Weaning strategies and calf productivity

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The average age at weaning in the US was 9 weeks in the 2014 NAHMS report. That was an increase of one week from the previous 2007 NAHMS report. Milk/milk replacer (MR) feeding rate had also increased from 4 to 6 quarts daily—a 50% increase. Given the inverse relationship between milk/MR fed and calf starter intake (Gelsinger et al., 2016), it is not surprising that the age at weaning increased a week when calves were fed 50% more than 7 years prior.

There are three critical periods for calves: around calving which includes cow, environment, and colostrum management; first 2 weeks when most diarrhea and deaths occur; and the weaning transition which is 2 weeks before and 2 weeks after full weaning. Data from a 2018 NAHMS study (Urie et al., 2018ab) showed that calves averaged 1.6 lb daily gain before weaning and that reduced to 1.3 lb the month after weaning. This is most likely due to a poor weaning transition program. Thus, weaning strategy and practice can have a major influence in this regard. That was the basis behind a study to evaluate two different weaning strategies for Holstein dairy calves (Wolfe et al., 2023).

The study was done at the University of Idaho with 72 Holstein calves, blocked by sex (40 females and 32 males) and birth weight (85.4 ± 9.7 lb), were randomly assigned in a 2 × 2 factorial arrangement (n = 18 per treatment) of weaning age (early 6–7 week vs. late 8–week) and weaning pace (abrupt 3 days vs. gradual 14 days). Early groups were weaned after a total MR intake of 102 lb, at either 42 or 49 days, and late groups were weaned at a total of 139 lb, at either 56 or 63 days. Abrupt groups were weaned in 4 equal step-downs over 3 days and gradual groups were weaned in 7 equal step-downs over 14 days. The treatments were early-abrupt (EA), whose weaning transition lasted from 40 to 42 days of age; early gradual (EG), whose weaning transition lasted from 35 to 49 days of age; late-abrupt (LA), whose weaning transition lasted from 54 to 56 days of age; and late-gradual (LG), whose weaning transition lasted from 49 to 63 days of age.

Calves were individually housed in hutches and bedded with coarse sand between September and November 2020 (40 calves) and between October and December 2021 (32 calves). Fresh water was provided ad libitum when calves arrived at the facility. Milk replacer (24% CP, 17% fat) was bottle fed up to 2.6 lb daily for every treatment and was fed twice daily at 0600 hours and at 1800 hours. A texturized calf starter (18% CP, 12.3 % NDF, 5.2% ADF) was offered ad libitum at 3 weeks of age and weighed every morning to ensure 5 to 10% orts. Chopped alfalfa hay (12,3 % CP, 39.0% NDF, 6.6% ADF, 40% in the upper sieve >2 cm, 25% in the middle sieve 0.6–1.9 cm, and 35% in the bottom pan) was offered at 4 weeks of age and fed ad libitum.

Male calves (n = 32) were orally bolused with a rumen pH logger for the last 3 to 5 days of the weaning transition and rumen pH was measured continuously every 2 minutes. The subacute rumen acidosis threshold was set as below 5.8 pH. Blood was collected via jugular venipuncture once every week per calf between 0730 hours and 0830 hours.

Before weaning application at day 35, there were no significant differences in health, production, rumen, and hematology data. During the weaning transition, calves weaned in late groups had a 0.88 ± 0.7 lb/day decrease in ADG. However, calves weaned gradually had a 0.64 ± 0.07 lb/day increase in ADG regardless of age (**Figure 1** and other figures kindly provided by Dr. Anne Laarman).

