ABSTRACTS

INTERNATIONAL SYMPOSIUM ON RUMINANT PHYSIOLOGY

AUGUST 26–29, 2024

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animals. The objective of this study is to investigate fescue grass dominated forage biomass (ton/ha), dry matter (DM%), plant height (cm), crude protein (CP%), and fiber content variations in pasture samplings at the pre and post rotational grazing with weaner lambs. Rotational grazing scheduled twice a week on pasture plots in size of one ha sectioned by electric wire fence. Thirty-six weaner lambs with an average body weight of 21.0 kg grazed continuously within the fenced paddock with ad lib water supply. Four paddocks were rotational grazed by each group. Pasture forage biomass was estimated by the clipping method and forage samples were collected at each pre- and postgrazing intervals for an 8-week grazing experiment. Animals were recorded for body weight weekly and daily weight gain was calculated. Forage samples were analyzed for DM, organic matter (OM), CP, crude fiber (CF), neutral detergent fiber (NDF), acid detergent fiber (ADF), and ash composition. Data were analyzed by GLM procedure fitting sex and age as fixed effect in model. The results indicated that forage biomass did not appreciably change though it slightly decreased postgrazing; whereas, DM content changed because of precipitation. Likewise, plant height was shorter ($P < 0.05$) at postgrazing. The mean values for OM, CP, CF, NDF, ADF, and ash were 91.3, 10.3, 26.7, 33.9, 60.1, and 8.7%. No significant difference was found in forage compositions although notable fluctuations in weekly measurements were noted pre- and post-rotational grazing pastures. Lamb body weight increased during the weekly measurements and gained 179 g/lamb daily. Rotational grazing in weaned lambs can increase live weight.

Key Words: forage biomass, rotational grazing, crude protein

P118 Estimation of internal body temperature of dairy cows using thermographic images. J. Schulz[1], K. Heinichen[2], and M. R. Wilkens*[1], *[1]Institute of Animal Nutrition, Nutrition Diseases and Dietetics, Faculty of Veterinary Medicine, Leipzig University, Leipzig, Germany, [2]Oberholz Farm for Teaching and Research, Leipzig University, Leipzig, Germany.*

Internal body temperature (IT) is the main indicator used to determine whether or not a dairy cow is experiencing heat stress. The aim of this preliminary study was to test if thermography is a suitable technique for estimating IT. Holstein dairy cows kept in the same barn at the animal facility of Leipzig University were studied from July to September 2022. The temperature-humidity index (THI) was calculated based on data from loggers at 3 different locations according to the German Society of Nutrition (2023). We measured IT of 10 animals and determined surface temperature (ST) using a FLIR E60 thermocamera on Thursday evening and Friday morning for 10 weeks. Four ST locations were defined: the surface of the udder, the left thoracic wall, the left abdominal wall and the left metatarsus. The THI influenced IT and ST at all locations significantly. Internal body temperature varied between 37.5°C and 41.7°C, with a mean of 38.9°C over all measurements. Surface temperature at the metatarsus (ST_MT) showed the widest range (18.0°C to 38.6°C), while ST at the udder (ST_U) showed the narrowest range (28.4°C to 40.0°C). Results of the regression models are shown in Table 1. While ST_U seems to be more suitable to estimate IT on herd level, ST_MT allows a better prediction for the individual animal. Information based on herd level could be used for example to adapt fans in the barn. During milking, ST_UT could be easily detected but it might be confounded by inflammatory diseases of the mammary gland. The correlation between ST_MT and IT depends more strongly on THI and might be more suitable to identify individual animals more vulnerable to heat stress.

Key Words: heat stress, thermography

P119 Effect of dietary inclusion of brown seaweed, tannin, and garlic polysulfides on enteric methane emissions and rumen physiology in dairy cows. D. Kirovski*[1], D. Bošnjakovic[1], I. Vujanac[2], R. Prodanovic[2], S. Nedic[2], S. Arsic[2], S. Dražic[1], M. Stojkovic[1], and L. Jovanovic[1], *[1]University of Belgrade, Faculty of Veterinary Medicine, Department of Physiology and Biochemistry, Belgrade, Serbia, [2]University of Belgrade, Faculty of Veterinary Medicine, Department of Ruminant and Swine Diseases, Belgrade, Serbia.*

This preliminary study aimed to investigate the effects of providing brown seaweed *Ascophyllum nodosum,* chestnut tannins and garlic polysulfides on enteric methane emissions (EME), rumen pH and temperature and productivity in dairy cows. Twelve peak lactating and individually fed Holstein-Friesian cows, chosen at 45.4 ± 3.1 d in milk (mean ± standard error) were divided into 4 numerically equal groups: CON (nonsupplemented cows),

Table 1 (Abstr. 118). Regression of body surface temperatures at the udder (ST_U) or the metatarsus (ST_MT) with rectal temperature (RT) as independent variable on animal (AL) and herd level (HL)

Y	Level	Equation	*P*-value coefficient	*P*-value intercept	R^2
ST_U	AL	Y = 1.71 ± 0.177 * x − 31.2 ± 6.90	< 0.001	< 0.001	0.33
	HL	Y = 2.10 ± 0.340 * x − 46.4 ± 13.1	< 0.001	0.002	0.68
ST_MT	AL	Y = 2.83 ± 0.281 * x − 79.0 ± 11.0	< 0.001	< 0.001	0.42
	HL	Y = 3.41 ± 0.612 * x − 101 ± 24	< 0.001	0.001	0.65

