

3 Milk Replacer Feeding Levels on Growth

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There are some studies in which feeding of milk/milk replacer at various levels have measured responses (Kertz 2019). One response is on the interaction with calf starter intake. Gelsinger et al., 2016 found that within the range of data from studies summarized, there was about a 2:1 decline for each additional amount of milk or milk replacer solids fed and decrease in starter consumed. The impact of different milk replacer feeding level programs was evaluated further by Stamey Lanier et al. (2022).

A total of 30 female and 45 male Holstein calves from the University of Illinois research herd were blocked by date of birth and sex, and then were assigned randomly to 3 treatments. Calves were born between March 17, 2005, and June 26, 2005. A minimum of 4 quarts colostrum and transition milk was fed to each calf within 8 hours of birth through 2 days of life. Male calves were castrated within 72 hours of birth.

Calves were housed in individual hutches through 9 weeks of age. From 10 to 12 weeks, they were housed in groups of 4 to 6 calves per pen. Since calves were moved to super hutches as they finished the first 9 weeks of the study, the range in ages within a group was up to 3 weeks. All hutches were bedded with layers of corn cobs and straw. Calves were then housed from 13 to 20 weeks of age in a single group in free stalls with access to an open lot.

The 3 experimental treatments were: 1—**LOW** milk replacer (MR) with 21.2% CP and 21.2% fat DM basis (20/20 as-fed) and 20.4% CP DM basis starter; 2—**MOD** MR 27.1% CP and 18.8% fat DM basis (26/18) and 23.3 % CP DM basis starter, and 3—**HIGH** MR 29.2% CP and 21.0% fat (28/20 as-fed) with 25.8% CP DM basis starter. All starters were texturized. All MRs were fed according to manufacturers' recommendations.

The **LOW** MR was mixed to 11% solids. During week 1, calves received 0.375 lb of solids twice daily. From week 2 to 5, calves received 0.5 lb of solids twice daily. During week 6, calves were fed 0.5 lb of solids once daily to facilitate weaning. The **MOD** MR was mixed to 13% solids, and calves received 0.625 lb of solids twice daily in week 1. From week 2 to 5, **MOD** MR was mixed to 14% solids, and calves received 0.5 lb of solids twice daily. In week 6, calves received 0.5 lb of solids once daily reconstituted to 14% solids. The **HIGH** MR was mixed to 18% solids. Calves received 0.875 lb of solids twice daily in week 1, and 1.25 lb of solids twice daily from week 2 to 5. In week 6, calves received 1.25 lb of solids once daily.

Water was fed ad libitum. Calves were offered starter for ad libitum intake beginning on day 3 and continuing through week 12. From week 13 to 20, calves were fed daily ad libitum starter to a maximum of 10 lb of the **LOW** starter along with free choice access to a mixed legume and grass hay. Calf health was monitored several times daily. Calves were weighed at birth before treatment assignment, on day 3, and each Wednesday at 1300 hours. Withers height, body length, and heart girth also were measured.

Table 1. Calf performance day 3 to 6 weeks of age at weaning.

	LOW	MOD	HIGH	SEM
Initial BW, lb	99.5	99.5	99.5	1.38
BW 6 wk, lb	139.2	150.6	156.8	1.38
Daily gain, lb	0.92	1.19	1.37	0.04
Withers Height, inch	33.5	34.3	34.2	0.14
MR intake, lb/day	0.83	1.65	2.00	0.04
Starter intake, lb/day	0.99	0.39	0.26	0.08
Total DMI, lb/day	1.81	2.01	2.22	0.09
% CP of DMI	20.0	29.3	23.1	

Up to weaning at 6 weeks of age, calves:

- Fed MOD generally had daily gains intermediate to both LOW and HIGH treatments
- This reflected as more MR was fed, starter intake declined.
- Interestingly, the % CP in total dry matter intake (DMI) was greatest for MOD.
- Withers height increase was greater for bot MOD and HIGH versus LOW MR programs.

Table 2. Calf Performance from week 7 to 9 of age.

	LOW	MOD	HIGH	SEM
BW at 9 wk, lb	171.8	180.6	179.7	2.20
Daily gain, lb	2.34	2.16	1.78	0.01
Withers Height, inch	34.7	35.2	35.0	0.15
Starter intake, lb/day	4.45	3.97	3.58	0.18

For the 2-week period post weaning, calves:

- Daily gains were greatest for LOW versus MOD and HIGH, and were on the verge of fattening (1 kg daily gain).
- This was a reflection and continuation of starter intake prior to weaning as well as during this postweaning period.
- The pattern of withers height increase was similar during this period as for the preweaned period.

Table 3. Calf performance at 20 weeks of age.

	LOW	MOD	HIGH	SEM
BW at 20 wk, lb	408.3	417.9	398.6	2.42
Daily gain, lb	3.17	2.99	2.97	0.07
Withers Height, inch	41.8	42.2	41.4	0.21

Calves at the end of the 20 weeks:

- Showed most body weight for MOD and least for HIGH treatments
- A similar pattern for withers height followed as for body weight.
- Daily gains were excessive for all treatments, but this may have been confounded by gut fill and steer calves.

Thus, it appears that the HIGH MR feeding program was too high for best results. Hill et al., (2016ab) found that about 1.67 lb MR DM fed daily was about the happy medium. That is similar to the 1.65 lb fed daily in this study's MOD treatment. Here are some other facets:

- In this study by Stamey Lanier et al., (2022), weaning was at 6 weeks while both Hill et al. (2016ab) trials weaned calves at 7 weeks of age.
- All of these studies had postweaning periods which are essential to see any carryover effects.
- The Hill et al. (2016ab) studies used only male Holstein calves whereas this Stamey Lanier et al. (2022) study used both male (castrated) and female calves. This may well be why daily gains were greater than the 1.8 to 2.0 lb goal because the male calves diverge in body weight and composition after 2 months of age.
- Holstein male calves weighed about 7% more at birth than female calves (Kertz et al., 1997). In a review of those and other data, we found that if male and female calves had the same birth weight, their performance during the first 2 months was similar. But since they generally do not weigh the same, and you want to use both male and female calves, then the best Approach is to simply use initial body weight as a covariate in data analysis.

Lastly, I calculated from a NAHMS study Urie et al., (2018) that Holstein calves gained 1.61 lb before weaning but only 1.32 lb after weaning. That means that US dairy farmers are doing a better job feeding calves prior to weaning, but do not have a good weaning transition and postweaning program. That resulted in a decrease in daily gain post weaning. The 2014 NAHMS study found that milk/milk replacer feeding increased from the 2007 NAHMS report from 4 quarts daily to 6 quarts—a 50% increase!

The Bottom Line

Feeding more milk replacer than the traditional 1 lb of a 20/20 milk replacer increased daily gain and withers height at 6-weeks weaning. However, feeding more than 1.6 lb milk replacer daily had little benefit. And feeding more milk replacer decreased starter intake. This interaction between milk/milk replacer fed and starter intake must be managed under any program as well as the post weaning performance to avoid a postweaning slump in performance.

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