Alternate Weaning Strategies for Cow-Calf Producers

by
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The natural weaning of any mammalian species is an event marked with some conflict between the parent and offspring.Natural weaning occurs at a time when a female balances the need to end the current lactation or she risks jeopardizing future reproduction against the offspring's need to maximize its own fitness by extending it's mother's lactation. Despite the parent-offspring conflict, the offspring is not denied social contact or maternal protection by the dam during natural weaning, only access to the udder and milk.

In beef cow/calf operations, weaning is artificially imposed at a date which reduces the length of the normal lactation 2-4 months. The weaning process is normally accomplished by physically placing the cow and calf in separate pens. In this situation the calf is denied access to the udder, but unlike the natural weaning process the calf is also denied social contact with the cow. Because the weaning is premature, from the animal's perspectives, a great deal of vocal and physical effort is exerted by the cow and calf to reunite. If the pair are kept within visual and auditory contact the vocalizing of the cow or calf stimulates the other to respond. Acting somewhat in empathy for our animals and hoping to lessen the chorus of constant bellowing, some livestock producers believe that the inevitable physiological and psychological stress of weaning is lessened and recovery is sped up if the cow and calf are out of visual and auditory contact. This may be counter intuitive, if the pair are programmed to accept nutritional separation, but not the disruption of the maternal bonds. It is possible that the separation between cow and calf during the weaning process impacts upon the performance and well-being of the young to a greater degree than necessary.

If you ever strolled through an agricultural museum you would likely find, nestled somewhere between the apple peelers and wire stretchers, those amazing “calf weaners”.Calf weaners were fascinating contraptions designed to keep the calf from suckling the cow. In North America, calf weaners were sold at most hardware stores around the turn of the century and well into the 1930’s. These devices were strapped over the muzzle of the calf or held in place with nose tongs. No doubt the spiked muzzle cover, worn by the calf, helped convince the cow that life was less painful if the calf wouldn’t suckle. Equally ingenious was the hinged muzzle cover, so appropriately named “kant suk”.The kant suk devices were designed to cover the mouth while the calf’s head was raised to the nursing position, but it swung away from the mouth while the head was down in the grazing or drinking position. Though such contraptions seem almost comical by today’s standards, in retrospect the calf “weaners” worn on the muzzle may have had a distinct advantage, from the cow and calf’s perspective, over present day weaning strategies because they allowed the cow and calf to maintain close physical and psychological contact but they prevented suckling.

To date, there have been few studies aimed at reducing weaning stress in cattle by altering weaning technique. A recent study in beef calves indicated that when cows were taken out of the home pens of calves gradually (3 or 4 at a time) over a 5 day period, the procedure was beneficial in reducing stress compared to an abrupt weaning procedure (Church, 1996).Calves that were weaned using the gradual weaning technique exhibited less pacing, had lower neutrophil/lymphocyte ratios and gained more weight in the first week after weaning than abruptly weaned calves (Church, 1996).Studies in elk calves and horse foals using a variety of "softer" weaning strategies have also shown positive effects. Elk calves given fence line contact to their mother or with another adult were found to settle down more quickly than abruptly weaned calves (Haigh et al., 1996; Church, 1996; Pollard et al., 1992) and have better weight gains (Pollard et al., 1992). Similarly, foals given fence line contact with their mothers exhibited fewer behavioural signs of stress than those weaned abruptly (McCall et al., 1985).These studies suggest that weaning animals so that they have visual and auditory contact with their mother is a less stressful and a more welfare friendly method of weaning.

During the last couple of years we set up trials using our beef cattle research herd at the Western College of Veterinary Medicine to investigate if there was any advantage of allowing calves and cows fence-line contact following weaning compared to a traditional method of separating calves and cows and then moving the cows to a location a couple of kilometers from the calves.

A total of 248 calves were used for two weaning studies (1996 n=132; 1997 n=116) and were randomly allotted (balanced for sex) to remote and contact weaning treatments.The contact calves were kept in feedlot pens adjacent to their mothers while the remote calves were housed at the same feedlot, but completely separated from their mothers.Calves were provided *ad libitum* hay and a barley ration for the duration of the study.

