

Pairing calf ages effects on health, behavior and performance

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Pairing preweaned calves has been recommended for various reasons as calves are social animals like cows. But there are still questions such as how to do this and when. And what impact this can have on health, behavior, and performance? A study to address these dimensions was done on a commercial dairy farm in Brazil (Moroz et al, 2025). The study was done from August to December 2023 which means that was early spring into early summer. Authors “hypothesize that calves paired early will show higher initial calf starter intake, greater daily weight gain, more desired behaviors (exploration, play, allogrooming), and fewer undesired behaviors (cross-suckling, stereotypies, idleness) even though pairing at this age may be considered challenging as the risk of diarrhea is high.”

“A total of 140 Holstein female calves (70 pairs) were included in the study, with 48 calves recruited for early pairing, 48 for intermediate pairing, and 44 for late pairing. Due to project timeline limitations, we were unable to include more calves. As a result, our study is underpowered for health variables, with approximately 40 calves per group. This sample size only provides sufficient power to detect differences in disease prevalence greater than 30% points (e.g., 40% vs. 70%).”

“All calves were separated from their dams within 2 hours after birth, housed in individual calf pens and colostrum volume provided as 10% of the calf’s body weight. Calves received transition milk until the fourth day of life. Subsequently, pasteurized waste milk was provided pooled with milk replacer (DM: 22% CP, 17% ether extract [EE], and 44% lactose to achieve 14% total solids. Pasteurized residual milk made up only a part of the total volume offered and was composed of milk from cows with mastitis, milk from cows under treatment, and transition milk. All calves were bottle-fed, divided into 2 feedings per day at 0800 hours and 1600 hours. The milk volume varied according to age intervals as follows: calves 1 to 4 days old received 4 L/day of transition milk; those 5 to 14 days old received 6 L/day; those 15 to 49 days old received 8 L/day; those 50 to 65 days old received 6 L/day; those 66 to 69 days old received 4 L/day, and calves from 70 days of age until weaning received 2 L/day. Calves were completely weaned at 78 ± 2 days of age.”

“Water and (*no indication of physical form but probably meal or pelleted* Kertz 2019 and 2025b) calf starter (86% DM, 24% CP, 2.3% EE, 5.2% crude fat, ADF 15%, NDF 70%, and 4% mineral matter, with added coccidiostat [40 mg/kg sodium monensin]) were provided ad libitum from day 1 of life. From day 51 of life, TMR (DM: 33.54%, ADF: 18.06%, NDF: 35.44%, and CP: 16.96%; %DM: 19.39% ground corn, 9.91% soybean meal, 11.01% barley, 1.09% mineral supplement, 25.55% oats, and 33.04% corn silage) was provided over calf starter, twice daily. The calves were housed in 2 barns, each with a capacity of 148 calves, and spaced 8 m apart. Both barns were homogeneous in animals per pairing age. Until the pairing day, calves were kept

in individual 3 m² pens (1.20 × 2.50 m) with fiberglass dividers. After divider removal (pairing), paired animals were housed in pens of 2.40 × 2.50 m, totaling 6 m². Pens had concrete floors covered with wheat straw and wood shavings (~20 cm). Each animal had access to 1 feed bucket, 1 water bucket (*no indication if separated or by how much*), and 1 bottle nipple (at milk feeding). All calves had partial visual contact with other calves. The barns were equipped with natural daylight and ventilation.”

“Age of Pairing Calves were assigned to specific pairing age groups based on the timing of their calving. The pairing occurred in the following sequence: early, intermediate, and late. To ensure a balanced distribution of pairing ages over time, the sequence was reset after every 6 calves, consistently maintaining contemporaneity across the pairing age groups. Until the designated pairing date (early: paired at 6–7 days, intermediate: paired at 29–30 days, or late: paired at 49–50 days), the calves remained in individual pens with partial visual access (front opening of the pen) to other calves. We prioritized pairing calves of similar ages, with a maximum difference of ±1 day. Pairing was done by removing the divider between the pens of the calves. Blinding the workers was unfeasible, as the calves were paired at different ages according to treatment. This made the pairs visually distinguishable due to differences in age and size.”

