offering a free choice between sainfoin pellets with high (T+; 4%) or low (T–; 2%) concentration of condensed tannins during three periods of 4 d each: Initial (Test 1), after the group PG developed an infection (Test 2), and after conditioning, when all animals consumed just T+ for 21 d so that parasitized animals experienced the benefits of therapeutic doses of condensed tannins (Test 3). Preference ([intake of T+ or T–] × 100/[total intake]) and fecal egg counts (FEC) were analyzed as a repeated measures design with animals nested within group. The group PG showed a clear increase in FEC after infection (from 0 to 3512 ± 446.34 eggs per gram; $P < 0.05$), but no further increase was observed after animals received T+ during conditioning (3145 ± 401.44 eggs per gram; $P > 0.05$). During Tests 1 and 2 animals preferred T- (Test 1: PG = $71.0 \pm 3.9\%$; NP = $71.2 \pm 4.3\%$; Test 2: PG = $73.9 \pm 2.8\%$ NP = $74.7 \pm 2.7\%$; $P < 0.05$). However, preference reversed after conditioning (Test 3): Both groups, PG and NP, preferred T+ (PG = $61.0 \pm 3.9\%$; NP = $62.6 \pm 3.4\%$; $P < 0.05$). These results stand in contrast with previous studies using other types of antiparasitic condensed tannins (e.g., tannins extracted from the quebracho tree) with antinutritional properties. In such studies, only parasitized animals increase preference for a quebracho tannin-containing food relative to nonparasitized individuals. When condensed tannins do not exert negative postingestive effects on consumers, or even provide postingestive benefits (i.e., improved nitrogen utilization) like those observed in sainfoin, both parasitized and nonparasitized animals may display similar levels of acceptability to the tannin-rich feed. These results are consistent with a feed-forward mechanism in which endoparasitic loads are controlled by the frequent ingestion of safe bioactive-containing feeds which are typically preferred by consumers.

Key Words: diet selection, foraging, *Haemonchous contortus*

0094 Mitigation of variability in feeding patterns between competitively-fed dairy cows through increased feed delivery frequency.

ANIMAL BEHAVIOR AND WELL-BEING SYMPOSIUM: METRICS FOR ON-FARM ANIMAL WELFARE ASSESSMENT—CURRENT STATE AND FUTURE NEEDS

0095 Poultry welfare assessments: Where do we go from here. R. Blatchford*, *University of California, Davis*.

Recent attention has been given to developing welfare assessment tools for research purposes and for use directly on poultry farms. Historically, most of these tools have relied on resource- and management-based measures, but it is unclear how well they correlate with outcomes indicative of positive animal welfare. The subjective nature of many of these tools also makes it difficult to generalize across studies and farms without extensive training. More recently, the European Union Welfare Quality® project set out to design assessment tools that were scientifically based and combined resource- and management-based measures with animal-based measures. Adding these measures was especially important for farm-level comparisons where farms may be utilizing different housing systems with inherent differences affecting the utility of resource- and management-based measures. The Welfare Quality® Assessment protocol for poultry offers researchers a tool that has been validated, tested for repeatability, and standardized across farms. This tool has been used in the United States and Canada both at the experimental and farm levels. However, assessment tools were only developed for layer-type hens and broiler chickens. There is a vast need for the development of assessment tools for other poultry species such as ducks, turkeys, quail, and game birds. Tools are continuing to be developed, but many have measures that need validation and benchmarking and creating tools that can be used by producers without needing training to use successfully is important on a go-forward basis. Tools must be designed for North American commercial production with a better understanding of the appropriate sample size, as well as their utility for use in alternative and extensive housing systems. These tools show promise in helping to understand the influence of genetics, housing design, and management factors on the welfare of poultry.

Key Words: assessment tools, poultry, welfare

0096 Metrics for beef cattle welfare. D. Griffin*, *Great Plains Veterinary Educational Center, Clay Center, NE*.

The "Five Freedoms" of livestock is an important concept in the stewardship of beef cattle. These are the backdrop for evaluating the beef cattle welfare husbandry guidelines. The beef cattle care, husbandry, and welfare guidelines for cow-calf, pastured stocker cattle and feeder cattle developed by the National Cattlemen's Beef Association (NCBA) are reviewed. The Canadian and Australian feeder cattle care and welfare guidelines will also be reviewed and compared with the NCBA guidelines. A U.S. packer currently has developed and implemented a Feedlot Cattle Audit. Their audit will be reviewed and the unique items not included on other beef cattle welfare assessments will be discussed. Important differences between site assessments and site audits are listed, and the utility of each approach to improving beef cattle care and husbandry. The major areas included are development of SOPs for; safety of employees and cattle, employee training, living space design and management, feeding and feed stuff selection management (including water), cattle handling, heath

management and pain mitigation, medication management including withdrawal times, timely attention to individual cattle needs such as injury and euthanasia, and transportation.

