



## The effects of alternative weaning methods on behaviour in beef calves

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### ABSTRACT

The aim of this experiment was to compare the behavioural responses and weight change of beef calves weaned using three weaning methods. Forty-eight primiparous Hereford or Hereford × Angus nursing beef calves ( $180.7 \pm 1.3$  days old; mean  $\pm$  SEM) were assigned to one of three treatments: 1) CON: weaned abruptly on day 0; 2) FEN: calves were separated by fence line from dams on day  $-17$  but remained in visual sight of one another; or 3) NF: cows and calves remained together but suckling was prevented on day  $-17$  by inserting a nose-flap anti-suckling device. In all treatments remote physical separation of the cow and calf took place on day 0. Behaviours were recorded by instantaneous sampling from day  $-20$  to day  $-13$ , and from day  $-3$  to day 5, except on day 0. Distance between cows and calves and the fence line in FEN calves and between the dyads in NF calves were recorded from day  $-17$  to day  $-13$ . Body weights of calves were recorded on days  $-24$ ,  $-11$ , 0, 7 and 21. There was a day and treatment by day interaction for all behaviours. Behavioural responses were strongest during the first 2 days after fence line separation in the FEN calves and after remote separation in the CON calves. For the NF calves, behavioural effects were observed immediately after insertion of the nose-flaps, including numerous unrewarded suckling events, and again when remote physical separation took place. Overall the FEN calves vocalized ( $P < 0.03$ ) more than CON and NF calves. CON calves played ( $P < 0.02$ ) and ruminated ( $P < 0.04$ ) more often than FEN and NF calves, and walked ( $P = 0.01$ ) more than NF. On day  $-17$  and day  $-16$ , FEN calves (and their dams) spent more time within 30 m of the fence line than on day  $-15$  to day  $-13$  ( $P < 0.02$ ). NF calves spent more time in close proximity of their dams on day  $-17$  and day  $-16$  ( $P < 0.001$ ). Calves of the CON treatment had a greater average daily gain (ADG) than FEN and NF calves ( $P < 0.008$ ); ADG was greater in FEN than in NF calves ( $P = 0.02$ ). Two-stage weaning with nose-flaps resulted in a second distress response after remote physical separation from the dam, and a drop in ADG in both periods indicating that the response was distributed between the two stages. In calves weaned using the fence line method, the response was more prolonged and more intense, with no advantages for weight gain compared to abrupt weaning. In conclusion, the two alternative weaning methods did not appear to provide any clear benefits in reducing weaning distress in beef calves compared to abrupt weaning in the conditions used in this experiment. However, the use of nose-flaps seems to reduce distress better than fence line separation.

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### 1. Introduction

Natural weaning in cattle occurs between 7 and 14 months of age, and the calf–cow dyad maintains some proximity for

some months after suckling stops (Reinhardt and Reinhardt, 1981). In contrast, under management conditions, weaning in beef calves is traditionally undertaken by abruptly separating the 6–7 month old calf from its mother. At weaning, calves can experience changes in diet, new social environments, loss of maternal contact, and in many cases new housing. Not surprisingly, these changes normally result in frequent

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displays of distress signals by calves during the first days after separation, such as vocalizations and locomotion (Newberry and Swanson, 2008). Previous work has reported that beef calves show physiological (Lefcourt and Elsasser, 1995; Hickey et al., 2003) and behavioural (Veissier and Le Neindre, 1989; Price et al., 2003; Haley et al., 2005) indicators of stress, and a drop in performance (Price et al., 2003) when abruptly weaned and separated from their dam at this age. These effects are thought to be mediated by the severance of mother–young bond (Weary et al., 2008; Newberry and Swanson, 2008) and the loss of milk supply (Ungerfeld et al., 2009).

Previous work has reported that weaning distress can be reduced by implementing pre-weaning treatments with fostered dairy calves (Loberg et al., 2008) and lambs (Schichowski et al., 2008), anti-suckling devices in beef calves (Haley et al., 2005; Siegford et al., 2007; Quintans, et al., 2008), and by fence line separation from the dam in beef calves (Stookey et al., 1997; Price et al., 2003; Siegford et al., 2007; Quintans et al., 2008; Burke et al., 2009) and wapiti calves (Haigh et al., 1997; Church and Hudson, 1999). For instance, Newberry and Swanson (2008) recommend a weaning system consisting firstly of nose-flaps followed by fence line separation, as described by Haley (2006), before remote physical separation. However, a three step procedure such as this may not be practical for many farmers. Moreover, although these alternative weaning methods have been compared with conventional abrupt weaning, to our knowledge no work has compared the behavioural response of beef calves weaned using the nose-flap device with the fence line procedure before and after remote physical separation.

Therefore, the aim of this study was to compare the behavioural response and growth rate of 6-month old calves abruptly weaned, or weaned using one of the two staged procedures: fence line separation or nose-flaps followed by final separation 17 days later. The comparison included the period immediately after implementing fence line and nose-flap treatments, and after the remote physical separation.

## 2. Materials and methods

### 2.1. Animals and management

The experiment was carried out in Palo a Pique Experimental Farm, INIA Treinta y Tres (34° S), Uruguay, between August and October (late winter–early spring 2008). Forty-eight primiparous Hereford or Hereford × Angus nursing beef calves ( $180.7 \pm 1.3$  days old; mean  $\pm$  SEM; range 160 to 200 days) were used. During the experiment cows and calves grazed on native pastures.

The experiment had three treatments with two replications of eight dyads each. Four days before the beginning of each trial calves were weighed, and assigned to three homogeneous groups according to body weight, age and sex. Each group of cow–calves dyads was moved to a different paddock of 6 ha, where they remained throughout the experiment. The paddocks did not share any common fences, and were located at a minimum distance of 40 m from each other. Available dry matter per day exceeded 160 kg in all treatments.

Milk production of every dam was assessed 28 days before remote physical separation. At approximately 17:00 h cows were separated from their calves and injected intramuscular with 10 IU of oxytocin (Hipofamina® Laboratorio Dispert S.A. Uruguay). Two minutes after injection cows were milked using a portable milking machine. Calves were fitted with nose-flaps and remained with their dams in the same paddock. The following day, at 06:00 h, cows were milked again with the same protocol and the milk obtained was weighed. This procedure carried out monthly, for other studies.

### 2.2. Treatments

Three groups of sixteen calves were blocked by sex, age and live weight, and assigned to each of the following weaning treatments: 1) CON group: were weaned by remote physical separation from their mothers on day 0; 2) FEN group: cows and calves were separated by a fence on day –17 (but remained in visual, auditory, olfactory, and possibly tactile contact), and remotely separated on day 0; 3) NF group: cows and calves remained together but suckling was prevented by placing a nose-flap anti-suckling device (Fig. 1) on each calf on day –17, followed by remote separation (and removal of the device) on day 0. Each group was divided in two subgroups of eight to facilitate observation.

The fences separating FEN calves from cows were made of 7 strands of wire 10, 25, 40, 55, 75, 100 and 130 cm from the ground. Nose-flaps (El destete, Argentina; Fig. 1), which were similar to those described by Haley et al. (2005), were made of flexible plastic ( $12.5 \times 12.5$  cm), and prevented suckling but did not prevent grazing or drinking. At complete separation (day 0), FEN and NF calves remained in their original paddocks and the dams were removed, while CON



Fig. 1. Calf with a nose-flap.

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