287 Feeding behavior and performance of dairy cows in an automated milking system is related to personality traits. A. J. Schwanke*[1], K. M. Dancy[1], G. B. Penner[2], H. W. Neave[3], and T. J. DeVries[1], [1]*Department of Animal Biosciences*, *Guelph, ON, Canada*, [2]*Department of Animal and Poultry Science, University of Saskatchewan*, *Saskatoon, SK, Canada*, [3]*Ruakura Research Centre, AgResearch Ltd*, *Hamilton, New Zealand*.

A goal of dairy cattle management is to meet the nutritional requirements of individuals, but there is large variability in behavior and performance of cows. The objective of this study was to identify and associate personality traits with behavior and performance of cows milked in a free-traffic automated milking system (AMS) and determine if the response to concentrate allocation in an AMS is associated with those personality traits. Holstein cows (n = 15; 124 ± 53 DIM; parity = 2.7 ± 0.9) were exposed to 2 treatments in a crossover design with 2 consecutive 28-d periods: cows were provided a basal PMR with a pelleted AMS concentrate allowance of: 1) 3.0 kg/d (L-AMS) or 2) 6.0 kg/d (H-AMS). During the last 5 d of the first period, behaviors in response to a novel arena, object and human were scored to identify personality traits. Principal component analysis revealed 5 factors interpreted as personality traits (2 from novel human test = 72% cumulative variance; 3 from novel object and novel arena tests = 81% cumulative variance). Linear regressions were used to explore relationships between each factor and behavior and performance outcomes. Cows high on Factor 1 (active and vocal) had greater total DMI, sorting of the PMR, and lying bouts, but shorter lying bout duration ($P < 0.01$). Cows high on Factor 2 (fearful of human) had greater meal size ($P = 0.05$), gained BW ($P = 0.04$), and required more AMS fetches ($P < 0.01$), likely explaining their lesser concentrate intake and milk yield ($P < 0.01$). These cows were less likely to meet their target concentrate allowance on the H-AMS treatment ($P < 0.01$). Cows high on Factor 3 (active) gained BW ($P = 0.05$) and had more problematic milkings ($P < 0.01$), likely explaining their lesser milk yield ($P = 0.02$). Cows high on Factor 4 (social) had greater meal frequency and SCC ($P < 0.01$) and lesser % milk fat ($P = 0.03$) and protein ($P = 0.04$). Cows high on Factor 5 (fearful of object) had greater eating rate ($P = 0.02$), rumination ($P = 0.03$), and % milk protein ($P = 0.01$). These results indicate that personality traits of dairy cattle are associated with feeding behavior and performance in an AMS.

Key Words: temperament, robotic milking system, individual variation

288 Repeated regroupings affect body and reproductive development and energetic metabolism. M. Moratorio*[1], A. Amil[1], M. Pedrozo[1], R. Ungerfeld[2], M. Carriquiry[3], and C. Fiol[1], [1]*Departamento de Bovinos, Facultad de Veterinaria, Universidad de la República*, *Montevideo, Uruguay*, [2]*Departamento de Fisiología, Facultad de Veterinaria, Universidad de la República*, *Montevideo, Uruguay*, [3]*Departamento de Producción Animal y Pasturas, Facultad de Agronomía, Universidad de la República*, *Montevideo, Uruguay*.

