723 Characterization of the VIP response element (VRE) in turkey prolactin promoter. S.W. Kang*[1], S. You[2], E.A. Wong[3], T. Bakken[1], and M.E. El Halawani[1], [1]*Dept. of Animal Science, Univ. of Minnesota,* [2]*Dept. of Animal Scinece and Technology, Seoul National University,* [3]*Virginia Polytechnic Institute and State University.*

We showed previously that vasoactive intestinal peptide (VIP) increases prolactin (PRL) gene expression and secretion in turkey primary pituitary cells. We have now used 5'- flanking deletions and mutations of the turkey PRL promoter fused to the luciferase (Luc) reporter gene in transient transfection assays to further characterize sequences involved in stimulation of PRL gene expression by VIP. Promoter activities were determined by quantitative RT-PCR of Luc mRNA. The deletion analysis of turkey PRL promoter (tPRLP) indicated that the VIP-stimulated tPRLP activity was controlled by three major positive regulatory regions and two negative regions. From the -127 to -14 Luc construct, where the 7-8 fold increase of promoter activity by VIP occured, we did deletion assay with -92/-14 and -60/-14 Luc constructs for investigating the minimal VRE of the promoter. The 35-base pair (bp) segment (position -127 to -93) deletion induced complete suppression of VIP-stimulated promoter activity, suggesting that the nucleotides between position -127 and -93 in the tPRL promoter are essential for the VIP-stimulated promoter activity. A putative Pit-1 binding site was found in the middle of the 35-bp segment and the significance of this element (12 bp) was tested by Decoy assay, deletion, and mutation analysis. The result of the present study demonstrated that VRE (12bp) in the proximal prolactin promoter is an important cis-element for the VIP-stimulated PRL gene expression in turkey primary pituitary cells.
USDA grant No. 00-02127 Key Words: Prolactin Promoter, Turkey VIP, Pituitary

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724 Met-enkephalin directly regulates the GnRH-I system in Japanese quail. MA Ottinger*[1], N Thompson[1], and P Micevych[2], [1]*University of Maryland,* [2]*UCLA Center of Health Sciences.*

Studies in our laboratory have shown that met-enkepalin (ENK) is a powerful regulator of the GnRH-I system. We have demonstrated a dose dependent, ENK -inhibition of GnRH-I release in vitro (Chen and Ottinger, 1999; Poult Sci abstr. #293). Other studies have suggested that ENK-inhibition of GnRH-I release may be directly on GnRH neurons and indirectly, through interneurons. The current study was conducted to examine the anatomical relationship of ENK immunoreactive to the GnRH-I cell bodies and processes. Double-labeling immunocytochemistry revealed close anatomical proximity of ENK and sexual dimorphismin the GnRH-I system as well as in ENK innervation. Confocal microscopy was used to determine if the ENK preferring delta opioid receptors occur on GnRH-I neurons, thereby providing a means for direct opiate regulation of the GnRH-I neuron. Fixed brains from adult males and females (n=6/group) were sectioned (20 m) and double stained using antibodies specific for GnRH-I (kindly provided by Dr. S. Wray, NIH) or d-opioid receptor (Diasorin, Inc). Many, but not all, GnRH-I positive cells were also immunoreactive for delta-opioid receptor. Further, the distribution of double labeled cell bodies tended to be in the rostral preoptic-septal region. GnRH-I axonal projections to the median eminence were also double labeled. These data provide evidence for colocalization of opiate receptor in the GnRH-I neuron, indicating a mechanism for direct opioid peptide regulation of the GnRH-I neuron.
Supported by NRI #92-37203 (MAO) and NS 39495 (PM).

Key Words: GnRH-I, Avian Reproduction, Opioid Peptides

725 Localization of neurons projecting to the infundibular nuclear complex and the median eminence in the turkey hypothalamus. K Al-Zailaie, O Youngren, and M EL Halawani, *Dept. of Animal Science, University of Minnesota.*

The release of prolactin (PRL) from avian anterior pituitary is under stimulatory control by vasoactive intestinal peptide (VIP), which functions as the PRL-releasing factor. VIP is mobilized from neurons concentrated within the hypothalamic infundibular nuclear complex (INF) that project to the external layer of the median eminence (ME). Dopamine (DA) acts centrally through D1 DA receptors to stimulate turkey PRL secretion and requires an intact VIPergic system in order to do so. The mechanisms of dopaminergic action upon VIP neurons are unclear. We have previously demonstrated the distribution of dopaminergic neurons in the turkey hypothalamus. It is not known if these DA neurons project directly to VIP neurons or if transsynaptic regulation is involved. To address this question, we have used the lipophilic fluorescent tracer Dil to determine the location of neurons which project to INF and ME. Birds were injected in INF and ME with the tracer and allowed to survive for 5 days, after which the brains were perfused, processed, and examined for retrograde transport. Following application of Dil to the INF, labeled neurons were detected in four distinct regions: preoptic area (POA), paraventricular nucleus (PVN), preopticus dorsolateralis (PD) and lateral septum (LS). After injecting Dil into ME, labeled neurons were detected in three distinct regions: INF, PVN, and preoptic medialis. The projections described above could provide anatomical substrates for neuroendocrine regulation of PRL. The identification of these labeled neurons is currently under investigation. USDA Grant No. 00-02127

