milking parlor. Daily milk yield between treatments were analyzed in linear mixed regression models for the rearing period, weaning period, and up to 3 wk post-separation. Full-time cows yielded less milk than part-time and separated cows during the rearing period (13.4 ± 0.8 L/d; 24.0 ± 0.8 L/d; 36.0 ± 0.6L/d, respectively; $P < 0.01$). Gradual weaning by reducing dam-calf contact did not increase milk yield (15.9 and 22.5 ± 1.5 L/d; full- and part-time, respectively). However, over the 3 wk post-separation, milk yield depended on both contact and weaning treatments. Full-abrupt cows had the lowest yield (25.6 ± 1.4 L/d) compared with full-gradual, part-abrupt and part-gradual cows (30.3 ± 1.5 L/d; 32.9 ± 1.6 L/d; 33.0 ± 1.5 L/d; $P < 0.01$), and no dam-contact treatment reached a similar milk yield as separated cows (36.3 ± 1.4 L/d; $P < 0.08$) over 3 wk post-separation. These results suggest that cows in full-time contact treatment should be gradually weaned from their calves to improve milk yield after separation, but overall, part-time contact (vs. full-time) returns higher milk yields. However, further investigation is required to understand the longer-term effects of cow-calf contact systems on a 305 d lactation curve.

Key Words: dam-rearing, milk yield, gradual weaning

2411 Enhancing dairy farm simulation: An approach to modeling farm-specific lactation curves with readily available data. Y. Gong*[1], H. Hu[2], K. F. Reed[2], and V. E. Cabrera[1], [1]*University of Wisconsin–Madison, Madison, WI,* [2]*Cornell University, Ithaca, NY.*

Accurate estimation of annual herd milk production (AHMP, reported by the farm) using a lactation model is a cornerstone of dairy farm systems simulation models. Our research introduces a 2-step method for defining parity-specific parameters of the Wood's lactation curve with the objective of improving model accuracy by including observed farm production and the parity composition of the herd as inputs. This method involves: (1) adjusting the model parameters using previously reported parameter estimates and farm contextual metadata (i.e., temporal, geographical, and management factors), and (2) fitting the parity-specific scale parameters to match parity-specific 305-d MY derived from reported AHMP and the herd parity composition. We leveraged the Ruminant Farm Systems (RuFaS) model, a comprehensive dairy farm system model, as our simulation platform to evaluate our method against 2 literature-based methods: (1) US averages; and (2) previously reported values adjusted for contextual metadata alone. The evaluation was conducted on 3 commercial Holstein farms located in WI (58 cows), VT (117 cows), and NY (1,002 cows). Preliminary results demonstrated a marked improvement in the accuracy of estimated AHMP. Overestimation of AHMP was reduced from 175%, 109%, and 116% (method 1); and 164%, 105%, and 113% (method 2) to 114, 102, and 108% (our 2-step method) for WI, VT, and NY farms, respectively. Large improvements relate to disparities between the farms' reported AHMP and local or national average productions that informed parameter estimates reported in the literature. For example, in WI, the 305-d MY (kg/cow per year; 8,545) substantially deviates from the US average (12,802 ± 4,518) or nearby farms (13,218 ± 4,391). By integrating additional data (AHMP) that is readily accessible to farmers, our method provides a practical and efficient approach to improve the accuracy of lactation curve parameter estimates, thereby elevating dairy farm simulation models to a higher standard of reliability. Future evaluations will expand to include more farms across regions.

Key Words: Wood's lactation model, annual herd milk production, farm-specific lactation model

2412 Effects of heat stress on animal physiology, intake, nutrient digestibility, and performance of dairy calves. L. F. M. Neves[1], S. G. Coelho[1], M. B. Gomes[1], J. P. Campolina[1], and M. M. Campos*[2], [1]*Departamento de Zootecnia, Escola de Veterinária, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil,* [2]*Empresa Brasileira de Pesquisa Agropecuária—Embrapa Gado de Leite, Juiz de Fora, Minas Gerais, Brazil.*

In the tropical environment, characterized by high temperatures and humidity, the rearing phase of calves has progressively become more challenging due to the detrimental effects of heat stress on physiology, performance, and health. Thus, this study aimed to evaluate the physiology, intake, performance, and digestibility of dairy calves subjected to high temperatures in a climate chamber, with controlled temperature and humidity. Thirty-five Holstein calves were divided into 2 treatments: Control (CON, THI of 66, n = 17) and Heat-Stress (HS, THI of 82 for 9 h + THI 66 for 15 h, n = 18). The experimental period ranged from 1 to 28 d of age. Physiological parameters such as respiratory rate (RR), heart rate (HR), and rectal temperature (RT), intake, and health were evaluated daily. Performance and blood parameters (triglycerides, glucose, creatinine, insulin, and cortisol) were assessed weekly, whereas rumen parameters were assessed every other week. Digestibility trials were conducted at 9–12 and 23–26 d of age. Data were analyzed using R software with ANOVA and a 95% confidence in a completely randomized design, with treatment was the main plot and week was the subplot. The HS group showed higher RR and RT compared with the CON group ($P < 0.001$). Intake was reduced in the HS group ($P = 0.007$), whereas water intake was greater ($P = 0.003$) than in the CON group. Differences in intake led to lower concentrations of ruminal ammonia, acetate, and propionate in the HS group ($P < 0.05$). Additionally, HS-calves exhibited lower digestibility of dry matter, organic matter, ether extract, gross energy, as well as higher urinary nitrogen ($P < 0.05$) in the first digestibility trial, and lower ether extract digestibility in the second digestibility trial ($P = 0.02$) compared with CON calves. However, these differences did not affect final weight, average daily gain ($P > 0.05$). There was no effect of HS on blood parameters ($P > 0.05$). Thus, heat stress negatively affected animal physiology, intake, and nutrient digestibility.

Key Words: climate, preweaning, temperature