309P The ability of White Leghorns with trimmed comb and wattles to thermoregulate before, during, and after a heat episode. Patricia Hester*1, 1Purdue University, West Lafayette, IN, 2Jerash Private University, Jerash, Jordan, 3USDA-Agricultural Research Service, West Lafayette, IN.

Egg-laying strains of pullets frequently have their combs partially trimmed at a young age to improve production traits. Dubbing, as trimming of the comb is often referred to, may impair the ability of hens to thermoregulate. During hot weather, conductive cooling of the blood through vasodilation of superficial vessels of the comb facilitates heat exchange. The objective of this study was to examine the effects of partial comb and wattles removal on the ability of White Leghorn hens to thermoregulate before, during, and after heat stress. Pullets were either subjected to a partial trim of the comb and wattles using surgical scissors at 21 d of age or served as intact controls. When hens were 189 to 191 d old or 27 wk of age, they were subjected to an environmental temperature that averaged 34.6°C for 50.5 h. Rectal temperatures and thermal images (FLIR Systems, Inc., Nashua, NH, model number FLIR-T62101) of the wattle, comb, beak, left eye, and the left tarsometatarsus were collected before, during, and after the heat stress. Using a randomized design, data were subjected to an ANOVA employing the MIXED model procedure of the SAS. Correlation analysis was performed on rectal temperatures and temperatures recordings on body parts using infrared thermography. The rectal temperature of trimmed hens was reduced before, during, and following heat stress as indicated by an increase in rectal temperature at 48 h into the heating episode.

Key Words: comb trim, wattle trim, heat stress

311P Effect of perch material on perch use, hen welfare and egg production. MaryGrace Erickson*, 1Texas A&M University, College Station, TX, 2Purdue University, West Lafayette, IN.

Perch access promotes the performance of natural roosting behavior and bone strength. But it has also been linked to footpad damage, the incidence of which is affected by perch material and design. We evaluated whether cork and AstroTurf, perch materials commonly used in raptor environments, are suitable perching materials for laying hens. Four 16-wk-old White Leghorn pullets were placed in each of 40 cages. Eight cage replicates were assigned to each of 5 treatments: no perch, softwood perch (W; 3.2 cm diameter), metal perch (M; 3.2 cm diameter), and metal perch covered with AstroTurf (AT; 5.6 cm diameter) or cork (CO; 3.4 cm total diameter). Data were collected through 41 wk of age. The proportion of hens perching was evaluated within a month at 1000, 1400, and 2200 h and averaged by day and cage. Feather and footpad condition, and BW were assessed on 2 birds per cage. Egg production was averaged over 5 d per month, and the mass and shell quality of 2 eggs per cage were evaluated. Perch use, BW, egg production, and shell quality data were analyzed using the GLIMMIX procedure in SAS with observation week and cage within treatment included as random variables. Consistently, higher proportion of hens perched on AT perches (74% overall average; all P < 0.0001) than on CO (65%), M (58%) or W (63%) perches. More hens perched on CO than M (P = 0.0006). The BW and average production were consistent across treatment groups (all P > 0.05). Feather cover and footpads were in excellent condition for all hens. No consistent differences between treatments in egg weight or shell quality across weeks were found (all P > 0.05). In conclusion, AT perches were utilized more than other perch types and had no negative impacts on feather or footpad condition or egg production or shell quality. AT perches differed from others in overall circumference, grip, and texture. Additional research is needed to evaluate which one or combination of these properties influences perch use.

Key Words: laying hen, perch material, AstroTurf, shell quality, footpad condition

312P An individually fitted physical barrier device as a tool to restrict the birds’ access to certain environmental areas: Can their...
use alter behavioral responses? Stefy Pellegrini¹, Raul H. Marin*¹,  and Diego A. Guzman¹², ¹Instituto de Investigaciones Biológicas y Tecnológicas (CONICET-UNC), Córdoba, Argentina, Instituto de Ciencia y Tecnología de los Alimentos, Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, Córdoba, Argentina, ²Department of Animal Science, Aarhus University, AU-Foulum, Tjele, Denmark.

Social interactions have been extensively studied in poultry in a variety of environmental situations. Many studies allowed full social contacts between birds, but there are others in which the interactions are tested through barriers (wire mesh or glass), precluding birds to get full social contact. Thus, a situation where, according to their needs, some birds can get access to physical contact with conspecifics while others cannot, would be useful to expand the testing options for social interaction studies. We developed an individual physical barrier device (IPB) that is fitted on the birds to prevent them from passing across boundaries of metal mesh while IPB free birds can easily pass (delimiting their ambulation areas). The prototypes showing greater efficacy consisted of a small metal bar placed in the bird’s back perpendicular to the sagittal plane that slightly exceeds the body width, held by a harness fitted by 2 elastic fabric bands around the wings’ base. To be useful, the IPB should allow natural birds’ movements without affecting the expressions of behaviors (non-invasive). Thus, the aim of this study was to assess whether the IPB may alter adult Japanese quail behavioral responses using 4 classical but different test situations: Open-Field, Runway, Time Budget in Home Cage, and Sexual Interactions. Open-field ambulatory behavior was affected 1 h but not 7 d after IPB was fitted, suggesting that 7 d (or less) are required to habituate to the device. After that period, IPB fitted birds showed no differences in any of the behaviors registered in the other 3 test situations when compared with birds that do not carry it. Findings suggest that after a brief habituation, the IPB does not affect main behaviors in adult quail. Thus, their use would be adequate to assess social interactions where IPB fitted birds are confined to certain areas while their IPB free counterparts can freely ambulate, get access and potentially interact with them. Its application could be expanded if an IPB device is also found suitable for other poultry species.