All calves were weighed on the day of weaning as well as 3, 7, 14, 21, and 28 days after weaning. All calves were vaccinated with a commercial Clostridial 8 way and *Pasteurella haemolytica* vaccines on the day of weaning. Blood samples were collected via venipuncture from all calves on days 0, 3, 7, and 21 days after weaning. Samples were assayed in triplicate using an antibody based ELISA type immunoassay to determine if the immune function was suppressed in either group of calves. Blood samples were also analyzed for changes in serum haptoglobin (an acute phase protein and indicator of stress) and antibody titers to the Clostridial and Pasteurella vaccines. Administration of antibiotics to sick calves during the duration of the study were recorded in 1996 and 1997. Rectal temperature were recorded on days 0, 3, 7, 14 and 21 days after weaning in 1997.Calves with rectal temperatures greater than 40.5 C were treated with antibiotics.

Behavioural observations were made at 10 minute intervals for a period of 12 hours (during daylight hours) on the first 3 days after weaning. On days 4-10 observations were made during peak activity periods (7:00-9:00am and 5:00-7:00pm) in 1996.In 1997 calves were observed between dawn and dusk for the 7 day period following weaning, except on weaning and weigh days. Behavioural data collected included: the amount of time the calves spent walking, fence pacing, lying, feeding and standing. At 10 minute intervals, the amount of vocalizations per pen of animals was determined by counting the number of vocalizations in a 2 minute period.

In 1996, weaned calves kept in fence-line contact with their dams had greater average daily gains during the first 3 days following weaning. However, this benefit quickly disappeared and was no longer evident by d 7.Over the entire 28 day period there was no benefit, based on weight gain, for the fence-line group. In 1997, there were no treatment differences in average daily gain for any of the time periods (Table 1).

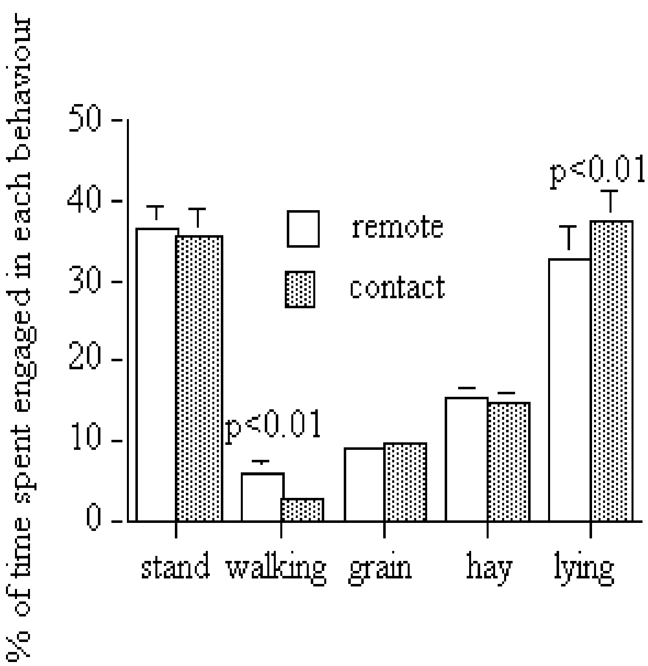
Table 1.Average daily gain ± SE (kg) (on a per pen basis) over a 28 d period after weaning of calves housed with fence line contact with their dam (contact treatment) and calves housed without fence line contact (remote treatment) .

Treatment	Days After Weaning				
1996	**0-3**	**0-7**	**0-14**	**0-21**	**0-28**
Contact n=62	.74 ± .06 [x]	.98 ± .23	.55 ± .03	.65 ± .05	.56 ± .04
Remote n=70	.32 ± .06 [y]	.91 ± .23	.67 ± .03	.64 ± .05	.62 ± .04
1997					
Contact n =58	1.80 ± .18	1.61 ± .41	1.22±. 07	.93± .17	.81 ± .02
Remote n=58	1.92 ± .18	1.43 ± .41	1.12 ± .07	.97 ± .17	.80 ± .02