Key Words: DA regulation of VIP, Turkey PRL, Dil

Reciprocation Sessions on Meat Science

726 The MARC beef carcass image analysis system. S. D. Shackelford*, T. L. Wheeler, and M. Koohmaraie, *U.S. Meat Animal Research Center.*

At present, beef carcass value is a function of USDA quality grade, a subjective estimate of meat palatability, and USDA yield grade, a subjective estimate of carcass composition. Although "expert" calculated USDA yield grade is a relatively accurate predictor of carcass composition, producers continue to distrust use of yield grade in pricing formulas because application of yield grades is subjective and a high level of error can occur when carcasses are evaluated at rates of 300 to 400 head per hour. In 1997, we developed a system to predict beef carcass cutability based on image analysis of the 12^{th} rib cross-section which was removed from carcasses for tenderness classification. This method provided a more accurate prediction of beef carcass cutability than did "expert" calculated USDA yield grade (R^2 = 0.89 vs 0.77). The Agricultural Research Service entered into a cooperative research and development agreement with IBP, Inc. to adopt this technology for application directly to beef carcasses. On-line testing has shown that this system provides a much more accurate (R^2 = 0.89 vs 0.61) prediction of boneless closely-trimmed, "user-friendly" beef carcass yields than is currently achieved by on-line USDA graders. In fact, the MARC image analysis system provides a more accurate prediction of beef carcass yields than does expert calculated yield grade (R^2 = 0.75). The ability of this system to predict "expert" calculated USDA yield grade was evaluated using 182 steer and 219 heifer carcasses that encompassed the typical range for carcass weight (227 to 455 kg), adjusted preliminary yield grade (2.2 to 4.7), ribeye area (57 to 132 cm^2), and calculated yield grade (-0.3 to 5.1). Combining image analysis variables with hot carcass weight explained 88% of the variation in "expert" calculated USDA yield grade. Implementation of this technology should allow beef packers to more accurately determine differences among carcasses in cut-out value. Thus, this system should be a key component of value-based beef price discovery systems.

Key Words: Beef, Cutability, Prediction

727 Development of Instructional Materials for CD-rom and the Internet, the Beef Myology and Muscle Profiling project. S.J. Jones* and R.L. Roeber, *University of Nebraska-Lincoln.*

With the improvement of computers to handle graphic images and search through large databases rapidly, it is now possible to develop a CD-ROM or web page that will serve as a resource for the muscular anatomy of the beef animal. With funding from the National Cattlemen's Beef Association, a CD-rom was developed on beef myology and muscle profiling. Six different sections were developed to view the muscular and skeletal anatomy of the beef carcass; they included cross-sections, lateral views, sub-primal views, skeletal views and muscle and bone descriptions by

name. Photographs of 1" cross-sections of each wholesale cut was obtained and converted to JPEG format. A second beef side was laterally dissected with the removal of fat and individual muscles removed and photographed along with the carcass. Drawings in GIF format were developed for each picture. Sub-primal cuts were prepared and photographed on a rotating table every 22.5 degrees so all sides of the cut could be viewed. Information about each muscle was obtained and put into a database. The program was rendered using hypertext markup language (HTML). Application logic was written in JAVA so information is presented to a reader using an internet browser as the user interface and allowing the information to be shared. Flash animations were utilized to give the user a three dimensional view of sub-primal cuts. Utilization of computer technology helped to develop a beef myology and muscle profiling manual that can be updated rapidly and accessed world wide through the internet.

Key Words: CD-rom, Beef Myology, Internet

728 Bacon quality evaluation methods. Roger Mandigo*, *University of Nebraska-Lincoln*.

This Reciprocation session will address a variety of techniques and procedures used in the evaluation of sliced bacon. Some of the procedures to evaluate bacon to be discussed include: Camera Visioning and Computer Data Capture for Fat/Lean Quantity, Fat/Lean Color Classification System, Color of Pre-cooked Bacon, Slice Abnormalities, Shattering, Laciness, Length/width of slice, shrinkage during cooking, cooked slice distortion. Other techniques for discussion include: bacon slab firmness, where to measure, how to measure slab parameters, temperature at pressing/slicing and fatty acid profiles.

Key Words: Bacon

729 "Meal Solutions": Value added processing for a changing industry. J.W. Rocke*[1], [1]*RMH Foods, Inc.*.

The dramatic growth of the "Meal Solutions" Category at both Retail and Food Services is signaling the shift from a commodity, fresh meat driven industry to a Value Added, consumer driven industry. This shift is requiring new technologies, processes and approaches to products that were once considered out of date or undervalued. Food Safety, Quality Eating Experiences and Variety are a few of the challenges that must be addressed by processors to meet and exceed the desire of today's consumer.

