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# Does housing and feeding during milk-feeding period affect the milk production of primiparous dairy cows?

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Calves are usually removed from their mother immediately after calving and fed by milk replacer (MR). Only a few calves, particularly from small herds, are fed with native milk until weaning. Majority of calves used individual housing (IH) during the milk-feeding period, about 10 % of calves are kept in loose housing (LH) with bucket feeding and very small part is housed in LH with the computer-controlled feeder (CCF).

IH could be stressed for calves. However, heifers reared in isolation until weaning milked significantly more milk than heifers from loose housing (Arave *et al.*, 1985). Arave *et al.* (1992) found that pre-weaning isolation affected growth, but did not affect milk yield (MY) during the first lactation.

The early separation of the calf from the cow is of course important for maximum production, but this system can be disadvantage for calves. On the other side, uncontrolled access to the mother by the calf can reduce MY of the mother, but daily weight gains (DWG) of nursed calves are higher than the separated calves (Metz-Stefanowska, 1987).

The purpose of this paper was to find whether milk production of primiparous cows is affected by their housing to weaning and the feeding method of milk or milk replacer. We tested hypotheses that the milk efficiency are impacted by the housing of heifers from the second to seventh day of life, the method of feeding milk from the second week of life to weaning, and the sire lineage.

32 Holstein heifer-calves were randomly divided in two housings on the second day of life: into the hutches (IH, n=19), or loose housing in the pen with the mother (LH, n=13). Calves from IH received colostrum and mothers milk in free choice three times a day from a bucket with nipple from the second to seventh day. Calves of the group LH were allowed to suck their dams ad libitum, but mother was milked from the second day after calving.

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## Introduction

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## Materials and methods

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Ten heifers were randomly moved out from IH on the seventh day to a group pen with the CCF and received MR through an artificial nipple of this equipment (AF). The remaining nine heifers stayed in individual hutches and were fed by sucking MR from an artificial nipple of the bucket (BF). Heifers, which were with the mother until the seventh day (LH), were moved to a group pen with nursing cows and sucked native milk from udder (UF).

Heifers of the treatment AF received 6 kg of MR per day divided into 4 portions in 6 h intervals. Calves of the treatment BF got the same amounts of MR divided into 2 portions in 12 h intervals. From the second day until weaning the calves could eat starter mixtures and alfalfa hay in free choice. The number of calves of group UF per one nursing cow was determined according to their milk yield (6 kg milk per each calf). Calves were allowed to suck ad libitum and they also had free access to starter mixture and feeds of cows.

All animals were weaned at the age of 8 weeks. Heifers of all groups were kept in common group pens in loose housing with bedding in age-balanced groups after weaning. Equal conditions of nutrition were ensured in all groups.

Primiparous dairy cows were kept in free-stall housing and fed by total mixed ration according to the stages of lactation. Cows originated from four sires: S<sub>1</sub> (n=8), S<sub>2</sub> (n=6), S<sub>3</sub> (n=9) and S<sub>4</sub> (n=9). Milking occurred twice daily with a milking interval of 12 hours in a 2x5 stall herringbone parlor, and individual MY was recorded once weekly by Tru-tests. Milk samples were collected every 2 weeks. The data were analysed with a statistical package STATISTIX (Analytical Software, Tallahassee, USA).

## **Results**

The MY in the 305 days lactation was higher in LH cows than in the IH group (6894.1 ± 879.8 kg vs. 6202.1 ± 923.9 kg; P<0.05). A significant differences were found also in the productions of FCM (6541.9 ± 649.2 kg vs. 5986.4 ± 669.2 kg, P<0.05) and protein (215.3 ± 23.9 kg vs. 193.2 ± 27.3 kg; P<0.05).

The UF cows reached the highest MY (6894.1 ± 879.8 kg) and AF cows the lowest (5757.5 ± 865.5 kg; P<0.01) for 305 days lactation. A similar trend was recorded also in FCM (6541.9 ± 649.2 kg vs. 5820.9 ± 797.3 kg, P<0.05). The contents of fat and total solids (TS) were the highest in the group AF (4,10 %; 13.14 %).

Effects of the sire lineage were very significantly showed in the fat content (P<0.001), very significantly in the production of the lactose and content of TS (P<0.01) in 305 days lactation. Statistical significancies (P<0.05) were showed in MY, contents of protein and lactose, as well as in the content and production of non-fat solids (NFS).

We found that productions of milk, FCM and protein were significantly higher in the LH group than in the group of IH. It is however possible that an effect of housing from the second to seventh day of life was suppressed by the method of milk feeding to weaning. That had a decisive effect on growth and subsequently milk production.

How could we explain the highest production of milk, FCM, protein, lactose, NFS and TS of the UF group? Basically by a higher live body weight (LBW) at calving. According to results of Khalili *et al.* (1992), calves given a high level of milk or MR in early life have a LBW advantage over similar calves given a lower level of milk. Differences in LBW due to increased DWG in the early life of a calf may be retained subsequently or, in certain situations, the difference in LBW may increase later in life. UF group had just this advantage, difference were significant in comparison to AF and BF group (35.7 kg and 18.6 kg).

The calves fed by nursing cows grew faster than the conventionally fed calves before weaning, probably as a result of the higher intake of milk. And that even when we limited the amount of milk by the number of calves per one cow. In suckling calves, postnatal growth rates ad libitum-fed calves were greater than in calves fed with limited intake (Egli and Blum, 1998).

Differences among rearing groups (factor R) can be also explained by nutrition during milk-feeding period of these first-calf heifers. Animals of group UF received obviously more valuable nutrition from udder than animals from groups AF and BF. In the experiment of Bar-Peled *et al.* (1997), heifer calves that suckled milk had higher DWG, an earlier age at calving, and a tendency for greater MY than did calves fed MR.

Another reason why dairy cows fed by the milk automat machine produced the lowest amount of milk can be their worse health condition by weaning. According to Plath *et al.* (1998) a higher proportion of calves reared in groups with CCF were affected by diarrhoea and bronchopneumonia and showed less DWG than calves reared in groups with bucket feeding. The risk of developing respiratory disease was 2.8 times higher in LH with CCF than in calves kept in IH (Svensson *et al.*, 2000).

We can conclude that the milk and its composition of primiparous cows is affected by their housing to weaning, the feeding method of milk or milk replacer, and the sire line.

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## Discussion

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## Conclusions

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