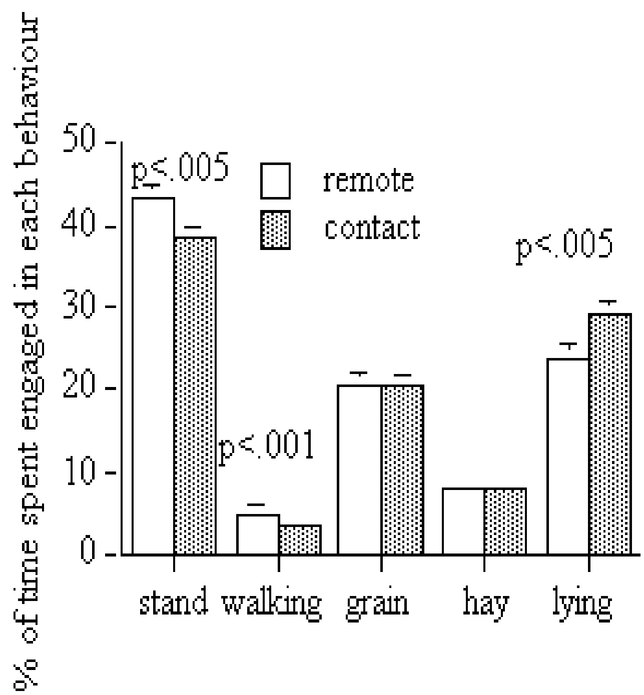
x,y Within a column values with different letters are significantly different (P < .01)

The blood haptoglobin levels were significantly different for the calves on the two treatments when measured 7 days after weaning. However, the significance was reversed in the two trials. In 1996 the calves in fence-line contact had higher blood haptoglobin levels than the remote group on day 7; in 1997 the reverse was true. Haptoglobin is an acute phase protein that is normally elevated when the animal is pathologically or physically challenged. Since all the calves were vaccinated we expected the vaccine to stimulate the haptoglobin response, but there appeared to be different rates at which the haptoglobin dropped. We can not explain why this effect was reversed in the two trials.

There were no treatment effects on antibiotic treatment rates, leukotoxin antibody titers, white blood cell counts and neutrophil: lymphocyte ratios. Based on these results, coupled with the performance data and the haptoglobin response it would appear that there is no advantage or disadvantage in either weaning method. However, the behaviour data consistently detected treatment difference across both years of the study (see Figure 1).In each year of the study the remote group spent more time walking and less time lying than the contact weaned calves. Calves on the remote weaning treatment were frequently observed milling about and circling the perimeter of the pen in large numbers. This behaviour was not observed in the contact wean group. The remote weaned group appeared more restless and during 1996 were found to vocalize significantly more than the contact weaned group.



1997 Results



1996 Results

Figure 1.The % of time calves spent standing, walking, eating and lying during the daylight hours following weaning (10 day period in 1996; 7 day period in 1997).

Keep in mind that with any type of weaning technique, and especially with the fenceline contact weaning procedure, the fences must be cow and calf-proof. Also, even though we recorded less vocalizations among calves kept in fenceline contact the overall noise level that humans may experience would be louder (if you wean calves near your home place) simply because the vocalizations of the cows will add to the overall level. In reality the cows and the calves weaned in fenceline contact may be calling less, but as a person you may not be able to register the improvement because of the addition of the cows calling. To date we have concentrated our study on the calves response and have not investigated the impact of different weaning strategies on the cow. However, we do know from other studies that the strength of the bond between the cow and the calf is strong and that the cow remembers her calf for a considerable length of time, perhaps for her entire life. Dr. Ray Stricklin and his coworkers at the University of Maryland have shown that cows recognize their heifer calves and give them preferential treatment (by displacing them at the feed bunk less than other herdmates) even after a year or more of absence from each other.

We know that cattle do have long term memories, that they do form strong bonds with their relatives and events such as weaning are psychologically stressful experiences. From our observations it was clear that the remote weaned calves were behaviourally more restless. Despite the lack of improved production traits, based on the behavioral differences we observed we believe fenceline weaning is the better option simply because it appears to have a more calming effect.

Some producers claim that cull cows can have a calming effect on newly weaned calves if left together in the same pen. Such an observation may have application in the feedlot setting where many newly weaned calves arrive in mass at the feedlot. A common problem associated with calves when they first come into the feedlot is low feed intake. This can last up to two weeks following their arrival (Cole and Hutcheson, 1988; Fluharty et al., 1994).This low feed intake is due in part to the calves being unfamiliar with the location of water or feed as well as the novelty of the new location. This on top of the recent separation from their dams, transport, and mixing poses an additional strain on the calves in terms of health and performance. Epidemiological studies have indicated that there is an association between stress of weaning, mixing and transport of calves and subsequent losses due to infectious diseases (Andrews, 1976; Ribble et al., 1994).This association has been attributed to the effects of stress on lowering the immune function (Kelly, 1980: Griffin, 1989).

