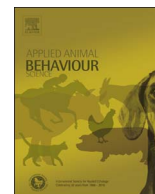




Contents lists available at ScienceDirect

Applied Animal Behaviour Science

journal homepage: www.elsevier.com/locate/applanim

Behavioural responses to cow-calf separation: The effect of nutritional dependence

Julie Føske Johnsen^{a,*}, Cecilie M. Mejdell^a, Annabelle Beaver^{b,1}, Anne Marie de Passillé^b, Jeffrey Rushen^b, Daniel M. Weary^b^a Norwegian Veterinary Institute, Department of Health Surveillance, P. O. Box 750, 0106 Oslo, Norway^b Faculty of Land and Food Systems, University of British Columbia, 2357 Main Mall, Vancouver, BC V6T 1Z4, Canada

ARTICLE INFO

Keywords:

Animal welfare
Cow-calf rearing
Bonding
Weaning
Dairy

ABSTRACT

There is increasing interest in keeping dairy cows with their calves during the milk feeding period, and in reducing distress associated with separation. The aim of this study was to investigate how nutritional dependence upon the cow's milk affects behavioural responses to separation by both the cow and calf. For the first six weeks of life, *dependent* (n = 10) and *semi-dependent* (n = 10) calves could suckle from their mother at night, but *semi-dependent* calves also had *ad libitum* access to an automated milk feeder (AMF). *Independent* (n = 10) calves had *ad libitum* access to an AMF, and their dams wore udder nets to prevent nursing. Once cow and calf were separated, (first a 4 d period of *partial separation* with fence-line contact followed by *total separation* when the dam was removed), all calves had *ad libitum* access to the AMF. We used live, focal-animal observations and classified vocalizations either as high pitched (open mouth) or low pitched (closed mouth). We found that during *partial* and *total separation*, *independent* calves produced fewer high-pitched vocalizations/d than did *dependent* and *semi-dependent* calves combined (median: 0.00 vs. 7.2; U = 12.0, z = -3.21, P = 0.001 and 0.00 vs. 0.00; U = 40.5, z = -2.25, P = 0.024 for the two phases respectively) and also tended to produce fewer low-pitched vocalizations during *partial separation* (0.00 vs. 1.17; U = 29.5, z = -1.90, P = 0.057). Similarly, *independent* cows tended to produce fewer high-pitched calls during *partial separation* (0.00 vs. 1.08; U = 31.5, -1.74, P = 0.083) as compared to *semi-dependent* and *dependent* cows combined. During the separation phases, 23 calves (four, nine and ten calves) of *dependent*, *semi-dependent* and *independent* treatments, respectively, consumed at least 1.5 L/d from the AMF; these calves spent more time playing (s) (*total separation*; 3.67 vs. 0.00; U = 28, z = -1.99, P = 0.047) and less time close to the separation barrier (*partial separation*; 51.31-81.01-124.44 vs. 134.03-147.23-280.10), produced fewer high-pitched vocalizations during *partial separation* (0.00 vs. 8.33; U = 16, z = -2.22, P = 0.027), and tended to produce fewer low-pitched vocalizations (0.00 vs. 0.83; U = 21.5, z = -1.73, P = 0.083), than did calves consuming less milk from the AMF. The number of high-pitched vocalizations produced was negatively correlated with the calf's milk intake (*partial separation*; Spearman's r = -0.770, P < 0.001). The results indicate that nutritional independence from the dam reduces behavioural responses to separation.

1. Introduction

Dairy calves are often separated from their dam shortly after parturition, but this early separation is contentious (Ventura et al., 2016) and some producers are interested in developing rearing systems that allow for continued cow-calf contact (Johnsen et al., 2016; Ventura et al., 2016). Such systems promote natural behaviours, an important element of animal welfare (Fraser and Duncan, 1998; Lund, 2006).

