Feedbunk Overstocking Effects on Growth Performance

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Use of corn silage in the diets of pregnant dairy heifers offered for ad-libitum intake can be problematic for several reasons. First, corn silage exceeds the energy requirement for this livestock class. Secondly, concentrations of structural plant fiber (NDF) are too low, and voluntary intake is not limited adequately through the normal gut fill process. As a result, heifers often gain excessive weight, which can affect mammary development negatively, as well as first-lactation performance. One remedy is to dilute total mixed rations (TMR) with low-energy forages, such as straw; however, heifers often exhibit aggressive sorting behaviors discriminating against these less-desirable forages. This can be a problem if smaller or passive animals are prevented from reaching the feedbunk until after substantial sorting has occurred. Recently, this has been examined by USDA-ARS and UW scientists at the UW Marshfield Agricultural Research Station.

Design. Sixteen pens of pregnant Holstein dairy heifers (8 heifers/pen) were grouped by weight and offered a diet for 91 days consisting of 54% alfalfa haylage, 21% corn silage, and 25% chopped wheat straw (49.2% NDF, 12.6% CP, 11.1% starch, and 59.0% TDN). All pen groups received the identical diet, but feeding restrictions were put in place so that 0, 2, 3, or 4 head-locking feed gates were covered. This created effective stocking rates at the feedbunk of 100, 133, 160, and 200%, respectively. It is important to note overcrowding was implemented only at the feedbunk; each heifer always had access to a freestall, and there was 114 ft^2 of pen area per heifer within each identical pen. Feeding management was consistent with UW recommendations for using straw in TMR diets, which includes feeding daily to a minimal amount of refusal. The diet was offered at 10:00 a.m. daily, and feed was pushed up within easy reach of the heifers 5 times during the next 24 hours.

Feedbunk Displacements. During weeks 1, 2, 4, 6, 8, 10, and 12 of the trial, observers monitored heifer behavior in each pen, recording the number of displacements during the first hour after feed was distributed. There was little evidence of aggressive behaviors after the first hour following feed delivery, and observations were then discontinued. Not surprisingly, displacements increased (linearly) with feedbunk stocking rate, and increased from ~16 to 61 displacements/hour between the 100 and 200% stocking rates (Figure 1).

Sorting Behaviors. Feedbunks were sampled at 1:00, 4:00, 7:00, and 10:00 p.m., as well as 1:00, 6:00, and 8:30 a.m. the next morning. Samples were evaluated for particle-size distribution with the Penn State Particle Separator to assess daily feedbunk sorting trends. Sorting behaviors were not affected by stocking rate. Concentration of large particles (>19 mm) increased by 80% during the day, indicating strong discrimination by heifers (Figure 2); however, concentration of medium particles (>8 mm, <19 mm) did not change. Heifers displayed a modest preference for short particles, and a strong preference for fine particles, whose final concentration was only 60% of that in the original TMR. Discrimination against large particles was associated with greater NDF, which increased by ~10% during the day (Figure 3).

Heifer Performance. Despite the differences in displacements from the feedbunk and the predictable overall sorting behaviors by heifers, feedbunk stocking rate did not exhibit any detectable effect on heifer growth performance. Average daily gains from the 100, 133, 160, and 200% feedbunk stocking rates were 2.14, 2.25, 2.25, and 2.36 lbs/day, but these rates of gain

Figure 1. Total displacements per pen from the feedbunk during the first hour after feed delivery as affected by feedbunk stocking rate. Displacements increased linearly with feedbunk stocking rate.

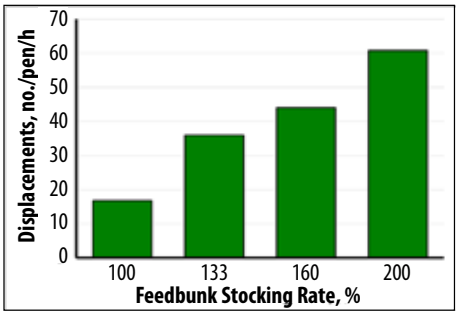


Figure 2. Concentrations of large particles (>19 mm) remaining in the feedbunk during the 24-hour period following feed distribution.

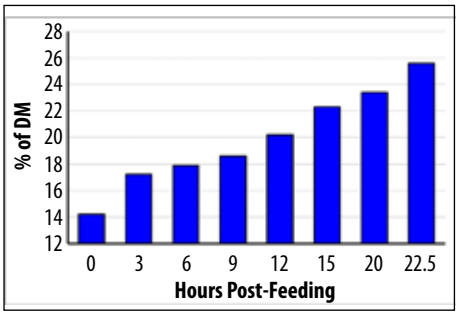
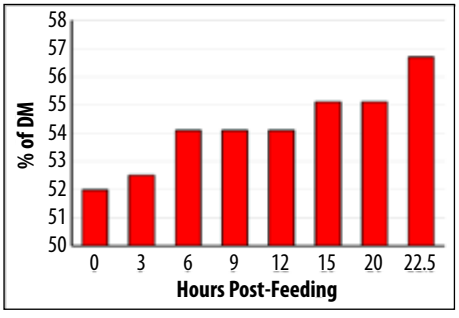


Figure 3. Concentrations of NDF within the TMR remaining in the feedbunk during the 24-hour period following feed distribution.



did not differ statistically (overall mean = 2.25 lbs/day). In addition, variation in daily gains within pens were not clearly affected by stocking density. There were statistical tendencies for more efficient feed:gain ratios with elevated stocking rates compared to pens with an available headlock for each heifer (10.3 vs. 11.0 lbs feed/lb gain). Body measurements and condition scores were not affected by feedbunk stocking rate.

Summary. It may be surprising to report that crowding heifers at the feedbunk had no effect on growth performance; in fact, if anything, there was some suggestion that weight gains were improved by this type of crowding, although it could not be confirmed statistically. To properly interpret these results, it is important to remember that other aspects of animal care were maintained at very high standards. These standards included adequate pen area and numbers of freestalls, regular manure removal, frequent push-up of remaining feed, and minimization of the variability for pre-trial body weights within each pen. Although heifer growth performance was not affected by feedbunk stocking rate in this trial, it should not be inferred that it can be practiced blindly, without attention to other aspects of animal care.