

higher glycogen content and more drip loss. This presentation will focus on the effects of environmental enrichment on technological and sensorial aspects of pork quality. The effects of barren (common intensive conditions with slatted floors, 0.7 m²/animal, and 10 pigs/pen) vs. enriched (straw for manipulation and 1.0 m²/pig) were studied. Salivary cortisol concentrations were measured before transport and at the end of the lairage period. At 5 min, 45 min, 4 h, and 24 h postmortem pH, temperature and lactate concentrations were determined in the longissimus lumborum (LL) and biceps femoris (BF) muscles. Capillarisation of the muscle, mean muscle fiber area, color and drip loss after 2 and 5 d storage were determined for both muscle types. Postmortem lactate formation was significantly lower in LL muscles of enriched pigs at 4 and 24 h postmortem. Capillary density and mean muscle fiber area did not differ between both groups of pigs. The percentage drip loss at 2 and 5 d after storage of LL muscle samples from enriched housed pigs was significantly lower than those of the barren housed pigs. Similar results were shown in a recent comparison of meat quality between intensively and free-ranged pigs. It can be concluded that on-farm improvement of animal welfare by environmental enrichment can also lead to beneficial economic effects after slaughter.

Key Words: Housing System, Pork Quality, Welfare

4 A Comparison of Production Costs, Returns and Profitability for Pork Finishing System. J. Kliebenstein* and B. Larson, Iowa State University.

A main focus of this presentation will be identifying the economic factors which impact the profitability of the alternative pork production systems. There are many varied types of facilities used in pork production. They range from totally confined environmentally controlled systems to outdoor pasture systems. Moreover, there is a wide range of systems between these two. Examples would include partial confinement and hoop facilities. There are tradeoffs between systems. Totally confined systems are capital intensive but typically have better feed efficiency. Costs referred to as fixed costs such as depreciation, interest, etc. are higher while operating costs or variable costs are lower. Pasture type systems have lower capital requirements but factors such as feed efficiency are typically are not as good. This system has lower fixed costs and higher operating (variable) costs. This paper will provide an economic analysis of alternative pork production systems. It will identify economic factors that differ between systems. These differences can lead to different production decisions respective for pork production system under similar economic conditions.

Key Words: Production Costs, Return, Profitability

5 Effect of thermal and hormonal manipulation of developing chick embryos on post-hatch behavior and physiology. M.J. Toscano*¹, D.C. Lay, Jr.¹, K.A. Scott¹, H.K. Smith¹, and M.E. Wilson², ¹USDA-ARS-Livestock Behavior Research Unit, West Lafayette, IN, ²West Virginia University, Morgantown, WV.

Stressors applied to pregnant mammals can affect the behavior and physiology of resulting offspring. However, specific mechanisms are difficult to determine due to confounding maternal variables. Developing chick embryos may provide an effective model in studying prenatal stress due their external development. Fertile eggs underwent one of 2 treatments: exposure to an elevated temperature in a 40.6°C incubator on d 14, 17 and 19 of development for 24 h (HEAT, n = 176) or application of 60 ng corticosterone to the embryo on d 14, 16, 18 and 20 of development (CORT, n = 176). A third group served as a control and received no treatment (CONT, n = 125). All birds were weighed on d 1, 3, 5, 7, 15, and 29. At 7 wk of age, birds underwent Tonic Immobility (TI, N = 58) and/or Open Field (OF, N = 42) tests. The OF was conducted in a pen measuring 3.7 x 2.4 m. Individual birds were placed in the pen for 15 min, after which a novel object was placed in the pen's center and a further 15 min of observations were conducted. Area traversed, time spent in outer, inner and corner areas, flapping of wings, and flying at the front of the pen were quantified. At 11 weeks of age, all birds were sacrificed and adrenal glands were collected and weighed. At hatch, CORT and CONT birds weighed more than HEAT (p = 0.001). CORT chicks were heavier than HEAT for the duration of the study (p = 0.04), while CONT birds weighed more than HEAT through week 4 (p < 0.05). No differences in duration of TI or the OF parameters were found among treatments (p > 0.10). Right adrenal glands of CORT birds weighed more than CONT (p < 0.05) but not HEAT birds (p = 0.08). Though

behavior was not affected by treatment, the differences in body weight and adrenal gland weight indicate that prenatal stress affects the physiology of chicks. Paralleling related research in other species, the CORT treatment effectively altered the HPA axis suggesting the utility of this model for future research in the area of prenatal stress. Determining the effects of prenatal stress on behavior, if any, require more investigation.