However, promoting the formation of a bond between the cow and calf only to break it later is one of the objections to cow-calf rearing systems (Ventura et al., 2013). If cow-calf rearing systems are to succeed, efforts to improve the conditions for mother and offspring during separation and weaning are needed. In feral cattle, the dam weans her calf at 7–10 months of age by gradually reducing nursing frequency (Reinhardt and Reinhardt, 1981). In dairy production, producers keeping cow and calf together typically separate them within the first 4

* Corresponding author.

E-mail addresses: julie.johnsen@vetinst.no (J.F. Johnsen), cecilie.mejdell@vetinst.no (C.M. Mejdell), ab2368@cornell.edu (A. Beaver), passille@mail.ubc.ca (A.M. de Passillé), rushen@mail.ubc.ca (J. Rushen), danweary@mail.ubc.ca (D.M. Weary).¹ Present address: Cornell University, College of Agriculture and Life Sciences, 149 Morrison Hall, Ithaca, NY 14853, USA.<https://doi.org/10.1016/j.applanim.2017.12.009>

Received 19 June 2017; Received in revised form 5 December 2017; Accepted 10 December 2017

0168-1591/© 2017 Elsevier B.V. All rights reserved.

weeks of life (Ellingsen et al., 2015) when calves are still dependent upon milk and unable to meet their nutritional demands with solid feed (Khan et al., 2011).

The behavioural response to separation can last several days (Enriquez et al., 2010), during which cows and calves vocalize, show increased activity, reduced play behaviour, and spend more time close to the separation barrier (Johnsen et al., 2015c; Lidfors, 1996; Rushen et al., 2016; Stěhulová et al., 2008). Behavioural responses increase if cow and calf are kept together for a longer period before separation (Flower and Weary, 2001; Weary and Chua, 2000). Different procedures can help reduce the response to separation. For example, allowing the cow-calf pair some continued physical contact (Johnsen et al., 2015c), separating cow and calf more gradually (Loberg et al., 2007; Loberg et al., 2008), or feeding calves more milk after separation (Thomas et al., 2001). Johnsen et al. (2015a) found that calves experience less growth check after separation if they had been taught to drink from a supplemental milk feeder during the nursing period. Thus, nutritional independence of the calves, through usage of a supplemental milk feeder, may also reduce the behavioural response to separation.

The aim of this study was to determine how different levels of nutritional dependence on the dam affect cow and calf responses to separation. We hypothesized that cow and calf vocalizations and time spent close to the separation barrier would decrease and that calf play behaviour would increase for 1) cow-calf pairs that had been prevented from nursing (and thus nutritionally independent) compared to nursing pairs and 2) for calves that used a supplemental milk feeder (and thus were less nutritionally dependent upon the dam) during the separation phases compared to calves with no access to the milk feeder.

2. Material and methods

The trial took place at the University of British Columbia's Dairy Education and Research Centre, Agassiz, Canada. The University's Animal Care Committee approved all procedures. The experimental setup is described in detail by Johnsen et al. (2015a).

2.1. Animals and experimental design

For this trial we used 30 Holstein cow-calf pairs calving in single maternity pens (4 × 4 m). Using block randomization, cow-calf pairs were assigned to one of three treatments at birth. *Dependent* and *semi-dependent* calves nursed their dam and were, if needed, assisted to do so in the maternity pen. *Independent* calves were prevented from nursing by means of an udder net covering the dam's udder (model Nr. 87355301, De Laval, Tumba, Sweden). Calves in all groups were teat-bottle fed 2–4 L (depending on voluntary intake) quality-controlled colostrum within 6 h after birth. The individual pairs of cows and calves remained in the calving pen during the first 2 d after calving. *Independent* calves were fed with a teat bottle to *ad libitum* intake 4

times daily.