The aim was to determine the effects of social regrouping (SR) on body and reproductive development and energetic metabolism in dairy heifers. Holstein heifers (153.3 ± 16.1 kg, 11 mo old) were allocated to 2 homogeneous groups according to BW, age and farmer origin: 1) Control (CON; n = 14 + 5 "fixed") and 2) Regrouped (RG; n = 14 + 5 "exchanged"), in which "exchanged" were switched for 5 unknown heifers every 21 d (total = 10 SR; Day 0 = SR 1). In each SR the BW, ADG, withers height (WH) and BCS were registered, blood samples were taken for IGF-1, glucose, NEFA and albumin determinations. In addition, date at first heat was registered. Body development, IGF-1 and metabolites data were analyzed by PROC GLIMMIX, and days to first heat were compared with PROC Lifetest. Body weight and ADG changed across SR (Table 1). Control heifers had greater WH and BCS in SR 8 (122 vs 120 cm ± 1.8), 9 (123 vs 120 cm ± 1.8) and 10 (124 vs 122 cm ± 1.8), and in SR 4 (3.5 vs 3.2 ± 0.15) and 5 (3.4 vs 3.1 ± 0.15), respectively, than RG. Insulin growth factor-1 concentration was greater in CON than RG heifers (Table 1), and CON had greater IGF-1 concentrations in SR 3 (207.4 ± 20 vs 97.4 ± 12 ng/mL), 5 (184.5 ± 17 vs 97.4 ± 12 ng/mL), 7 (175.9 ± 17 vs 122.4 ± 14 ng/mL) and 9 (193.5 ± 18 vs 137 ± 15 ng/mL) than RG. Glucose and albumin concentrations of CON were greater than RG heifers (Table 1), and glucose was higher in CON than RG heifers in SR 3 (4.7 vs 4.4 mmol/L ± 0.1) and 6 (4.2 vs 3.7 mmol/L ± 0.1). In contrast, NEFA was greater in RG than CON heifers (Table 1), and RG had greater NEFA than CON in SR 3 (0.6 ± 0.09 vs 0.3 ± 0.06 mmol/L), 5 (0.5 ± 0.08 vs 0.3 ± 0.05 mmol/L) and 7 (0.4 vs 0.3 mmol/L ± 0.05). Control heifers showed first heat earlier than RG heifers (93 ± 9 vs 126 ± 14 d; $P < 0.05$). In conclusion, frequent SR negatively affected body and reproductive development and energetic metabolism.

Table 1 (Abstr. 288).

	Group			*P*-value		
Item	CON	RG	SEM	Group	SR	Group × SR
BW, kg	266.7	259.9	5.4	ns	<0.01	ns
ADG, kg/d	0.82	0.79	0.02	ns	<0.01	ns
WH, cm	115.9	115.4	1.8	ns	<0.01	0.01
BCS	3.4	3.3	0.13	ns	<0.01	<0.01
IGF-1, ng/mL	177.4	116.5	10.5	<0.01	0.02	<0.01
Glucose, mmol/L	4.3	4.2	0.07	0.04	<0.01	0.05
Albumin, mmol/L	30.0	28.6	0.6	0.01	<0.01	ns
NEFA, mmol/L	0.30	0.35	0.04	0.04	<0.01	<0.01

Key Words: social regrouping, heifer

289 Impact of a dietary citrus extract on the rumination behavior of cows following social regrouping. F. H. Padua*[1], R. Bergeron[1], G. Desrousseaux[2], J.-F. Gabarrou[2], and T. J. DeVries[1], [1]*Department of Animal Biosciences*, *Guelph, ON, Canada*, [2]*Phodé*, *Terssac, France*.

The objective of this study was to determine if feeding a citrus extract (CE; derived from *Citrus sinensis*) reduces the negative impact of social regrouping of lactating dairy cows. It was hypothesized that cows supplemented with CE would demonstrate a quicker stabilization of their rumination behavior after being moved into a new group of cows. Thirty-two multiparous (parity = 2.1 ± 0.1) mid-lactation Holstein dairy cows (169.8 ± 1.1 DIM) were enrolled as focal cows in this study and housed individually a tie-stall facility where they were assigned to 1 of 2 treatment diets: 1) control TMR (control; n = 16), or 2) control TMR with 4 g/d of citrus extract (VeO; Phodé, Terssac, France) (CE; n = 16). Cows were fed their experimental diets for 7 d in the tie-stall facility (P1), then moved to 1 of 2 experimental freestall pens (containing 29 other cows) for a period of 7 d (P2), where they remained on the same treatment diet as provided in the tie-stall facility. This process repeated until all 16 cows/treatment were introduced to the group pens. Data were analyzed using repeated measures mixed-linear regression models to test whether rumination varied in P2 within cow, by day, from their P1 average. In P1, CE cows consumed 27.2 ± 0.4 kg/d of DM and ruminated for 490 ± 9 min/d, while control cows consumed 27.7 ± 0.4 kg/d of DM and ruminated for 505 ± 9 min/d. In P2, CE cows ruminated 537 ± 6 min/d, while control cows ruminated 519 ± 6 min/d. For control cows, rumination time did not change after regrouping ($P > 0.05$), while for CE cows, rumination time increased after d 2 ($P < 0.04$). A tendency for a difference in change in rumination time ($P = 0.09$) was identified on d 2 after regrouping, whereas control cows were reduced by 6.3 ± 21.3 min/d from their P1 average, while CE cows were