“Health assessments were conducted by a veterinarian 3 times per week to evaluate fecal scores and respiratory health scores. Fecal scoring followed McGuirk (2008): 0 indicated normal fecal consistency; 1 indicated semi-formed or pasty consistency; 2 indicated loose consistency but sufficient to remain in the bedding; and 3 indicated watery feces penetrating the bedding. Calves with scores ≥2 were considered to have diarrhea. Respiratory health was assessed using the Calf Respiratory Health Score developed by the University of Wisconsin (McGuirk, 2008), based on 5 criteria: rectal temperature, cough, nasal discharge, ocular discharge, and ear position. Each criterion was scored from 0 to 3 based on sign severity. Calves with a total score of ≥5 were considered positive for BRD (McGuirk, 2008; Buczinski et al., 2016).”

“Calves positive for diarrhea, BRD (*bovine viral disease*), or both on the day of pairing were treated and paired exclusively with contemporaneous calves that were also undergoing treatment and belonged to the same designated pairing age. Our health assessment results were not shared with the farm management team during the conduct of the study. Only 12 sick calves were paired, resulting in a total of 6 pairs. The prevalence of diarrhea during the experimental period was calculated based on the number of calves with fecal scores ≥2 (McGuirk, 2008), assessed as previously described. A new case of diarrhea was considered when the event occurred more than 7 days after the first case of diarrhea (McGuirk, 2008; Cramer and Stanton, 2015). The prevalence of BRD during the experimental period was calculated based on the number of calves with respiratory health scores ≥5 (McGuirk, 2008; Cramer and Ollivett, 2019). A new case of BRD was considered when a positive diagnosis occurred more than 14 d after the first case of BRD (Casella et al., 2023).”

“Calves positive for diarrhea and BRD were treated according to the veterinary practices adopted on the farm. Disease identification (for treatment purposes) and treatment protocols were conducted daily by 2 trained staff members under the supervision of the farm veterinarian, without participation of our research team.”

“Behavioral observations occurred 5 times a week, always after the morning (0800 hours) and afternoon (1600 hours) milk feedings. Throughout the study, the observation time window was kept the same (30 minutes starting immediately after feeding), with observations starting from the sixth to seventh day of life until weaning. Observations were performed by a single veterinarian responsible for the behavioral assessment who was exclusively assigned to conduct this assessment during this period. Behavioral assessments were conducted by direct observation, with scans taken every 5 min for a total of 30 minutes, resulting in 7 scans per session. Thus, each calf was observed 14 times per day. The behaviors evaluated are described in the ethogram (*Table 1 in paper*).”

“A food neophobia test was conducted at 50 to 51 days of age, starting always at 1100 hours, in the pair’s home pen (2.40 × 2.50 m). The test was performed per pair, but contact (yes or no) and latency to contact (snout < 5 cm from the bucket) were recorded for each calf. Two commonly used stainless steel buckets were placed side by side in the same location where the calves typically received their daily solid feed. For the test, each bucket contained 200 g of TMR. The test lasted for 20 minutes, after which the buckets were removed, and the average TMR intake was calculated based on the amount consumed using a digital scale. However, consumption was calculated based on the average per pair if both calves approached, but if only one calf approached the bucket, total TMR intake was assigned to that calf.”

Results:

- Calves born from multiparous and primiparous cows were similar for all pairing ages.
- Birth weight was 78.6 ± 8.1 lb, and no difference was observed in the birth weight of calves among pairing ages (early: 78.6 ± 2.2 lb; intermediate: 76.4 ± 2.0 lb; late: 79.7 ± 2.5 lb. Calves born to multiparous cows were heavier (79.9 ± 2.4 lb) than those born to primiparous cows (75.7 ± 2.1 lb). These calves were all smaller and with less variation than an older data for Holsteins (Kertz, et al, 1997).
- Dystocia occurrence did not differ among pairing ages and serum total protein did not differ among pairing ages either.
- Mortality rate during the study was 1.4%, and the 2 calves that lost their pen mates were removed from the study.
- Average number of health treatments until weaning per calf by pairing age did not differ.
- There was no association of pairing age with the prevalence of diarrhea during the study.
- Average number of diarrhea treatments per pairing age did not differ nor did age at first case of diarrhea.
- There was no association between pairing age and lung consolidation score nor with the number of cases of Bovine Respiratory Disease per calf.

