

# Does processing corn influence growth performance, nutrient digestibility and rumen and hindgut fermentation in calves fed high or low volumes of milk replacer?

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The goal of this research was to evaluate how the volume of milk replacer (low vs. high) and the source of starch (slow vs. rapid rumen fermentability) in starter may alter the growth performance, nutrient digestibility and rumen and hindgut fermentation of dairy calves. A total of 48 Holstein bull calves housed in individual pens were randomly assigned to 4 treatments (n = 12): low (LO; 5.2 L/d) or high (HI; 10.5 L/d) volumes of milk replacer (MR) and slow (whole corn; W) or rapid (flaked corn; F) rumen fermentability starter. Calves fed the high (HI) volume of MR were stepped up over 3 weeks. All calves were stepped down by reducing the allocated milk volume by 1 feeding a day during week 6. Intake of milk and starter were recorded daily while body weight was measured weekly. Rumen fluid (n = 12) and fecal matter (n = 6) were sampled at week 5, 6, 7 and 8 for pH, short chain fatty acids, and starch. Nutrient digestibility was also measured (n = 6) during week 5 and 8. Data were analyzed using a complete randomized design and a 2 by 2 factorial design using MIXED procedure of SAS. Repeated measures were used when suitable. There was an interaction ( $P = 0.03$ ) between the MR volumes and the corn type for average daily gain (ADG) during the pre-weaning period. The calves with the greatest ADG (0.71 kg/d) were the HI-F calves and the least ADG (0.47 kg/d) were the LO-F calves. Starter intake was greater for the LO calves compared to the HI calves (0.54 vs. 0.41 kg/d;  $P = 0.02$ ), but HI calves had greater ADG than the LO calves (0.62 vs. 0.55 kg/d;  $P = 0.003$ ) during the entire study. During wk 5 and 8 LO calves had increased ( $P = 0.001$ ) digestibility of ADF and NDF compared to the HI calves. Rumen fluid pH was not affected by treatment ( $P = 0.81$ ). Butyrate concentrations were higher ( $P < 0.0001$ ) for the LO-W calves compared to the other treatments during wk 6. Treatment did not affect fecal starch ( $P = 0.96$ ). The HI-W treatment had lower ( $P = 0.0004$ ) fecal pH ( $6.6 \pm 0.06$ ) during wk 8. Implications: Further research exploring the hindgut of calves is warranted to determine if including slow rumen fermentable (whole corn) calf starter can influence the structure, function and microbiota and thereby compromise the gut health of calves.