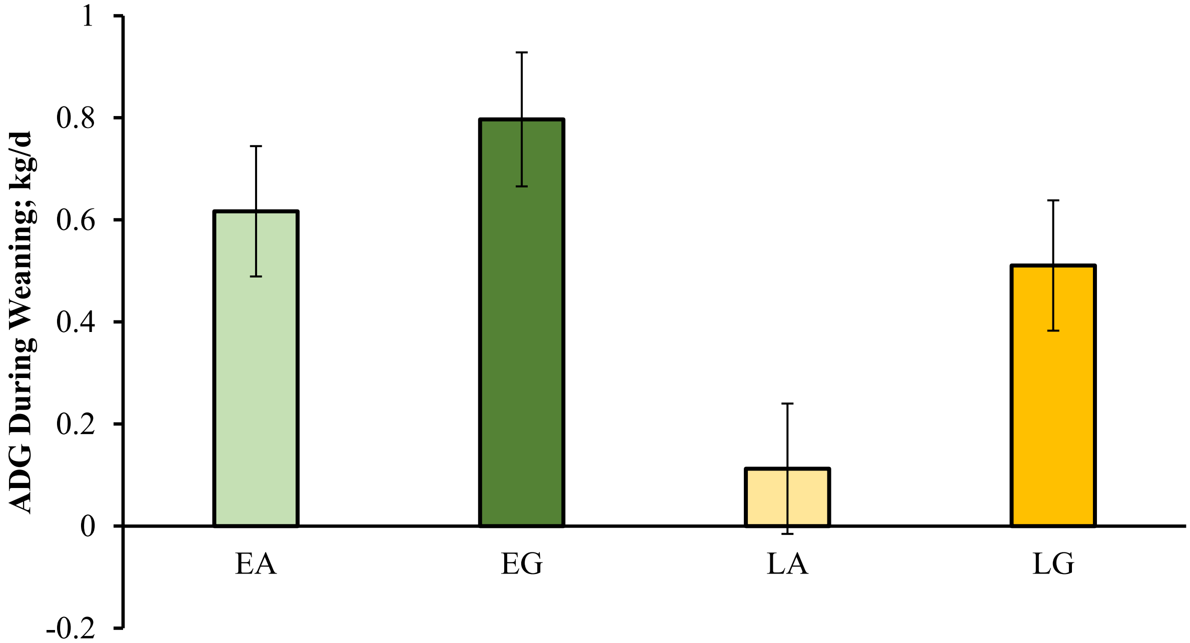

Figure 1. Calf average daily gain during weaning transition. Treatments were EA (early-abrupt), EG (early-gradual), LA (late-abrupt), and LG (late-gradual.

Grain (starter) intake during weaning increased by 1.1 ± 0.1% body weight (BW) with gradual weaning (**Figure 2**), irrespective of weaning age. LG (later gradual weaning) had greater relative grain intake than EG by 0.19 ± 0.14% BW but there was a 0.13 ± 0.13% BW decrease from EA to LA. Forage intake change during weaning was not detectably affected by weaning age or age × pace interaction.

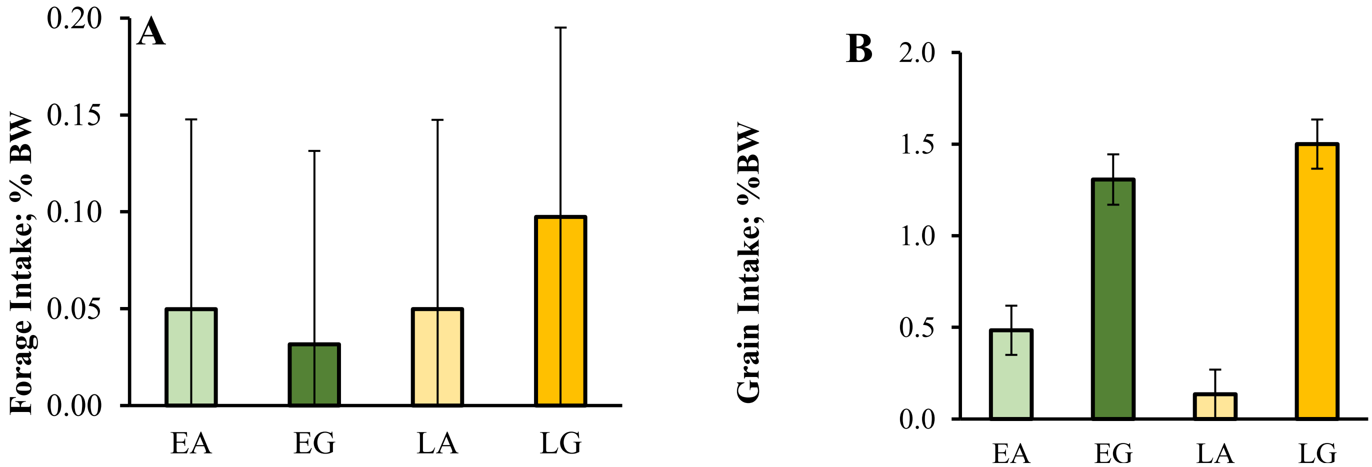

Figure 2. Change in forage (A) and grain (B) intake during weaning. Treatments are denoted as EA (early-abrupt), EG (early-gradual), LA (late-abrupt), and LG (late-gradual).

Mean rumen pH was unchanged among treatments (**Figure 3**). Authors noted minimum rumen pH was also unchanged by treatments, but maximum rumen pH marginally increased with age and with gradual weaning. Maximum rumen pH was greater in LA than EA by 0.03 ± 0.19 and from LA to LG by

2.30 ± 0.18. Duration of subacute ruminal acidosis (SARA) was not different among treatments (**Figure 4**).

