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Improved weaning reduces cross-sucking and may improve weight gain in dairy calves

Beatrice A. Roth [a,*], Edna Hillmann [a], Markus Stauffacher [a], Nina M. Keil [b]

[a] *ETH Zurich, Institute of Animal Sciences, Physiology and Behaviour, LFW B 54.1, CH-8092 Zurich, Switzerland*
[b] *Federal Veterinary Office, Centre for Proper Housing of Ruminants and Pigs, Agroscope Reckenholz-Taenikon Research Station ART, Taenikon, CH-8356 Ettenhausen, Switzerland*

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Abstract

Artificially reared dairy calves are weaned as soon as possible for economic reasons, often without sufficient consideration of individual differences in capability to eat dry food. A particularly critical situation occurs when milk provision is discontinued without knowing whether the calves are able to cover their nutritional requirements with solid food only. Possible consequences are diminished weight gain and abnormal oral behaviour (especially cross-sucking). In this study, a concentrate-intake-dependent weaning method (reduction of milk allowance dependent on an increasing consumption of concentrate ($n = 14$ calves: individually weaned calves)) was compared with a conventional weaning method generally used on Swiss farms (milk provision ended at 11.5 weeks of age irrespective of concentrate intake ($n = 13$ calves: conventionally weaned calves)). The sucking and feeding behaviour of each calf was observed three times for two consecutive days (1 week after grouping, 1 week before and 1 week after the end of milk provision). Each calf was weighed twice weekly. Individually weaned calves reduced cross-sucking occurring independently of milk intake with increasing age, whilst this was not observed in conventionally weaned calves ($P = 0.002$). There was a tendency for weight gain in individually weaned calves to increase steadily, whereas the weight gain of conventionally weaned calves remained constant after milk provision was stopped ($P = 0.069$). These findings indicate that optimised management of weaning bearing the individual animal's development in mind improves production and welfare in dairy calves.

Keywords: Abnormal behaviour; Artificial weaning; Cross-sucking; Dairy calves; Weight performance

* Corresponding author. Tel.: +41 44 632 09 92; fax: +41 44 632 11 28.
E-mail address: Beatrice-Roth@ethz.ch (B.A. Roth).

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1. Introduction

The newborn calf is not yet capable of digesting solid food, but instead develops into a ruminant during the first few months of life (Kirchgessner, 2004; Garnsworthy, 2005). Under natural conditions, the weaning process of a calf is completed at about 9–11 months of age (Reinhardt and Reinhardt, 1981). In the artificial rearing of dairy cattle, calves are meant to be weaned as soon as possible for mainly economic reasons, e.g. solid food costs less than milk (Garnsworthy, 2005) and the provision of solid food is less labour-intensive than the provision of milk.

Conventional milk feeding plans normally consider the age of the calves as the sole criterion for milk allowance and weaning. When one feeding plan is applied like this to all calves, however, it is scarcely possible to consider individual differences in capability to eat dry food. Moreover, milk allowance for calves in poor health should not be reduced too quickly, as the growth development of calves lessens during illness (Radostits, 2001). Failing to bear in mind individual characteristics means at worst that the calves' ability to cover their nutritional needs with solid food only after milk feeding has stopped cannot be guaranteed. A possible consequence of this is diminished weight gain, which is commonly seen in dairy calves after weaning (Kirchgessner, 2004). Furthermore, it has been shown that an inappropriate feeding management around weaning is likely to enhance cross-sucking in dairy calves, because less adequate ration energy density has been shown to be related to increased cross-sucking frequency (Keil and Langhans, 2001).

Most studies suggest that cross-sucking is mainly elicited by feeding milk, since sucking motivation is elevated for 12–15 min after milk ingestion (e.g. Lidfors, 1993; de Passillé and Rushen, 1997; Margerison et al., 2003). Cross-sucking also occurs in the absence of close temporal association with milk intake, however, as has been found in several studies with prolonged observations after milk consumption. Such cross-sucking bouts accounted for a remarkable proportion of all observed cross-sucking events (e.g. Veissier et al., 1998; Keil and Langhans, 2001; Weber and Wechsler, 2001). Questions thus arise as to why cross-sucking occurs not only after milk intake, but also temporally independently of it, and how cross-sucking can be explained by nutritional deficits. Hunger is known to enhance sucking motivation in calves (de Passillé and Rushen, 1997). This may be especially important when a calf is fed according to an inadequate weaning schedule, where milk is reduced despite the calf's rumen not being capable of sufficiently digesting solid food. We therefore assumed that milk-independent cross-sucking is triggered not only by milk intake, but also by other motivational mechanisms, one of them likely being hunger.

The improved weaning method used in the present study was therefore based on the concept that milk allowance should be reduced in close relation to the individual calf's concentrate intake. This weaning method aims to cover the nutritional needs of each calf at any time during the milk feeding period, and ensures that calves are not weaned from milk until they are able to feed on solid food only. The consideration of the individual animal's potential to become a ruminant should thus reduce the negative consequences of premature weaning, such as diminished weight gain, or cross-sucking occurring independently of milk intake.

The aim of this study was therefore to test the effect of this individual and concentrate-dependent artificial weaning method on performance and cross-sucking occurring independently of milk intake in artificially reared dairy calves.