

Suckling as an alternative rearing system for replacement calves on dairy farms

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Introduction

Maternal behaviour and contact between cow and calf is limited or absent in modern dairy systems due to the wide use of bucket feeding of artificial milk. This is also the case in organic dairy systems. An increasing number of individual farmers are not satisfied with the artificial bucket feeding system. In order to improve the welfare of their dairy cattle, a number of organic farms introduced suckling systems. The aim is to develop an alternative calf rearing system for replacement calves that will improve animal welfare on dairy farms and meets the requirements of farmers in terms of practicality and cost. On the dairy farms that make use of a suckling system are calves suckled by their mother or a nurse cow, for a duration that ranges from three days up to three months. Compared to artificial calf rearing, suckling systems are beneficial to the welfare of calves. The calves will be nursed by their mother, suckled with milk, learn to eat roughage at a younger age, have social contact with other calves and cows and have space enough to exercise and play. Most of these factors are absent in artificial calf rearing systems (Krohn, 2001). In a pilot study, which started in 2002, the effect of suckling on several aspects of the farming system, including calf growth, animal health, milk production, rearing costs, animal welfare and naturalness were studied during the winterseason (september-march). In the winterseason of 2003, the focus of the research continued to be on live weight development of calves. In addition, behavioural studies of calves before and after weaning were carried out. This paper will focus on the following aspects of the project:

- Motivation of farmers to make use of suckling systems;
- Calf growth; and
- Milk consumption.

Suckling as a rearing system for dairy calves has potential benefits. However, suckling systems can also be in conflict with measures to secure food quality. For example, in the case of Johne's disease, suckling may spread the disease with an infected herd. Results of long term effects of suckling on cows and calves are still to be determined.

The suckling methods

Three farms, which introduced suckling as a calf rearing method, were studied for 18 months. The farms were selected on the basis of their willingness to co-operate and exchange information on different aspects of their farm. The farms made use of different suckling systems, in which the period of suckling by the own mother was followed by a period of suckling by a nurse cow. The duration of the different suckling methods varied between farms, and the age at weaning varied as well.

Three methods can be distinguished in the suckling systems.

1. Single suckling during the colostrum period, which covers the first days after birth when the cow produces colostrum. During the colostrum period mother and calf are housed separate from the herd for approximately three days. The cow is only milked mechanically when this is necessary for udder health the cow or to support the calf with additional feeding. After this period, there are two options:
2. Single suckling with additional milking. After the colostrum period the calf is introduced with its mother in the dairy herd. The milk consumption of the calf is *ad libitum*, the cow is milked twice a day mechanically.
3. Multiple suckling without additional milking. The calf is placed by a nurse cow with 2-4 other calves. The nurse cow is housed separate from the dairy herd. The milk consumption of the nursed calves is restricted by the number of calves under each nurse cow. The nurse cow is not milked mechanically.

In figure 1, the suckling systems with the different periods are presented. The suckling systems used are a combination of the above mentioned methods. In 2003 all farms made use of suckling with the own mother during the colostrum period. Two farms made use of a single suckling with additional milking followed by a multiple suckling. At one farm, the duration of single suckling varied from two days up to two months and multiple suckling varied from one month up to three months. All calves were weaned at three months. One farm used a single suckling for two months and there after multiple suckling for one month. All calves at this farm were weaned at three months. One farm made only use of multiple suckling after the colostrum period. Calves were weaned at varying ages of three to five months. Results on long term effects of suckling on the farms for cow and calf are still to be determined. At the end of 2004 the first suckling calves will come into the first lactation.

Figure 1 Periods in the suckling systems

Birth		Weaning
1-3 days with own mother in calving stable	Calf with mother in the herd Machine milking 2 times a day Duration 1 up to 2 months	Nurse cow with 1-4 calves in separate area <ul style="list-style-type: none"> • No machine milking • Duration 1 up to 2 months
1-3 days with own mother in calving stable	Nurse cow with 1-4 calves in separate area No machine milking Duration 3-4 months of age	

Motivation of the farmers

Motivation of farmers was bases on experiences with bucket feeding and suckling systems and the expectations farmers had with the use of a suckling system. In a problem analysis according to Udo *et al*, 2002, the cause-effect relations were established. Seven farmers and four experts were selected and asked for their experiences and expectations with

suckling. The information was collected by means of semi-structured interviews with open questions.

According to some farmers, the bucket feeding system leads to poor immunisation and diarrhoea in calves, and high somatic cell counts and poor development of social behaviour (Langhout, 2003). These farmers also felt that it was hard to defend their calf rearing practices to critical consumers who support the development of sustainable farming. Another important argument mentioned in favour of the suckling system was expected increased naturalness of the farming system. Naturalness refers to the avoidance of inorganic, chemical inputs, to the application of organic, agro-ecological principles and to the respect for the 'integrity of life' (Verhoog *et al*, 2002).