Key Words: Prenatal Stress, Behavior, Poultry

6 Effects of weaning age on post-weaning belly nosing behavior and umbilical lesions in pigs. R.G. Main*, S.S. Dritz, R.D. Goodband, M.D. Tokach, and J.L. Nelsens, Kansas State University, Manhattan.

Our objective was to determine the effect of weaning age on post-weaning belly nosing behavior and associated umbilical lesions. Treatments included weaning litters of pigs from a 7,300-head sow farm at 12, 15, 18, and 21 days of lactation. Sixty-four nursery pens (16 pens per age group, 2,272 total pigs) were used in a randomized complete block design, with off-site nursery as the blocking factor. This study was completed in four blocks (4 pens/age group/block), and all pigs within each block were weaned on a single day into the same nursery. Each pig was individually identified and weighed prior to weaning. Using the individual pig weight and gender information, each nursery pen was allotted with an even number of barrows and gilts, and was representative of the normal weight distribution of pigs weaned within each age group. Each nursery pen was observed for 15 minutes on day 7, 14, and 21 after weaning, and the number of pigs demonstrating belly nosing behavior was recorded. The umbilical region of each pig was examined on day 21 post-weaning following the observation period. Umbilical regions were scored as per the amount of inflammation, swelling, and physical deformity observed (normal = 0, moderate lesion = 5, severe lesion = 15). The proportion of pigs exhibiting belly nosing behavior (21.3, 10.9, 8.9, 5.7 ± 1.2 %) and umbilical lesion scores (3.80, 2.02, 1.79, 1.75 ± 0.80) were reduced (quadratic, P < 0.01) as weaning age increased (12, 15, 18, or 21 days, respectively). Although numeric reductions in both belly nosing prevalence and umbilical lesion scores continued up through the 21 d old weaned pigs, the most pronounced decrease in prevalence and lesion scores occurred as weaning age increased from 12 to 15 d. This study indicates that weaning pigs less than 15 d of age was associated with increased belly nosing behavior and resulting umbilical lesions. Therefore, weaning age is an important factor to consider when investigating increased rates of belly nosing behavior or umbilical lesions.

Key Words: Weaning Age, Belly Nosing, Umbilical Lesions

7 Behaviors in stalled pregnant females and reproductive performance on a commercial swine farm. T. Sekiguchi* and Y. Koketsu, Meiji University.

Our objectives in this study were to observe behaviors in stalled females and to investigate associations between those behaviors and reproductive performances. A commercial farrowing-to-finish farm using a computerized recording system with approximately 300 female inventories was recruited. We visited the farm three times to observe three postural behaviors (lying, standing and sitting) and three stereotypies (vacuum chewing, drinker playing and bar-biting) of stalled females at 5 min intervals for 6 hours (one-zero sampling). Relative frequency of the postural behaviors and the stereotypies for 6 hours were calculated as observed frequency of each behavior divided by the 25 -time observations. Females were categorized into two or three groups by relative frequency of each behavior, because frequency distributions of these behaviors were not normally distributed. Statistical models for reproductive performance included each categorized behavior group, parity and visited month. Visited month was used as a random variable in the Mixed procedure of SAS. In 609 observed females, means in relative frequency of lying, standing, sitting, vacuum chewing, drinker playing and bar-biting for 6 hours were 60.1 ± 0.91, 32.3 ± 0.87, 7.6 ± 0.44, 12.7 ± 0.65, 0.4 ± 0.06 and 0.2 ± 0.05, respectively. Subsequent reproductive performance was extracted by a recording system. In 507 farrowed females, means of total pigs born, pigs born alive, pigs born dead, birth litter weight and adjusted 21days weight were 12.3 ± 0.13, 11.2 ± 0.12, 1.1 ± 0.06, 6.0 ± 0.19 kg and 17.1 ± 0.18 kg, respectively. Females showing no-vacuum chewing during gestation produced greater total pigs born (12.5 ± 0.25 vs. 11.5 ± 0.36) than those showing high relative frequency (##36%) of vacuum chewing (P<0.05). However,