

Tuesday June 27th: Ruminant Nutrition 4 - Calves and Heifers

Long-term impacts of in-utero heat stress on heifer feed efficiency and enteric gas emissions

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As global climate changes, producers may face the consequences of increased heat stress events during the dry period on performance and efficiency of the cow and her unborn calf as evidenced by previous research. Studies regarding the feed efficiency of lactating cows are readily available, but data regarding the feed efficiency of growing heifers are limited. Our objective was to evaluate the long-term effects of in-utero heat stress on subsequent heifer performance and greenhouse gas emissions. A total of 38 heifers had been subjected to heat stress (HT; n = 17) or artificial cooling (CL; n = 21) in-utero (last 56 d of gestation) and were enrolled in a 63-day study at 18-20 months old. Heifers were blocked by weight and randomly assigned to 3 pens with Calan gates and access to a GreenFeed machine (GF; C-Lock, SD) for 8 ± 1d to measure CH₄ and CO₂ gas fluxes. Body weights (BW) were measured on days -2, -1, 0 and 61, 62, 63 and used to calculate average daily gain (ADG). Hip height (HH), hip width (HW), and chest girth (CG) were recorded on days 0 and 63. All heifers were fed the same TMR consisting of 46.6% oatlage, 44.6% grass/alfalfa haylage, 7.7% corn silage, 0.3% urea, and 0.8% mineral (DM basis). Statistical analyses were performed using R version 4.1.1 (R Core Team, 2021) with packages lme4, and emmeans. Residual feed intake (RFI) was calculated by subtracting predicted DMI from observed DMI. The HT and CL heifers did not differ in initial (lsmean ± se; 551 ± 8.6 kg, 543 ± 7.8 kg; *P* = 0.47, respectively) or final BW (615 ± 10.1 kg, 607 ± 9.1 kg; *P* = 0.57, respectively). There were no treatment effects (*P* > 0.1) on DMI (HT: 12.0 ± 0.46 kg, CL: 12.0 ± 0.46 kg DM) or ADG (HT: 1.00 ± 0.04 kg/d, CL: 1.02 ± 0.03 kg/d). RFI was similar between HT (-0.009 ± 0.1) and CL (0.007 ± 0.1, *P* = 0.90). Methane production, CO₂ production, and visits to the GF did not differ between treatment (*P* > 0.5). Despite previously reported reductions in growth and feed intake of in-utero heat stress heifers during the pre-weaning phase, it does not seem to have long-term effects on growth, feed efficiency, or methane emissions later in life.

Adisseo Message:

Exposure to heat stress during the peripartal period has negative consequences not only for the cow, but also the unborn calf. As climate change continues to be an issue, it is important to understand how in-utero exposure to heat stress can impact heifers long-term. During the pre-weaning period, calves exposed to in-utero heat stress have been reported to have reduced performance, as well as lower milk yields when they reach lactation. Despite those previous outcomes, the results of this study suggest that in-utero heat stress during late gestation does not seem to affect heifer performance during the growing phase.