

DAIRY VETERINARY NEWSLETTER

September 2020

Dairy Calf Time with the Dam and Housing System - What is the Latest on Calf Impacts?

Raising dairy calves, including when they are separated from the dam and individual versus group housing of baby calves, has always interested me. Early in my career a dairy producer told me that it was amazing how much time, money and effort goes into getting cows pregnant and producing calves only to have some aspects of caring for baby calves seem to be a secondary area of effort on some farms. Another producer told me not long afterward that a pen full of bred heifers in good shape as calving approaches is the best thing that can happen to any dairy farm. In the years since, developments such as sexed semen, genomics, and synchronized breeding programs have emerged. We continue to put a lot of work and expense into getting cows pregnant and ensuring the birth of female dairy calves. The subjects of separation from the dam after birth and the relative merits of individual or group calf housing for welfare and production are as important as ever today.

A recent paper from the Czech Republic by B. Valnickova et al. in Applied Animal Behaviour Science, May 2020 also led me to an earlier paper by the same research group in 2015. The previous study addresses some interesting aspects of rearing dairy calves.

The 2015 paper investigated effects of age when separated from the dam and individual or group housing on play behavior and body weight of dairy calves. There were 4 treatments studied: Kept with dam until 4 d old (DAM), Separated from dam soon after birth (time range after birth not specified, but on day of birth; SEP) combined in a 2-factorial design with Individual calf hutch housing (IND) or Group housing with 3 other calves (GRP). Thus there were DAMIND, DAMGRP, SEPIND, SEPGRP treatment groups. The 40 calves in the study included 11 Czech Red Spotted and 29 Holstein breed animals. Unfortunately, an all too common omission resulting in selection bias was made in assigning the calves to treatment groups by breed. The completely randomized block design was not used; the calves were completely randomly allocated to treatment groups without accounting for breed. This resulted in marked confounding of the treatment effects by breed. For example, the 20 SEP calves had 17 Holsteins and 3 Czech Red Spotted calves while the same ratio among the DAM calves was 12:8. After this was realized, the attempted “fix” of the problem was to analyze for birth weight differences in calves assigned to the 4 treatment groups, which in a behavior study is not a substitute for breed effects. Also, the birth weights were not significantly different between treatment groups, but the p value was not extremely high ($P = 0.52$). There is one comment in the paper that the study was limited by small herd size and small number of calves born per week, but herd size was not stated.

The IND calf hutches were 1.7 m² with an “outside run” of 1.2 m². Hutches were 40 cm (16”) apart. The GRP calf housing was a pen with 4 hutches and one connected “run” of 4.8 m². The GRP calves as well as the IND calves were housed individually from when they were separated from their dam to 7 d old to learn to drink milk (not milk replacer) from a bucket. All treatments were continued until 8 wk old when calves were weaned. The GRP of 4 calves housed together always included 2 heifers and 2 bulls, breed not specified, but only one heifer calf was the experimental GRP calf and the others only served as companions.

An interesting second stage of the experiment was that from 8 to 12 wk old, the IND calves were then housed in a group pen with 3 other calves (1 heifer, 2 bulls, breed not specified), and the GRP calves were moved to a new group pen together. These larger group pens were 9 m² and had “outside runs” of 9 m². All hutches and pens were bedded with straw. It was still true that each group had only one experimental heifer calf and the others only served as companions. I think the decision not to monitor the behavior of all of the calves in each group pen setting was a lost opportunity and might have missed important data. Because the treatments themselves included (as well as DAM and SEP) the size of animal groups it would be acceptable to have 4 times as many animals in the GRP housing as the IND housing. Ideally though, there would have been 4 times as many calves originally housed IND so their total numbers equaled that of the total calves enrolled in GRP housing. What if there were some calves in GRP housing (or from 8 to 12 wk old when all calves were grouped) who behaved differently in calf play? What if bulls were different from heifers? What about breed differences? In the study design used, 75% of all animals in the study (present in the groups) were not even evaluated for dynamics or individual differences in calf play behavior.

Calf play behavior was only monitored for a small amount of time considering the length of the study. At 2, 5 and 12 wk old, the experimental calf (unless housed IND at 2 and 5 wk old) was marked with colored spray. A mounted video camera filmed the calf behavior between 1 pm and 7 pm. The authors had observed in preliminary study that this was the 6 hr period with most frequent calf play. At 8 wk old, all calves were moved to the larger group pens, and at that time the monitoring of the experimental calf play was different. Calves were recorded for 4 hr after release into the pen, and for 4 hr the next day. However, the exact time of day of these 4 hr times was not specified, but analysis was only done on video from 9 am to 11 am each day. The relationship between this 2 hr time of analysis and when calves were released into the group pen is unclear.

Behavior of all calves with only one other unfamiliar calf was evaluated at 2, 5 and 12 wk old. The experimental calf was released into a 2 x 4 m pen for 15 minutes alone, then an unfamiliar calf was added for another 15 minutes. The entire 30 min was filmed and evaluated.

Weight was another outcome evaluated. Calves were weighed at 4 d, 7 d, and then weekly until 12 wk old.