Prior to weaning, calves are in constant contact with their dams who provide them with protection, as well as lead them to forage and water (Fraser and Broom, 1990).However, when newly weaned calves are grouped together in a feedlot, they are placed in a novel environment where both the location of feed and water sources are foreign and contact with an adult leader no longer exists. We know however that feeding and drinking in beef cattle are activities that can be socially facilitated (Fraser and Broom, 1990).This means that the act of another cow or calf eating may encourage other animals to come to the feed bunk. It seems possible that the presence of a cow (accustomed to feed bunks and waterers) in a feedlot pen would help to settle calves and get them onto feed and water sooner. We conducted trials over a two year period to test this hypothesis.

A total of 550 steers (1996 n= 253; 1997 n = 297) were used in trials to determine the impact of trainer cows on the performance of newly arrived feedlot calves. In both years calves were randomly allotted to pens with a trainer cow or a no cow treatments. On the day of arrival calves were ear tagged and vaccinated with a commercial Clostridial 8 way and Pasteurella haemolytica vaccine. They were housed in groups of 10-13 calves per pen in 24 separate feedlot pens. Half of the pens contained a cow that was already familiar with the pen layout and the location of feed and water. The other half of the pens did not contain a trainer cow. Calves on the two treatments were visually isolated from each other so that the treatment groups without cows were unable to see any pen containing an adult cow. All cows and calves were provided a starter ration (80% forage and 20% grain on a dry matter basis.

Calves were weighed on arrival at the feedlot and again on d 3, 7, 14, 21 and 28.Blood samples were collected via venipuncture from all calves on days 0, 3, 7 and 21 days after arrival. Samples were assayed in triplicate using and antibody based ELISA type immunoassay to determine if immune function was suppressed in either group of calves. Blood samples were also analyzed for changes in serum haptoglobin (an acute phase protein and an indicator of stress) and antibody titers to Clostridial and Pasteurella vaccines. Calf morbidity (based upon feedlot protocol which treated calves when they look sick or had a temperature above 40.5 C on days 0, 3, and 7) and mortality was recorded.

Behavioural observations were made at 10 minute intervals (using an instantaneous scan sampling technique) for a 9 d period (during daylight 7:00 - 17:00 hr).Behavioural data collected included the amount of time calves and cows spent eating, walking, lying, standing.

A replicate study was set up at a commercial feedlot using 470 calves (approximately 115 calves per pen) randomly allotted to the same treatments. Trainer cows were stocked at the ratio of 15 calves per cow.

Calves housed in the presence of trainer cows, contrary to expectations, had a lower rate of gain over the first 3 days of the trial compared to no-cow groups (see Table 2).This was true for calves during both 1996 and 1997 trials. However, when gain was averaged over the first seven days the differences were no longer significant.

Table 2. Average daily gain ± SE (kg) (on a per pen basis) over a 28 d period after calf arrival to the feedlot of calves housed with and without a trainer cow.

Treatment	Days After Arrival to feedlot				
1996	**0-3**	**0-7**	**0-14**	**0-21**	**0-28**
Cow n=126	.80 ± .20[y]	.76 ± .22	1.22 ± .08	1.33 ± .07	1.26 ± .05
No Cow n=127	2.02 ± .20[x]	1.11 ± .22	1.14 ± .08	1.26 ± .07	1.23 ± .05
1997					
Cow n =148	.16 ± .28 [b]	1.38 ± .11	1.50 ± .09	1.38 ± .07	1.25 ± .13
No Cow n=149	.97 ± .28 [a]	1.18 ± .11	1.29 ± .09	1.41 ± .07	1.36 ± .13

a,b Within a column values with different letters are significantly different (P <.05)

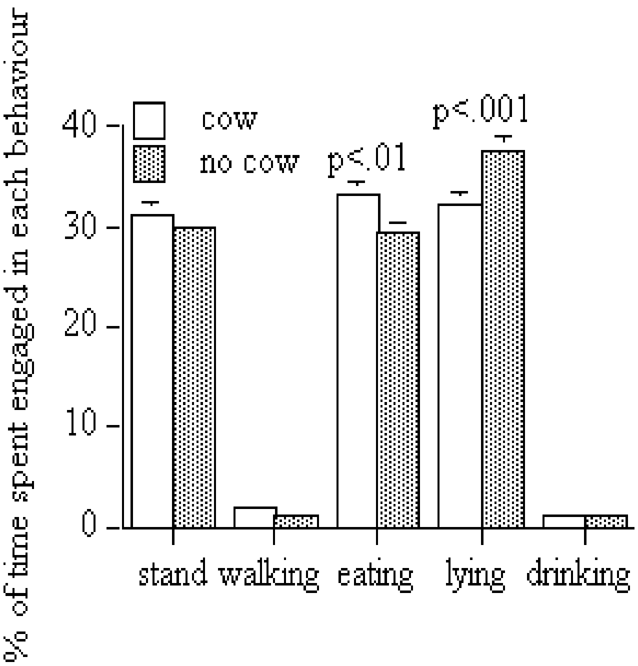
x,y Within a column values with different letters are significantly different (P < .001)