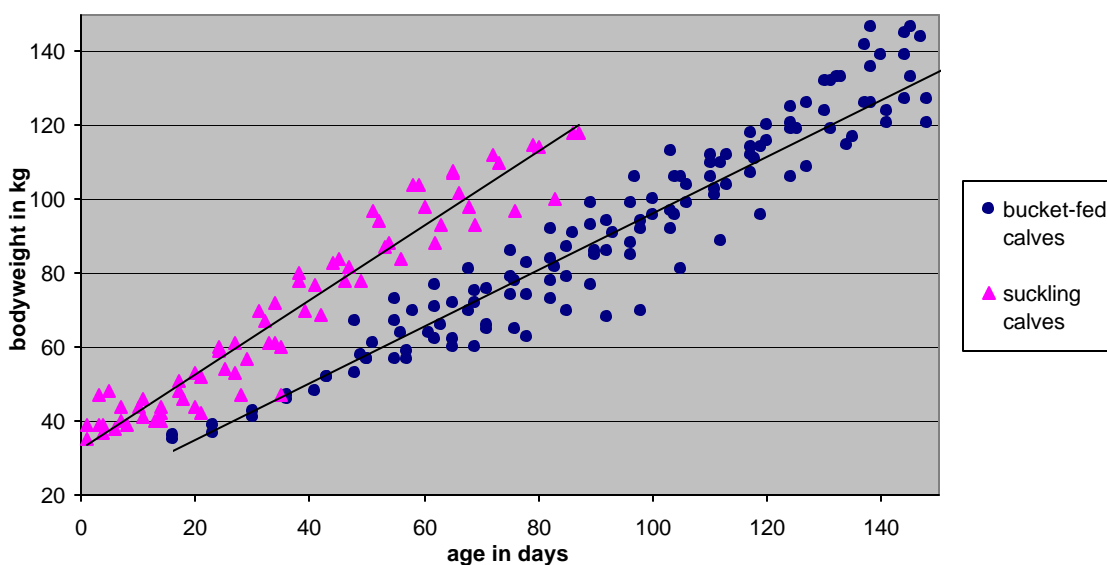
Problems resulting from the bucket feeding system were indicated as reasons for the willingness to experiment with suckling systems. The expectations of positive effects of the suckling system in the long term were high. Expectations on improved udder health, development of social behaviour and improved health of calves and cows are supported by several studies. The strong points of the system, according to farmers, were less labour, pleasure and enjoyment, and increased activity of cows. Weak points indicated by the farmers were fear for inter-suckling and decreased milk ejection.

Calf growth

The milk consumption and growth of calves was studied. At one farm 17 calves were assigned to two treatments in 2002. Calves born before the experimental period received a control treatment (bucket feeding system). Calves born during the experimental period received a suckling treatment. The treatments were conducted during pre-weaning until calves reached the body weight of 100 kg. Post weaning, all calves received the same treatment. Bucket-fed calves (n=10) were fed fresh cow milk in open buckets, six kg per day. Bucket-fed calves were housed in single pens for 14 days, thereafter in groups of two up to four calves housed in straw pens.

The milk consumption of suckled calves was *ad libitum* by sucking their mother. Suckled calves had free access to the cubicle stable of the dairy herd. The calves had also access to a straw pen, which was not accessible for cows. Calves and cows were kept indoors 24 hours a day. During the post weaning period, all 17 calves were housed in a cubicle stable in groups of four to six calves. Calves were fed *ad libitum* grass silage and one kg of concentrates per day. Weight gains in the pre and post weaning period of calves was measured weekly during the experimental period of five months. In figure 2, the body weights of the calves in both treatments (repeated measurements) in this experiment are presented.