Key Words: social interaction, quail, behavioral test

313P  Divergent cloacal gland responses to short days in Japanese quail and short-term related consequences on social behavior and reproduction. Maria F. Dominchin, Juan M. Busso, Diego A. Guzman, Jackelyn M. Kembro, and Raul H. Marin* ¹Instituto de Investigaciones Biológicas y Tecnológicas (CONICET-UNC) and Instituto de Ciencia y Tecnología de los Alimentos, Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, Córdoba, Argentina.

Exposure to short day photoperiod (SD) in Japanese quail reduced gonadal development, and consequently, their cloacal gland (CG) size, reproductive capacity and aggressive behaviors. Interestingly, not all quail fully responded to SD inhibition with some birds even showing no CG response. In a previous work, quail in SD were arbitrarily classified by their divergent CG development as either responsive (R) or non-responsive (NR), with NR males showing on average intermediate CG and testosterone values between R and long day photoperiod reared males (LD). Herein we evaluated whether R and NR males differ in social interactions and reproductive potential while under SD. LD males were used as controls with full reproductive capacity. ANOVA, χ² observed vs. expected, and proportion tests were used to detect differences at P < 0.05. First, during peak photoinhibition (5 wk after SP exposure) we assessed male-male aggressive interactions determining winners and losers. Individually-caged R, NR and LD residents received 5-min LD male intruder visits along 4 consecutive days. Next wk, same males received 10-min visits from a LD female partner along 3 d to determine whether those males could fertilize them. Male interactions showed that LD, NR and R residents respectively won 100, 64, and 0% of the fights and were able to fecundate 100, 100 and 17% of the females. Then, male-female encounters were again repeated 4 wk later to assess whether previous social interactions could modulate later reproductive performances during an initial photorefractive stage. Naive R, NR, and LD male residents were used as controls. Mounts, CG contacts, and fertility showed an R < NR = LD pattern. Copulatory efficiency (CE) was found higher in NR compared with R and LP quail. No effects of previous social interactions were detected. Findings suggest that while on SD, NR males are able to breed similarly to their LD counterparts regardless of the outcome of a previous social interaction. Potential differences in the expression of aggression between NR and LD males may underlie the observed differences in CE.

Key Words: photoperiod, social behavior, reproduction

314P  Coherent and synchronized ultradian rhythms in the locomotor activity of visually isolated adult female Japanese quail. Diego A. Guzman¹², Ana G. Flesea¹, Miguel A. Aon¹, Stefania Pellegrini¹, Raul H. Marin*¹, and Jackelyn M. Kembro¹, ²Instituto de Investigaciones Biológicas y Tecnológicas (IByT-CONICET), and Instituto de Ciencia y Tecnología de los Alimentos, Catedra de Química Biológica, Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, Córdoba, Argentina, ¹Department of Animal Science, Aarhus University, AU-Foulum, Tjele, Denmark, ²Centro de Investigaciones y Estudios de Matemática (CIEM-CONICET), and Facultad de Matemática, Astronomía y Física (FAMAF), Universidad Nacional de Córdoba, Córdoba, Argentina, ³Division of Cardiology, Johns Hopkins University School of Medicine, Baltimore, MD.

Quail coveys are characterized by successive cycles of active phases (moving, foraging, observing) alternating with rest phases (resting, preening), presenting ultradian (<24h) rhythms. The temporal organization activity of groups of poultry chicks not only has been shown to present both circadian (24 h) and ultradian rhythms with periods <80 min, but also synchronization of activity among chicks within the group. However, individual adult Japanese quail seem to exhibit greater inter-individual variability in ultradian compared with circadian behavioral rhythms, which could be in part due to methodological limitations, given that ultradian rhythms can be difficult to detect in behavioral time series at an individual level. This study focuses on whether synchronized ultradian rhythms can occur along several days when adult individuals are visually isolated. Herein, we study high resolution locomotor time series of 24 Japanese quails sampled every 0.5s in a home-cage environment during 6.5 d. Applying an array of methods, including autograms, power spectra, autocorrelation, Enright’s periodogram, and wavelet analyses, we show that circadian as well as ultradian rhythms with periods of a fraction of the circadian cycle (12, 8, 6, 4.8, 4, 3.2, 2 h and lower) were found in all locomotor time series analyzed. In addition, these ultradian rhythms were fully organized in a coherent and synchronous way in all birds studied even though they were visually isolated from conspecifics. To our knowledge, this is the first time that long ultradian rhythms (>2h) are shown to be also present in poultry behavior, and that physical and visual contact between birds is not necessary for rhythm synchronization. Hence, our results support the contention that ultradian rhythms could be generated by an endogenous oscillator. Improving our knowledge on ultradian rhythms and for example whether a particular behavior is more probable to occur at a given time interval than another can have applied relevance for improving management practices.

Key Words: poultry, ultradian rhythm, circadian rhythm, locomotion, behavior