increased by 46.3 ± 22.0 min/d from their P1 average. The results indicate that feeding a citrus extract additive to mid-lactation dairy cows may promote a quicker stabilization of rumination behavior after regrouping.

Key Words: citrus extract, social regrouping, behavior

290 Validation of an infrared camera for measuring ocular temperatures of veal calves. H. Goetz*[1], D. Kelton[1], J. Costa[2], C. Winder[1], and D. Renaud[1], [1]*Department of Population Medicine, University of Guelph*, *Guelph, ON, Canada*, [2]*Department of Animal and Food Sciences, University of Kentucky*, *Lexington, KY*.

Temperature measurement is a key part of the clinical exam process, however, the standard method to monitor temperature using rectal temperatures is subject to errors and can be laborious and disruptive to animal behavior. Use of infrared thermography (IRT) is a plausible alternative to rectal temperatures for providing a non-invasive method to assess calf health. The objective of this prospective cohort study was to validate IRT for measuring core body temperatures. A total of 320 calves were enrolled upon arrival at a veal facility in southwestern Ontario, Canada. Calves were followed for 14 d between May and August 2019. Researchers visited the farm daily to measure ocular infrared (IR) temperature and rectal temperature (RT), as well as evaluate navel, attitude, fecal, and respiratory scores. The IR camera was placed at a distance of 12 inches away from the calf's eye to ensure consistent measurement. Treatment and mortality records were also collected throughout the 78 d the calves were at this facility. The mean difference in IR temperature and RT was 0.30°C ± 1.50. Youden's Index was used to determine the optimal cutpoint which would maximize the sensitivity and specificity of the IR camera for detecting a fever when compared with a RT of ≥39.5°C. The optimal cutpoint for the infrared camera to detect a fever, defined as a RT of ≥39.5°C, was 39.45°C, and the sensitivity and specificity of detecting a fever using IRT at this point were 60% (95% Confidence Interval (CI): 53, 67) and 71% (95% CI: 70, 73), respectively. The area under the receiver operating characteristic (ROC) curve at this point was 0.66 (95% CI: 0.62, 0.69). A random number generator was used to select a day between 1 and 14, and a simple linear regression model was built to assess the ability of the IR camera to predict RT on d 10. The R squared of this model was 0.0122, suggesting that IR temperature alone was poorly correlated with RT. Further analysis is being conducted to explore external variables which influence accuracy of the IR camera and to evaluate the predictive ability of IRT in assessing calf health.

Key Words: male dairy calf, morbidity

291 Effect of two stable fly control methods on dairy cattle bunching behavior on a California dairy. E. Abdelfattah*[1], J. Tonooka[1], D. Williams[1], W. El Ashmawy[1], A. Gerry[2], H. Rossow[1,3], T. Lehenbauer[1,3], and S. Aly[1,3], [1]*Veterinary Medicine Teaching and Research Center, School of Veterinary Medicine, University of California-Davis*, *Tulare, CA*, [2]*Department of Entomology, University of California*, *Riverside, CA*, [3]*Department of Population Health and Reproduction, School of Veterinary Medicine, University of California*, *Davis, CA*.