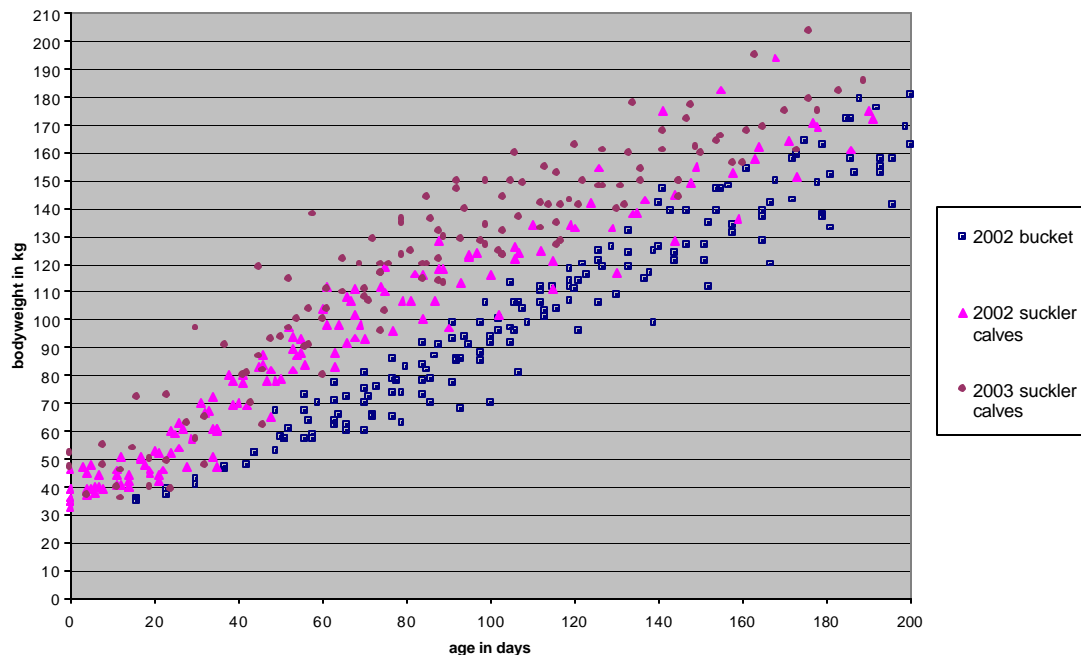
Figure 2 Weight development of the calves at Farm II (Langhout, 2003).



The bucket-fed calves showed significantly lower growth in the first month pre weaning than the suckled calves (Langhout, 2003). There was a large difference in growth in the first month. The mean growth pre weaning of suckled calves was 0.97 kg/day vs. 0.59 kg/day for bucket-fed calves. The difference is 0.38 kg/day ($P < 0.1$). For the second month

pre weaning a significant difference was also found. The mean growth of suckled calves was 0.50 kg higher than growth of bucket-fed calves ($P < 0.001$). Bucket fed calves were weaned at 118 days and suckled calves at 65 days. In the following year, the farmer changed his suckling system for all replacement calves into the following regimen: three day colostrum period, two month single suckling, followed by one month multiple suckling with a nurse cow ($n=16$). Calves were weaned at 90 days of age. In figure 3, the body weights (repeated measurements) of these calves are presented. A difference between the two suckling systems can be observed. The figure also shows a large variation in the first three months between calves in the suckling systems compared to the variation within the bucket feeding system at this farm.

Figure 3 Bodyweight development of calves in two successive years.



Milk consumption by calves

The difference in milk production of suckler cows between pre and post weaning of the calf, together with the difference between suckler and non-suckler cows in the first months

of the lactation was used to estimate the milk consumption of the suckled calves (Langhout, 2003). At one farm 12 cows were assigned to the treatment of suckling their calves, 36 cows were used as controls. During the first month of the experiment, cows had access to outdoor grazing during the day. After the first month, cows were kept indoors in a deep litter stable 24 hours a day. In the stable, all cows were fed *ad libitum* grass silage and were fed concentrates corresponding with their lactation stage. All cows were milked two times a day in a milking parlour. The farmer selected the cows for the treatments. Only cows that gave birth to a female calf for replacement were assigned to the treatment of suckling. Cows that gave a bull calf or female calf not used for replacement were assigned to the group of non-suckler cows. The milk yield of all the cows was measured every four weeks during the experimental period of five months. Milk quantity was measured in kg/day. Suckler cows showed significantly less measured milk production during the pre weaning period compared to post weaning.. This difference varied from 13.3 kg ($P < 0.001$) pre weaning vs. post weaning within the suckler cow group to 15.7 kg between suckler and non-suckler cows ($P < 0.001$). In the first 14 days the consumption of calves estimated was up to 10 kg of milk per day and, thereafter, up to 15 kg per day.

Conclusions

In a suckling system different methods can be distinguished, the colostrum period with the own mother, single suckling with the own mother and multiple suckling with nurse cow. In practice a combination of 2 or 3 methods is used. Farmers expectations of long term effects of suckling systems are high. Less labour, pleasure and increased activity of cows were regarded as the strong points of suckling systems by the farmers. Suckling systems have the potential to improve calf growth with 0,5 kg per day pre weaning. In single suckling systems milk consumption of calves is up to 10 kg per day in the first 14 days and up to 15 kg there after. Single suckling can be used in combination with multiple suckling improve welfare and naturalness on dairy farms. In multiple suckling one can make use of cull cows of dairy production as nurse cows. Farmers continuously adjust the system to their specific circumstances and needs. In this way, different suckling methods are tested for their

potential and limitations in practice. One should aim at the development of an animal production system in which healthy animals produce healthy products. The identification of factors that support health and the development of the immune system is important, in order to implement them in animal husbandry systems. Suckling systems can contribute to this, the long term effect and preconditions for use of these systems are, therefore, under study.

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