the groups in the percentage of extra-cellular-matrix area with Picro Sirius Red staining (47.9% vs. 46.9 ± 9.6%; $P = 0.87$), indicating that structural components were unaffected by heat stress. In conclusion, our findings suggest that heat stress induces changes in vasculature, likely associated with thermoregulation. Further investigation focusing on the interhemal barrier and fetal-placental vasculature is warranted to elucidate the effects of these modifications on placental transfer and fetal development

Key Words: hyperthermia, placenta, fetal development

2229 Effects of thermal range on animal physiology, intake, nutrient digestibility, and performance of dairy calves. M. B. Gomes[1], S. G. Coelho[1], L. F. M. Neves[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.*

Farms located in continental areas are more susceptible to temperature fluctuations, making the rearing phase of dairy calves more challenging due to the detrimental effects of daily temperature variations. Thus, the aim of this study was to evaluate animal physiology, intake, performance, and digestibility in dairy calves subjected to thermal amplitude in a climate chamber with controlled temperature and humidity. Thirty-four Holstein calves were divided into 2 treatments starting at d 1 of life: control (CON, temperature-humidity index [THI] of 66 during 24 h, n = 17) and thermal range (TR, THI of 84 for 9 h + THI of 66 for 6 h + THI of 54 for 9 h, n = 17). Animals were exposed to treatments 24 h from 1 to 28 d of age. Respiratory rate (RR), heart rate (HR), rectal temperature (RT), intake, and health were evaluated daily. Performance was assessed weekly and rumen parameters biweekly. Digestibility trials were conducted at 9 to 12 and 23 to 26 d of age. Data were analyzed using R software with ANOVA and 95% confidence in a completely randomized design, where treatment was the main plot, week was the subplot, and hour was the sub-subplot. The TR group increased the RR by 82% ($P < 0.05$) during THI = 84 exposure. The HR was similar between treatment groups but was affected by week and THI exposure time ($P < 0.05$). The RT was higher for the TR group, averaging 0,49°C at THI exposure 84 ($P < 0.05$). There were no treatment effects on feed and nutrient intake ($P > 0.05$). However, water intake was 32% higher in the TR group ($P < 0.01$), with more pronounced differences on wk 3 and 4. Apart from a higher C2:C3 proportion for the TR group ($P = 0.01$), ruminal parameters were similar. The TA group had lower ether extract digestibility ($P = 0.01$) in the first digestibility trial and higher fecal nitrogen on the second digestibility trial ($P = 0.03$). No differences were observed for final weights ($P = 0.96$), ADG ($P = 0.10$), withers height ($P = 0.96$), chest circumference ($P = 0.99$), and width ($P = 0.47$). Thus, calves subjected to thermal range show an increased RT and RR but no differences in intake or performance.

Key Words: preweaning, temperature, thermal variation

2230 Evaluating effects of heat stress on the efficacy of robotic milking systems. R. Neupane*[1], B. Shrestha[1], J. Velez[2], N. Rodriguez[2], N. Charlton[3], and S. Paudyal[1], *[1]Department of Animal Science, Texas A&M University, College Station, TX, [2]Aurora Organic Dairy, Dublin, TX, [3]DeLaval North America, Bannockburn, IL.*

The objective of this study was to examine the associations between the efficiency metrics of robotic milking systems, milk yield within the robots, and temperature-humidity index (THI) in robotic milking operations. This retrospective study was conducted using data collected from March to October 2023, at a commercial dairy farm in Dublin, Texas, USA, milking 1,500 cows with 22 robots in a batch milking system. Temperature and humidity data were collected from the nearest weather station. Daily idle time per robot was compared with different levels of daily THI (low <72 THI, moderate 72 to 79 THI, and high >79 THI). Statistical analysis was conducted using ANOVA and associated post hoc tests in SAS 9.4. The average robot idle time during the study period was 220 ± 1.27 min per day per robot. Robot idle time (minutes; mean ± SE) was higher in the high THI days compared with low THI days ($P < 0.05$; 192 ± 1.88, 231 ± 1.74, 280 ± 2.52 for low, medium, and high groups, respectively). The idle time per robot was lower in morning milking compared with evening milking ($P < 0.05$; 115 ± 0.76, 106 ± 0.75 min/12 h for morning and evening milkings, respectively). Robot idle time was not associated with robot direction or robot location (front, mid, and back) in the barn. Average milk yield per cow per milking was also reduced with increase in THI ($P < 0.05$; 7.4 ± 0.01, 7.8 ± 0.01, 9.09 ± 0.01 kg, for high, moderate, low THI levels, respectively). The average milk flow rate (kg/min) was also reduced during heat stress ($P < 0.05$; 0.89 ± 0.01, 0.93 ± 0.01, and 0.99 ± 0.01 for high, moderate, and low THI groups, respectively). Furthermore, the average duration of milking (seconds) was also reduced in heat-stressed cows ($P < 0.05$; 315.1 ± 0.25, 323.0 ± 0.17, and 334.4 ± 0.14 for high, moderate, and low levels of THI, respectively). The data from this preliminary exploratory study demonstrate a relationship between elevated THI values and decreased milking efficiency metrics in robotic milking systems, suggesting that heat stress conditions have a detrimental effect on robot efficiency due to the effect on cow behavior.

Key Words: heat stress, robotic milking, efficiency

2231 Evaluation of voluntary milking system metrics in a small North Carolina Jersey herd. S. Brandon*, E. Pearsall, T. Anthony, C. Miller, and L. Mayo, *North Carolina Agricultural & Technical State University, Greensboro, NC.*

The adoption of the voluntary milking systems (VMS) in the Southeast United States is increasing as new generations come onto the farm and labor availability lessens. A VMS was recently installed at North Carolina Agricultural & Technical State University, the only operating dairy farm at an 1890s land-grant institution. The objective of this study was to evaluate the data gained from the VMS including milk conductivity, number of visits, concentrate consumed, and milking time on a teat, cow, and herd basis across seasons for a small Jersey herd with access to pasture. Primiparous and multiparous Jersey cows (n = 30) were equipped with an radio-frequency ID, electronic ear tag, to gain access to the VMS and connect data gained. Cows were fetched twice a day at 0600 and 1400 h to ensure all cows received at least 2 milkings. The VMS was left open in between these fetch times to allow free access for the cows while in the free-stall barn for 12 h or pasture for 12 h. Data obtained from the VMS in daily offloads included milk conductivity, number of visits, concentrate consumed, and milking time on a teat, cow, and herd basis with time stamps and days in milk for all milkings and major events such as breeding and mastitis treatments. The number of visits to the VMS increased 3 mo after startup to an average of 2.3 ± 0.6 (mean ± SD) visits per day. Concentrate consumed varied by cow and stage of lactation with an average of 1.84 ± 0.98 (Mean ± SD) per visit to the VMS. Further evaluation of milk conductivity and VMS visits could result in increased alerts for attention cows.

Key Words: automated milking system, voluntary milking, pasture