730 A potential neural tract-tracing method for use in avian species. W.J. Kuenzel*[1], R. Ramesh[2], J.A. Proudman[3], and R.R. Miselis[4], [1]*University of Arkansas, Fayetteville, AR,* [2]*National Institutes of Health, Bethesda, MD,* [3]*United States Department of Agriculture, Beltsville, MD,* [4]*University of Pennsylvania, Philadelphia, PA*.

Turkey hens display broodiness or incubation behavior involving contact of the breast area with eggs. The purpose of the study was to utilize a method found effective in mammals for tracing neural fiber tracts to determine whether it might be applicable for tracing a pathway from the brood patch to the brain in turkey hens. The method employed was the pseudorabies virus (PRV, Becker's strain) procedure. Four turkey hens were utilized: one injected with PRV along the left side of the brood patch near nerve fibers, a second bilaterally injected, a third injected into the left vitreous humor and a fourth served as a control. The concentration of PRV was 4-7 x 10^8 plaque forming units/ml and the amount injected at each site was 5.0 μl. Brain sections were exposed to a polyclonal antibody to PRV (1:10,000) and subsequently processed using immunocytochemistry. Results of the bilateral injection into the brood patch showed immunostaining in the nucleus tractus solitarius, the dorsal motor nucleus of the vagus, the nucleus vestibularis descendens, the ventrolateral medulla and the nucleus reticularis gigantocellularis. Results of the injection into the vitreous humor included immunostaining of two portions of the proposed suprachiasmatic nucleus (SCN) of birds: the SCN pars medialis and the ventral nucleus of the supraoptic decussation. Other neural structures immunostained included the anterior, medial hypothalamic nucleus (n.), the bed n. of the pallial commissure, the paraventricular n., the lateral hypothalamic area, the inferior hypothalamic n., the n. of I, the archistriatum, the intercollicular n. and the central gray. A caution concerning the use of PRV in birds is that the immunostaining was not robust, particularly when brain sections were compared to those performed in rats following injection of Bartha's K strain of PRV into a peripheral injection site. The reason for the reduced number of neurons that show immunoreactivity following injections of PRV into hens compared to the rat is not known. Supported by USDA grant 97-35206-5087 to JAP and WJK.

Key Words: Pseudorabies virus, brain, turkeys

Applications of Ultrasound in Livestock Production Systems

731 Scanning the future - Ultrasonography as a reproductive management tool for dairy cattle. P. M. Fricke*, *University of Wisconsin, Madison, Wisconsin*.

Application of transrectal real-time ultrasonography to the study of bovine reproduction represents a technological breakthrough that has revolutionized our knowledge of reproductive biology. New research information generated through ultrasonic imaging has clarified the nature of complex reproductive processes in cattle including ovarian follicular dynamics, corpus luteum function, and fetal development. Widespread adoption and use of ultrasonography for routine reproductive examinations of dairy cattle is the next contribution this technology will make to the dairy industry. Although rectal palpation is the established method for conducting reproductive examinations in dairy cattle, the information-gathering capabilities of ultrasonic imaging far exceed those of rectal palpation. Assessment of pregnancy status and fetal viability early post breeding to identify cows that fail to conceive improves reproductive efficiency by decreasing the interval between AI services and increasing AI service rate. Early identification of cows carrying twin fetuses allows for implementation of differential management strategies to abrogate negative effects of twinning during the periparturient period. Ovarian and uterine pathologies not accurately detected via rectal palpation can easily be visualized and appropriate therapies selected and implemented. Determination of fetal sex in utero is useful when coupled with a management decision that justifies the expense of fetal sexing. Development of integrated reproductive management systems that combine ultrasound with new and existing reproductive technologies will further ehnance the practical applications of ultrasonography. Collectively, current and future applications of ultrasonography hold tremendous potential to enhance reproductive management and improve reproductive efficiency in dairy cattle. Development of Extension education programs to train bovine practitioners to use ultrasound for routine reproductive examinations is a critical step toward rapid implementation of this technology into the dairy industry. As ultrasound equipment becomes increasingly portable and less costly, it is only a matter of time until widespread implementation of this technology occurs in the dairy industry.

Key Words: Ultrasound, Dairy Cattle, Reproduction

732 Ultrasound applications in beef cattle research and management. A.R. Williams*, *Mississippi State University, Starkville, MS*.

The advent of real-time, B-mode ultrasound has greatly facilitated and accelerated research capabilities in the areas of bovine reproductive physiology and live animal carcass evaluation. The incorporation of ultrasound in bovine reproductive research has led to greater understanding of ovarian physiology, early embryonic development, follicular wave dynamics, and reproductive disorders. Ultrasound has been used extensively in the development of controlled breeding programs involving estrus synchronization and ovulation synchronization for effective timed AI. Practical applications of ultrasound in bovine reproduction include imaging of the ovary as a diagnostic aid, examination and confirmation of ovarian cysts, early pregnancy detection, fetal sex determination, and identification of twins. More specialized reproductive applications include follicular oocyte aspiration (ovum pickup) and follicle ablation. Live animal carcass evaluation is another important area of research. Recent advancements in carcass image interpretation software have allowed for highly accurate estimates of ribeye area, backfat, percent intramuscular fat, and rump fat. Ultrasound measurements are