The performance of newly arrived calves at a commercial feedlot followed a similar pattern.At the commercial feedlot there was also no advantage to having trainer cows in the pens.Though the difference in weight gain was not significant, there was a trend for the no-cow group to gain faster during the first 7 days of the study (see Table 3).

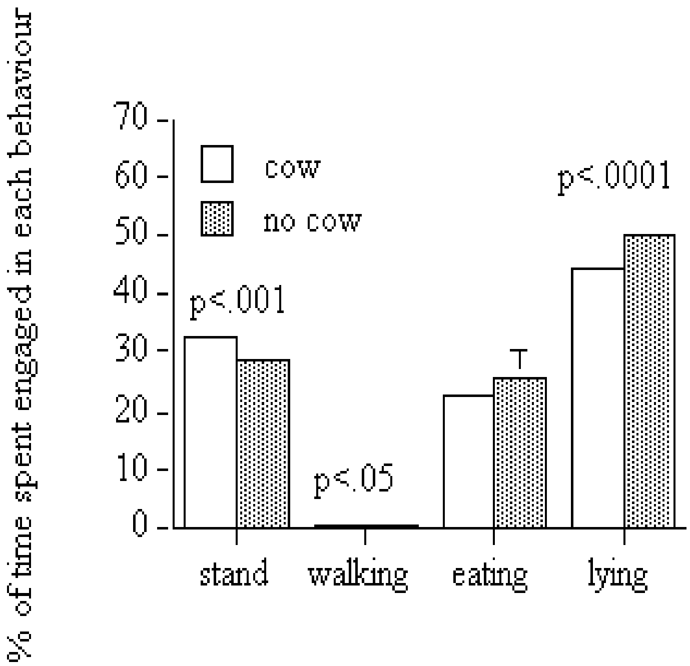
Table 3. Average daily gain ± SE (kg) of newly arrived calves at a commercial feedlot over a 21 d period after arrival.

Treatment	Days After Arrival to feedlot		
	0-7	**0-14**	**0-21**
Cow n = 236	1.23 ± .14	1.07 ± .23	1.83 ± .18
No Cow n = 234	1.68 ± .14	1.17 ± .23	1.96 ± .18

Unfortunately the behaviour data does not help explain the differences between treatments in weight gain. The no-cow group averaged a greater weight gain during the first 3 days of the trials, but were actually observed eating less than the cow group, this was especially true for 1996 (see Figure 2).However, the no-cow group was observed lying more than the cow group, so perhaps the no-cow group conserved more energy and as a result were more efficient. Based on the behaviour patterns we would have expected the no-cow group to have a lower weight gain because they were observed eating less. Either the no-cow groups were eating while we were not observing or the cows were actually preventing calves in the trainer cow group from eating ad libitum. However, we observed very few negative interactions between cows and calves at the feed bunk. In fact, it appeared that many pens of calves were synchronized with the behaviour pattern of the cow. In many pens calves appeared to eat and rest at the same time as the cow.



1996 Results



1997 Results

Figure 2. The % of time calves spent standing, walking, eating grain or hay, and lying during the daylight hours following arrival at the feedlot (10 day period in 1996; 7 day period in 1997).

The number of steers which were treated with antibiotics did not differ between treatments in either trial over the 28 day period. In 1997, twice as many calves on the no-cow treatment were treated with antibiotics, but this difference was not statistically different. There were no treatment difference in the blood haptoglobin levels, leukotoxin antibody titers, white blood cell counts or neutrophil:lymphocyte ratios.

Overall, there was no benefit of having trainer cows present in pens of newly arrived feedlot calves. In fact, the expected advantage of having cows to help settle calves and start them onto feed and water was not realized and may have been detrimental. It may be that weaned calves are not comforted by the presence of an unfamiliar adult. In our studies there appears to be some detrimental effect due to their presence. Based on our findings, we recommend that trainer cows not be added to pens of newly arrived feedlot calves.

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