For the next 6 w (hereafter referred to as the *nursing phase*) cows were housed in a group pen (36 × 9 m) where calves had night-time access (20:00 – 08:00 h). Cow-calf pairs from all three treatments were housed and managed as one dynamic group to which new pairs were added and separated calves were removed. *Dependent* calves' only source of milk was from nursing the cow (at night) and these calves were denied access to an automatic milk feeder (AMF; CF1000CS-Combi automatic feeder, De Laval, Tumba, Sweden). *Semi-dependent* calves could both nurse the cow at night and were trained to use and provided access to 12 L/d whole, pasteurized milk from the AMF which was accessible throughout day and night. *Independent* calves also were trained to use the AMF allowing 12 L/d and could access this feeder at all times. These calves were provided night-time access to the dams in the group pen but could not nurse due to the udder nets.

During the day (08:00 to 20:00 h), in the *nursing phase*, calves were housed in a "calf creep" (a pen with dimensions of 10 × 3 m) adjacent to the group pen to which access at night-time was provided by means of a sliding door located on the separation barrier between the group pen and the calf creep. This barrier allowed calves visual and some tactile contact with the cows (although nursing was not possible). Throughout the trial, calves were provided free access to concentrate (barley based, 21.6 % CP; Unifeed Calf Tex, Chilliwack, BC, Canada), orchard grass hay (90.5 % DM) and water. Cows had *ad libitum* access to orchard grass hay (same as above) 24 h/day, TMR (22 % corn silage, 19 % grass silage, 10 % alfalfa hay, and 49 % concentrated), and water. At night calves were also able to access the cows' TMR and hay.

2.2. Separation and weaning

After 6 weeks, calves were moved into a separation pen (8 × 3 m) also adjacent to the group pen, allowing fence-line visual, auditory, and limited tactile contact with the cows (but no nursing). All calves, regardless of treatment, were now allowed to drink 12 L of milk/d from the AMF, but no training to use the AMF was given during this phase. The cow-calf pairs were separated in two steps: During the first 4 d (*partial separation*), cows and calves could lick and sniff each other through the fence but calves no longer had night-time access to the cow. On d 5, cows were moved to another barn out of contact with the calves (*total separation*, 3 d). Over the next 10 d, calves were weaned gradually, with the milk allowance reduced by 1.5 L/d over 8 d. Daily milk and concentrate intakes were recorded by the automated feeders and the results are reported elsewhere (Johnsen et al., 2015a).

2.3. Recording of separation-related behaviour

Using Observer software (version 11; Noldus Information Technology, Wageningen, The Netherlands) different behaviours were noted (Table 1) during the *nursing phase* (9 observation d), *partial separation* (3 observation d) and *total separation* (2 observation d). Each

Table 1
Definitions of the behaviours used to describe cow and calf responses to separation and weaning.

Behaviour	Definition	Recorded for	Unit
Playing	Running equivalent to trotting (two-beat leg movements synchronized diagonally), cantering (three-beat gait in between a trot and a gallop) or galloping (four-beat gait with a phase where all legs are off the ground) and jumping (both forelegs lifted off the ground and body moves upwards), bucking (head is lowered, and rear legs are lifted off the ground), and/or kicking with one or two legs. (Jensen et al., 1998)	Calf	s
Time spent close to separation barrier	Standing or lying with one or more parts of the head < 10 cm from the fence or head physically through/over the fence	Cow and calf	s
High pitched vocalization	Every single open mouthed "muh" vocalization with inhalation between each subsequent occurrence. Vocalizations during play jumping or running were not included (Johnsen et al., 2015c; Padilla de la Torre et al., 2015)	Cow and calf	no.
Low pitched vocalization	Every single closed mouthed 'mmh' type vocalization with inhalation between two occurrences (Johnsen et al., 2015c; Padilla de la Torre et al., 2015)	Cow and calf	no.

Download English Version:

<https://daneshyari.com/en/article/8882801>

Download Persian Version:

<https://daneshyari.com/article/8882801>

[Daneshyari.com](https://daneshyari.com)