Analysis of play behavior videos used a previously described method called one-zero. Each minute was scored as having some play behavior (1) or none (0). Each hour was scored in percent of total minutes with any play within those minutes. An extensive list and description of calf play behaviors is in the full paper, including Run, Leap, Jump, Head Shake, Buck-kick, Fast Stop, Turn, Butt, Mount, Run Together as well as several others. For each video time interval (6 hr, 2 hr, or 0.5 hr) the mean percent of minutes with (any) play behavior per hour was the outcome variable. A linear mixed model analyzed for effects of DAM vs. SEP, IND vs. GRP, and the combinations DAMIND, DAMGRP, SEPIND, SEPGRP on mean proportion of time with play. Each of the 2 wk, 5 wk, etc. age intervals of calf play video were analyzed separately. The breed and weight of each calf at the beginning of each new time interval were also analyzed for effects on the outcomes during the time interval that followed.

Results of the calf play study

Two calves died. However, between 4 and 9 other calves had “failure in management and video recording” at various time points, so there was considerable lost data; many analyses had only 29 to 34 calves included. All 4 treatment combinations DAMIND, DAMGRP, SEPIND, SEPGRP had no significant associations with calf play or body weight at any time (all $P > 0.10$).

When all calves kept with DAM were compared with all of those SEP, the only statistically significant association with any outcomes was odd. Only within their group (all calves were grouped after 8 wk) but not with an unfamiliar calf, the DAM calves played more only at 12 wk old ($P = 0.03$). To me, this is a classic example of what can happen when many outcomes (including similar ones at many time points) are evaluated in

a relatively small sample population; this was probably by chance and biologically insignificant because it is illogical that practices just after calving would affect calf play only at 12 wk old but not at any of the previous times. (The authors concurred with this in the discussion section of the paper.)

In contrast, when all IND calves were compared with all GRP calves, IND calves played more when they first entered the larger pen and again 15 min later when they encountered one unfamiliar calf at 2 wk or 5 wk old, or when first put into a group at 8 wk old (all $P \leq 0.03$). By 12 wk, when all calves had lived in a group for a month, there were no effects of IND or GRP housing. Possibly the novelty of other calves had somewhat “worn off” by then.

The body weight of calves was never associated with play behavior during the next week at any time. However, calves played more as they got older regardless of housing or time until separation from the dam. Play minutes per hour were: 22% wk 2, 33% wk 5, 60% wk 12 ($P < 0.001$).

The DAM calves weighed more at 4 d old than the SEP calves, 49 kg (109 lb) vs. 44 kg (97 lb), $P = 0.008$. However, once separated, there were no more differences in body weight between the DAM and SEP calves from 2 wk old until the study ended at 12 wk old.

Again, this was different when all IND calves were compared with all GRP calves. From 3 wk to 10 wk old, GRP calves were heavier and grew slightly faster than IND calves (all $P < 0.05$; actual weights were not reported). However at 11 and 12 wk old, the previously IND housed calves were catching up. The body weight gap was no longer significant and was numerically shrinking.

Among the conclusions stated by the authors was, “[Together with an earlier study, results] indicate that brief postnatal presence of the dam does not - - increase later playfulness in dairy calves”. I found it interesting that with the long list of specific play behaviors and subsequent placing of them into some categories, only total time of play per hour was evaluated. The authors alluded in the discussion to having looked at some categories of play, but did not say much else except maybe this could be in future studies. Another conclusion suggested that group housing increased play rates, but this was not supported by the data. The conclusions focus on trends observed until 8 wk old but ignore the fact that the few differences observed in the 4 treatment groups had essentially or in most cases completely disappeared by 12 wk old. The results of this study show no major welfare or calf health implications resulting from removing calves from the dam the day they are born in contrast to at 4 d old, or in individual calf hutch or group housing of 4 calves in connected hutch housing.

An important question is whether play behavior in calves is associated with any long-term health, longevity, or production effects when they become adult dairy cows. I will address that subject further in a future issue of this newsletter. As mentioned above, the same authors have some interesting results on that as well.

More Event Cancellations or Modifications

Utah Veterinary Medical Association Membership Meeting

The UVMA Membership meeting was recently announced as being entirely a remote online event. It will be on Thursday, October 22, 2020 at 6:30pm. The link for the meeting is: <https://www.gotomeet.me/UtahVMA/membership>

If you know of other planned veterinary conferences or CE events that have been cancelled or had a change in schedule and/or format, please let me know.

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Hopefully next year will be better than some aspects of this year; following the resumption of school and college classes and as we enter fall weather, there look to be continuing pandemic challenges ahead. Current projections suggest continued volatility in milk pricing, but trending downward for the next 6 to 9 months. Thanks again for all that you continue to do to safeguard animal health, welfare and food safety during these challenging times.

Please let us know your comments and suggestions for future topics. I can be reached at (435) 760-3731 (Cell), or David.Wilson@usu.edu.

A handwritten signature in blue ink that reads "David J. Wilson".

David Wilson, DVM, Extension Veterinarian

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