The stable fly (*Stomoxys calcitrans*) is blood-feeding fly that targets the lower limbs and abdomen of cattle leading animals aggregating into groups, a protective behavior known as bunching. The objective of this crossover study was to evaluate the effectiveness of 2 stable fly control methods on reducing the incidence of bunching and stable fly counts on the front legs of cows. The study was conducted on 3 pens, of approximately 150 lactating cows each, at a single dairy over 3 replicated phases. Pens were assigned to the following treatments: 1) KattleGuard fly spray system (KG) which dispenses a solution of 1% permethrin and 1% piperonyl butoxide over the back and legs of cows as they exit the milking parlor, 2) trigger fabrics impregnated with 0.1% lambda-cyhalothrin (TF) hung along the feedbunk of the pen, or 3) a no treatment control (CON). The treatment period lasted for 10 d, followed by a 4-d washout period before the treatments were rotated among the same 3 pens. Stable fly counts on cow legs and cattle bunching in the pens were recorded twice per day (9–11 and 12–2). Bunching was recorded daily at the pen level and stable fly counts were recorded on 15 cows from each pen by 2 trained personnel. The log-transformed mean number of flies on the legs of 15 cows from each pen was calculated and analyzed with pen and period as crossed random effects in a linear mixed model. Bunching was analyzed using mixed-effects logistic regression. Cows treated with KG had significantly reduced odds of bunching during the afternoon (OR = 0.002; $P = 0.001$) in comparison to CON pens. Similarly, TF reduced the odds of bunching during the afternoon times (OR = 0.04; $P = 0.01$) in comparison to CON. During afternoons, cows treated with KG had ($P = 0.03$) lower stable fly counts on their legs (0.67 ± 0.21 flies/legs) in comparison to untreated group of cows (1.11 ± 0.20 flies/legs); however, the fly count on legs in TF pens (1.00 ± 0.30 flies/legs) was not different from CON ($P = 0.67$). The current study showed that the fly spray system significantly reduced bunching and stable fly biting during the afternoon on a dairy in Tulare County.

Key Words: fly spray, treated fabrics, stable fly

292 Daily milk losses associated with bunching, dairy cattle's protective behavior against stable flies (*Stomoxys calcitrans*), on a California dairy. W. R. ElAshmawy*[1,2], D. R. Williams[1], A. C. Gerry[3], and S. S. Aly[1,4], [1]*Veterinary Medicine Teaching and Research Center, School of Veterinary Medicine, University of California-Davis*, *Tulare, CA*, [2]*Department of Internal Medicine and Infectious Diseases, Faculty of Veterinary Medicine, Cairo University*, *Giza, Egypt*, [3]*Department of Entomology, University of California Riverside*, *Riverside, CA*, [4]*Department of Population Health and Reproduction, School of Veterinary Medicine, University of California-Davis*, *Davis, CA*.

Bunching is the behavioral phenomenon of cattle aggregating in tight groups to protect them from biting by stable flies (*Stomoxys calcitrans*). The incidence of bunching varies between dairies and pens within the same dairy as it is associated with the intensity of stable flies on the dairy, management and environmental factors. In addition, bunching may be associated with heat stress experienced by cattle aggregation, as well as a decrease in feeding and laying times. Thus, bunching may affect dairy cows' milk production mediated through a reduction in dry matter intake and rumination times. However, there are no previous studies on the effect of bunching on milk production in lactating dairy cows. The objective of our study was to estimate the impact of cow bunching on milk production on a commercial dairy. A longitudinal study was conducted between April 26th, 2017 and July 31st, 2017 on a large Holstein herd housed in freestall pens in Tulare, California. The study dairy used the KattleGuard fly spray system (Dairy Solutions Inc., Tulare, CA) as a fly control program. Pen level cow bunching was recorded weekly on 4 lactating cow pens for 13 weeks. Bunching observations were matched to daily milk records from the study's 2 high production pens (558 cows) and 2 low production pens (591 cows) by day of observation. Two-piece spline linear mixed models were used to estimate the association between cow bunching and milk production. On average, bunching was associated with a decrease in daily milk production of 2.72 kg ± 0.486 per cow ($P < 0.01$). In addition, cows in high producing pens had 2.68 kg ± 0.302 more daily milk production compared with cows in low producing pens. Additionally, the model showed that, compared with first lactation cows, there was a significant increase in milk production in second lactation cows (8.92 kg ± 0.564) and third or greater lactation cows (10.71 ± 0.564 kg). Bunching due to stable flies can negatively affect dairy cattle welfare and productivity.

Key Words: bunching, daily milk, stable flies