to an elevation of the heart rate (Rushen et al. 2001;

Hopster et al. 1998; Nosal et al. 2004). An elevated heart rate during milking can be used as a stress parameter (Troxler, 2009).

Early experiences of the animals with humans and technical equipment seem to play an important role as to the reactions of the animals in the milking parlour (Hemsworth et al. 1987; Heinrichs 1996; Wicks et al. 2004; Bremner 1997; Rushen et al. 2001). Permitting dairy herd replacements to become accustomed to the new surroundings of the milking parlour before calving will enable them to deal with the new stresses that they will have to face in the early weeks of lactation (Heinrichs 1996). During milking these animals show reduced fear responses, are less nervous, the duration of milking is longer, they show increased milk production, their milk production is higher and their heart rates are lower compared with “non-accustomed” animals (Bremner 1997; Wicks et al. 2004, Schwalm et al. 2009).

In modern dairy systems maternal behaviour and contact between cow and calf is limited or absent due to the wide use of artificial rearing methods, where cow and calf are separated in the first days after birth. This is also the case in organic dairy systems (Rahmann et al. 2004, Langhout and Wangenaar 2006). An increasing number of farmers are not satisfied with the artificial rearing systems and introduce suckling systems (Langhout and Wangenaar 2006). The former have many beneficial effects on calves and cows (eg. Langhout and Wangenaar 2006, Roth et al. 2009) but there are also some critical aspects to be taken into consideration (eg. Barth et al. 2009, Krohn 2001, Wolters 2006). One of these aspects is, that young animals from mother bonded rearing systems are shyer in the presence of humans than artificially reared animals. This can lead to difficulties as to the management of these animals (Wolters 2006). Calves and heifers get used to the human contact (when the contact is positive) (e.g. Boivin et al. 1992; 2009; Lensink et al. 2001). Likewise they can get used to the contact with technical equipment in the stable. It has been an object of investigation in the existing literature whether a very early animal-human contact can lead to persistent changes in animal behaviour (e.g. Boivin et al. 2009) or if this early interaction has no influence on the later behaviour towards humans (e.g. Boissy und Bouissou 1988).

**AIM OF THE STUDY** The first primary aim of the study was to evaluate the influence of habituating heifers to the milking parlour routine prior to calving on heart rates in the first lactation days during milking. The second aim was to determine whether the rearing method (mother-bonded vs. artificial) has an effect on heart rates of heifers on the first lactation day during milking.

**MATERIAL AND METHODS** Heart rates of 15 heifers and five cows were investigated in the first ten days of lactation during the afternoon-milking. A group of five heifers (group TF) was exposed to the full milking parlour routine once daily (afternoon milking) on three subsequent days about one week prior to calving. Ten heifers routinely entered the milking parlour the first time for the afternoon milking after calving. Five of these heifers (group F) were reared with an automatic teat feeder, five (group FKK) were reared naturally by suckler- or foster cows (Tab. 1). The control group consisted of five cows (group K), entering the milking parlour routinely the first time for the afternoon milking after calving.

Table 1. Differences in rearing method and experimental design between the three heifer groups

	TF	F	FKK
Rearing method of the heifers	with automatic teat feeder Ø 2 days with their mother		with suckler or foster cows
	8-19 days in individual pen with bucket feeding  At the age of 10-21 days group housing with automatic teat feeder  suckle period Ø 60 days		1-2 weeks in individual pen with their mother 2x/day (later 1x/day) calves were allowed to suckle for 30 min on their mother, which afterwards went to milking between the suckling intervals cows and calves had no contact suckle period Ø 60 days
All heifers	hay and water ad lib. concentrate (500g up to 2500g) post weaning all calves received the same treatment all heifers had close human contact during birth time		
	TF	F	FKK
experiment	exposed to the full milking parlour routine once daily on three subsequent days about one week prior to calving	entering the milking parlour routinely the first time for the afternoon milking after calving.	

Heart rate was evaluated with a POLAR heart rate monitor on day one and nine of lactation during the milking procedure. The respective heart rates could be assigned to the events in the milking parlour via videoanalysis.

Because of mastitis and imprecise heart rate measurements, only the data of four heifers (F), four training-heifers (TF), four mother bonded reared heifers (FKK) and two cows (K) could be analysed. For heart rate analysis, the mean heart rates in the 20 sec following an activity performed were investigated and the mean heart rates during milk extraction were analysed.

**RESULTS** On the first day of lactation group F and group FKK displayed nearly the same heart rates. TF had lower heart rates compared with the two other heifer groups. On day one of lactation the lowest heart rates were recorded for group K. During the first nine days of lactation the differences between the heifer groups diminished. Only group K showed lower heart rates on day nine compared with the heifers.

Table 2. Heart rates [b/min] during milk extraction on day one and nine of lactation

group	Heart rate
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	day 1 of lactation	day 9 of lactation
F	119,4	89,3
FKK	113,8	88,0
TF	103,0	88,2
K	78,8	81,6

The differences in heart rates between day nine and one of lactation showed similar values (fig. 1). The greatest differences were found in F and FKK, TF showed lower differences and in group K the differences were minimal.

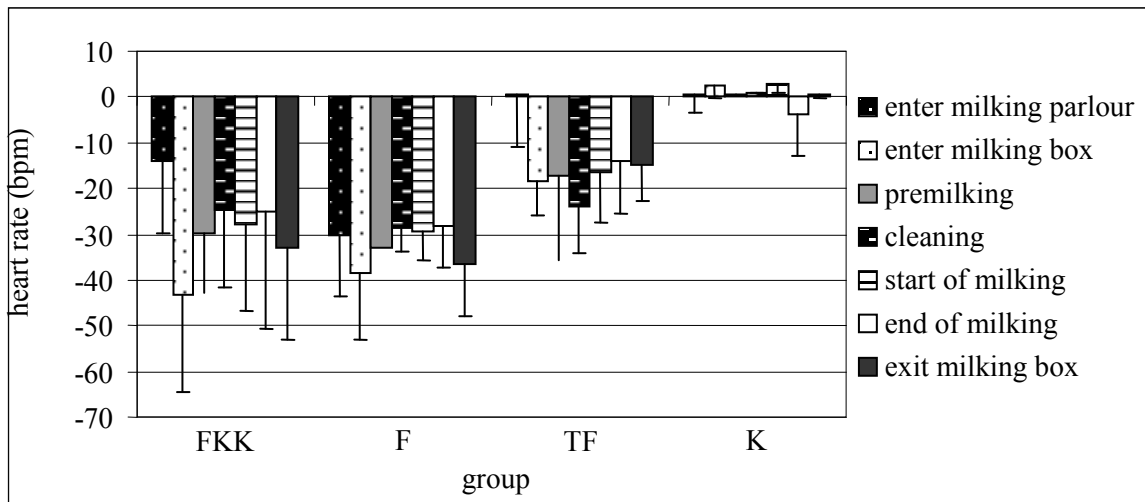


Figure 1. Differences in heart rates [b/min] between day nine and one of lactation

**CONCLUSIONS** These results indicate that a habituation of heifers to the milking routine on only three afternoon milkings can reduce heart rates in the milking parlour in the first days of lactation. The rearing method of the heifers does not seem to have any influence on the heart rates in the first lactation days. Cows have lower heart rates than heifers.

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