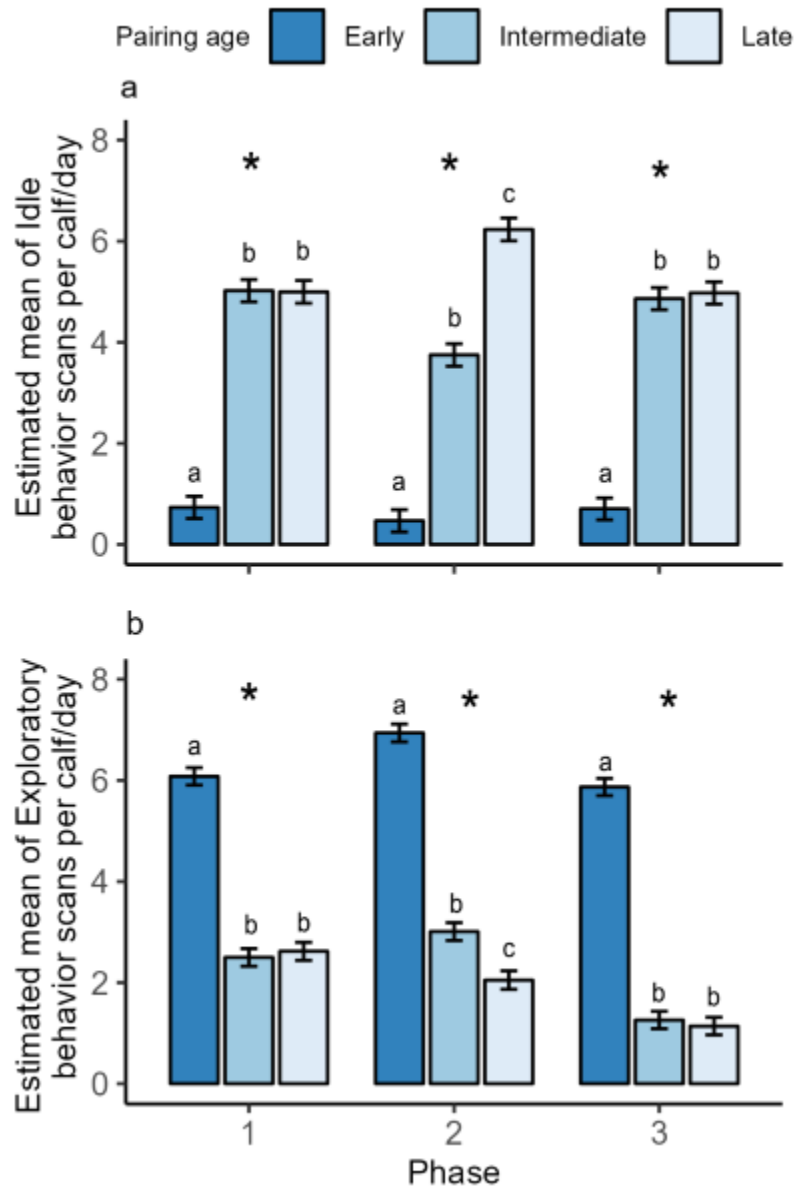
Table 1. Daily gains for calves paired early (6-7 days), intermediate (29-30 days), and late (49-50 days) ages.

Pairing age	Early	Intermediate	Late	<i>P</i> <
Daily gain, lb				
0-30 days	2.27	2.29	2.22	0.98
at 50 days	2.31	2.18	2.14	0.04
at 60 days	2.18	2.09	2.07	0.06
0-78 days weaning	2.20	2.09	2.20	0.20

- I was initially surprised by all daily gains being over 2 lb and around 1 kg for calves with birth weights of only about 79 lb. But calves were fed a high level of milk until at 50 days of age began feeding a TMR with 33% corn silage which undoubtedly caused significant gut fill. There were no other body measurements such as withers or hip heights and body length or circumference to measure size, not just weight gain. And all body weights were taken by tape, and not by scales.
- Nevertheless, body weights did not differ at 30 days of age; and only at 50 and 60 days did early-paired calves have greater daily gains ($P < 0.04$ and 0.04 , respectively) than late-paired but not than intermediate-paired calves,