Key Words: beef, husbandry, welfare, management

0097   Optimizing outcome measures of welfare in dairy cattle assessment. E. Vasseur*, *McGill University, Ste-Anne-de-Bellevue, QC, Canada.*

In most countries producing milk, industry-, government- and/or other stakeholder-driven initiatives are in place to improve welfare and dairy farming sustainability, for example, by enhancing profitability and reducing environmental impact. Those initiatives typically include a system of verification of reaching targets and tracking progress over time. Reliable indicators of welfare are required to provide public assurance and allow improvement on farms. Assessing dairy cattle welfare through outcome measures is done today through visual evaluations, including lameness, injuries, hygiene, and body condition. Numerical scoring charts have been validated, together with the development of training programs, to achieve high repeatability of assessors. Sampling strategies have been validated to determine how many animals and how many days are required to obtain reliable estimates of prevalence. However, visual evaluations require a long period of data collection and multiple visits to farms, along with follow-up checks of assessors to maintain repeatability over time, and in turn, are costly to implement. An attractive alternative is relying on automated measures collected from activity monitors that are becoming common on commercial farms; among those, lying time has gotten the most attention. The use of herd lying time in both free-stall and tie-stall situations has been validated. Current research is looking at relationships between lying time and other outcome measures of welfare, as well as lying time and risk factors for welfare in the environment (e.g., poor stall configuration or hoof trimming routine). We are not yet ready to rely solely on lying time to assess welfare; however, activity monitoring could certainly contribute to early detection of health and welfare issues (e.g., frequency of visits to the robotic milking system or feeders). Another interesting avenue is the development of early outcome measures of welfare and, possibly, remote indicators; for example, performance data (milk production, reproductive success, longevity) collected routinely in DHI databases. The rationale being that a herd with good health and high longevity should be at lower risk of poor welfare. Research is needed to identify predictors and their conditions of use, allowing to discriminate good vs. poor welfare status, both at the individual and herd level. Finally, milk samples are already collected in routine to check quality and safety. It would be extremely convenient to be able to predict cow welfare status directly in the milk using biomarkers; but again, we are not there yet.

Key Words: dairy cattle, welfare, outcome measure

0098   The Common Swine Industry Audit: Future steps to assure positive on-farm animal welfare utilizing validated, repeatable, and feasible animal-based measures. M. Pairis-Garcia[1] and C. J. Rademacher*[2], *[1]The Ohio State University, Columbus, [2]Swine Medicine Education Center, Department of Vet Diagnostic & Production Animal Medicine, Ames, IA.*

The Common Swine Industry Audit (CSIA) was developed in collaboration with pork producers, packers and processors to provide stakeholders with a consistent, reliable and verifiable system to assure on-farm swine welfare and food safety. This audit tool was built from the framework of Pork Quality Assurance®Plus program to develop a single, common audit platform for the U.S. Pork industry. The audit can be broken down into 27 key aspects that cover swine care, husbandry, and pre-harvest food safety. Of these key areas, animal based measures represent approximately 50% of the total points achievable for the audit and encompass all critical criteria including willful acts of abuse and timely euthanasia. As this tool is designed to provide an objective, science-based platform to facilitate continuous improvement in animal care, the use of validated, repeatable, and feasible animal-based measures is critical. Recognizing this, the CSIA task force and researchers within this field are focusing on the future needs and expectations of the audit by evaluating three questions. (1) How do we determine thresholds for animal based measures? Within the CSIA, each animal based measured has a threshold for what is considered acceptable or unacceptable. For example, farms will receive 10 points if 1% or less of the pigs observed have a body condition score of 1 or 0 points if prevalence is $\geq 2\%$. Although thresholds provide a more objective manner to validate welfare on farm, these thresholds may often be arbitrary and based more on experience than science. (2) How do we identify, interpret and provide value to animal based measures assessed in the audit? For any assessment and audit, the data we collect must directly relate back to the welfare status of the pigs on the farm. Identifying animal-based measures that cover a broad range of potential welfare problems to provide direct interpretation and value of individual pig welfare is critical. (3) What do these values mean to the U.S. swine industry as a whole? As the goal of the audit it to provide useful feedback for continuous improvement on farm, we must as an industry be committed to utilizing the information attained through on-farm audits to develop the educational tools, resources and support to advance on-farm swine welfare.

Key Words: audit, swine, welfare