BS (cows received 100 mL/d of 10% *A. nodosum*), CNT (cows received 80 g/d of chestnut tannins) and GDP (cows received 1 g/d of garlic dipropyl polysulfides). In each cow, EME was measured using a laser methane detector, while rumen parameters (pH and temperature) were measured using smart rumen bolus. These measurements were performed before supplementation, after 15 and 30 d of supplementation, and the results obtained were tested using mixed design ANOVA with the dietary treatment as a between-subject factor, period as a within-subject factor, and examined parameter as a dependent variable. Inclusion of all 3 supplements significantly reduced EME, estimated by methane production (ppm) and methane intensity (ppm/kg of fat-protein corrected milk) at 15 and 30 d of supplementation, respectively. There was no significant difference in rumen pH and temperature between the examined groups of cows. No difference in dry matter intake (CON = 21.52 ± 0.1 kg/d, BS = 21.47 ± 0.1 kg/d, CNT = 21.23 ± 0.1 kg/d, GDP = 21.39 ± 0.3 kg/d, after 30 d of supplementation) and milk yield (MY) was found between examined groups of cows, with exception of lower MY in GDP than in CON cows after 15 d of supplementation. However, both GDP and CNT cows had significantly higher milk lactose and fat content compared with CON cows after 15 d of supplementation. In conclusion, dietary treatments with *A. nodosum*, chestnut tannins and garlic polysulfides reduces EME with no effect on rumen physiological parameters in dairy cows, but with an improvement in milk composition when providing chestnut tannins and garlic polysulphides.

Key Words: cows, methane, supplements

P120 Feeding frequency affects the circadian cycle of physical activity and ear temperature. T. Fernandes*[1], M. H. de Oliveira[1,2], Z. Wachsman[1], S. M. Morlatt[1], and M. D. Hanigan[1], [1]*Virginia Tech, Blacksburg, VA,* [2]*School of Veterinary Medicine and Animal Science, State University of São Paulo, Botucatu, Brazil.*

This study aims to characterize the effect of feeding frequency (FF) on the circadian cycle of physical activity and ear temperature. Six Holstein heifers were fitted with ear monitoring tags (CowManager B. V., the Netherlands). The experimental period consisted of 98 d, divided into 7 periods (14 d). Each period consisted of 7 d of baseline FF, fed ad libitum once a day at 0830 h (BFF), 4 d of high FF, fed 95% of ad libitum divided into 12 meals (HFF), and 3 d of the baseline as recovery phase (BRP). Data were continuously registered and summarized by hour on d 6 and 7 for BFF, 9 and 10 for HFF, and 13 and 14 for BRP. Data were classified as eating, ruminating, not active, active, and highly active using a proprietary algorithm and average ear temperature. Data were analyzed using R software with a linear mixed-effects model, with fixed effects of FF, hour, and period and random effects of heifers with significance of $P < 0.05$. The DMI (kg/d) was lower for HFF than for BFF (10.8 vs. 11.6) due to a 95% intake restriction; however, the cows did not recover intake on BRP (BRP, 11.1 kg/d). Time spent eating (min/d) was similar for BFF (159) and HFF (159) and lower for BRP (146). Heifers on HFF and BRP ruminate less (24 min/d) than BFF. All variables significantly interacted between FF and hour when heifers were evaluated hourly. The HFF spent 5 to 10 min/h eating and 15 to 25 min ruminating continuously over 24 h; BFF and BRP had 2 eating peaks, first around 1200 and second from 1900 to 2200 (over 20 and 10 min/h, respectively), and decreased the rumination time at 1200 (below 5 min/h). HFF had a few activity peaks due to external intervention. Heifers on BFF and BRP had a peak of high activity from 1000 to 1200. Ear temperature dropped from 26°C (HFF) to 18°C (BRP) and 14°C (BFF) from 1000 to 1300; no changes in the environmental temperature were observed during this time. The drop in ear temperature during peak intake may indicate a change in blood flow from extremities to the digestive system. More studies must be performed to evaluate blood flow change in different body tissues (e.g., mammary glands) during intense eating time.

Key Words: eating pattern

P121 Can we improve net food production by feeding high-byproduct diets to lactating cows? M. N. Mills, E. Sarmikasoglou*, S. R. Naughton, and M. J. VandeHaar, *Michigan State University, East Lansing, MI.*

Cows can produce high-quality food for human consumption by consuming human-inedible byproducts. Our objective was to evaluate the effects of feeding diets high in byproducts on production performance, and net food production. In exp. 1, we fed 30 multiparous Holstein cows (113 ± 28 DIM, 700 kg BW) with diets composed of 20% byproducts (CON1) or 70% byproducts (BYP1). BYP1 diet consisted of 25% corn silage, 8% straw, 15% gluten feed, 15% bakery waste, 12% beet pulp, 8% soyhulls, and 17% supplements. In exp. 2, we fed 31 multiparous Holstein cows (90 ± 23 DIM, 730 kg BW) with diets of 20% byproducts (CON2) or 70% byproducts (BYP2). BYP2 diet consisted of 25% corn silage, 18% corn gluten feed, 15% bakery waste, 10% whole cottonseed, 10% wet beet pulp, 8% wheat straw, and 13% supplements. Corn grain, soybean meal, the grain portion of corn silage, and the leaves of alfalfa haylage were considered human edible. Both experiments were designed as crossover with 2 diets, and their control diets contained mostly corn silage, haylage, and corn grain. Cows in each study fed a 50:50 mix of both diets for 1 wk, then the respective control and byproduct diets for 4 wk, mix for 1 wk, and then opposite diet for 4 wk. The effects of diet and period were considered as fixed and cow as random. In exp. 1, cows fed BYP1 consumed 1 kg more DM ($P = 0.02$) and

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