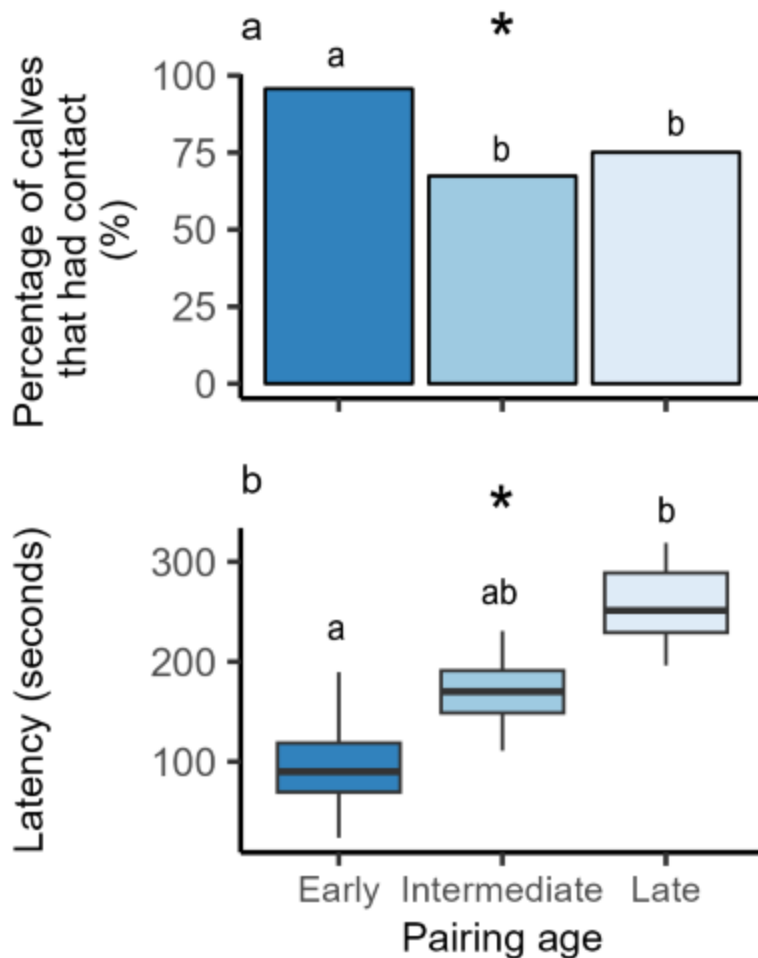
Since I am not an animal behaviorist, I will just summarize authors' findings in this area using 2 figures from the study and some of the authors' comments. (Both **Figure 1 and 3** kindly provided by Dr. Ruan Daros).

Figure 1. Frequency of observations for calves' behavior of idle time and exploratory behaviors by periods or phases of initial pairing calf times.



- It is clear that early-paired calves had more idle time but more exploratory behavior across all 3 phases of the study.
- But these differences only related to early versus intermediate and late phase periods with the exception of intermediate versus late phases for idle and exploratory behaviors during phase 2.

Figure 3. Percentage of calves that had contact with the new TMR at 50 days of age and latency in seconds of initial contact of that TMR by periods or phases of initial times.



- Early-paired calves had more frequent contact with the new TMR feed than did intermediate and late phase periods which did not differ.
- Early-paired calves took less time to contact the new TMR than did later phase calves with intermediate=paired calves not being different than either of the other 2 phases.

Authors concluded about calf behaviors:

- Early-paired calves exhibited more exploration and play behaviors and less idleness, stereotypies, and nonnutritive oral behaviors than late-paired calves.
- In addition, no differences were observed in cross-suckling likelihood across pairing ages.
- Early-paired calves also showed a shorter latency to touch a novel feed in the food neophobia test, higher calf starter intake during the first 15 days, and greater ADG up to

50 days. Although overall ADG did not differ among pairing ages, early-paired calves were more homogeneous in weaning weight than late-paired calves.

- In conclusion, early pairing supports calves' initial development, promoting early feeding behavior and growth and enhancing behaviors associated with positive affective states without adverse effects on health or undesirable behaviors.

One caveat to this study is that there were no carryover effects measured postweaning for these calves (Kertz 2025a).

The Bottom Line

Pairing calves early at 6-7 days of age versus intermediate pairing at 30 days or late pairing at 49-50 days had beneficial effects in behavioral measurements with no real differences in health measurements and calf performance.

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