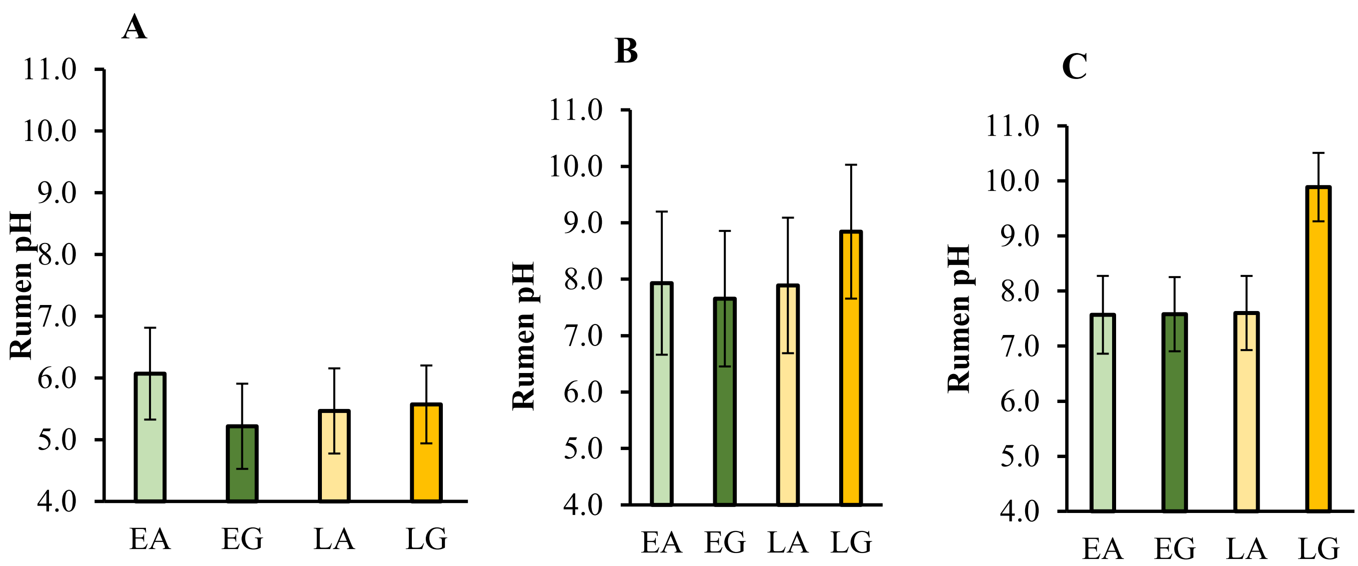

Figure 3. Minimum (A), mean (B), and maximum (C) rumen pH during weaning. Bull calves (n=32) had rumen pH loggers orally bloused. Treatments are denoted as EA (early-abrupt), EG (early-gradual), LA (late-abrupt), and LG (late-gradual).

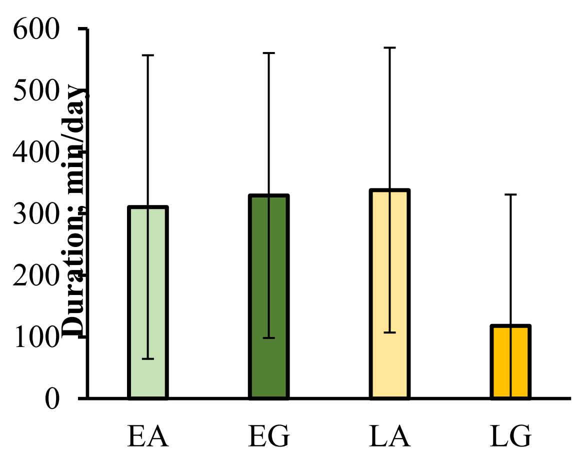

Figure 4. Duration of sub-acute-ruminal-acidosis (min/d) during weaning (pH below 5.8). Treatments are denoted as EA (early-abrupt), EG (early-gradual), LA (late-abrupt), and LG (late-gradual).

In this study, late-weaned calves had increased respiration, fecal score, lymphocytes, neutrophils, and platelets, showing a more comprehensive stress response. Decreased ADG also resulted, suggesting that the increased stress response at late weaning may be enough to compromise growth. When calves are weaned later, the weaning stress will engage with a more immunocompetent animal. However, other studies cited found that late weaning had increased growth over early-weaned calves.

Several key comments about this study and results:

- Starter intake over time largely determines rumen development and minimizes postweaning slump. A texturized starter was fed in this study but was not fed until the beginning of the 3rd week. Since starter intake normally doubles each week, two weeks were lost to build starter intake.
- Hay was also fed in this study but with a well-texturized starter that is unnecessary and may also cause gut fill (Khan et al., 2011).
- Milk replacer was fed at a high level (up to 2.6 lb daily) which retards starter intake and can postpone rumen development,
- Rumen pH was measured with rumen bolus loggers so these pH measurements should have been more reliable than stomach tubing which risks saliva contamination and consequently higher pH values. Preweaned calves often have rumen pH at or below 5.5 (Kertz 2019; Rey et al,, 2012). In this study, rumen pH was only measured 3 to 5 days before weaning when pH would be greater than earlier values. In addition, the starter was texturized, and some hay was consumed, both of which cause greater rumen pH values.

The Bottom Line

Gradual is better than abrupt weaning. Feeding a well-texturized starter needs no hay feeding. The key to successful weaning is to have adequate starter intake for 2 to 3 weeks before initiating weaning; and then have continued good starter intake to avoid a slump postweaning.

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