ABSTRACTS
AMERICAN DAIRY SCIENCE SOCIETY
AMERICAN MEAT SCIENCE ASSOCIATION
AMERICAN SOCIETY OF ANIMAL SCIENCE
POULTRY SCIENCE ASSOCIATION

July 24–28, 2001
Indianapolis, IN

*** Author Presenting Paper**

National Extension Education Workshop: Current and Future Impact of Issues Facing Animal Agriculture

1 Introduction. Richard Reynnells*[1], [1] *USDA/CSREES/PAS.*

There is insufficient understanding by society of our food supply network. Our agricultural system is simultaneously robust and fragile, so must be protected, but is taken for granted. Our agricultural future requires mutual respect and a search for truth, versus special interests and myopic agendas.
Technological advances at the molecular level demand we deal with bioethical issues. We require an honest evaluation of the consequences of progress. Our keynote speaker will address GMO's in the Food Chain. Society's demand for inexpensive food, coupled with competition and grocery store's efforts to fulfil those requirements eliminated many good farmers. Consumers are appalled at the consolidation of farms, yet show little concern about the consolidation of grocery and other stores. These issues will be discussed by two speakers and an industry panel. ADDS, Inc. personnel will discuss and demonstrate their unique educational program.
Activist groups protest vigorously, and some may be considered a secular religion. Can animal rights dogma be promoted as originally intended, or must it be sold on welfare or a reduced version of "rights"? Can industry withstand the crucible of common decency in dealings with animals? Do they deal progressively with societal issues? Prescriptive Production Issues will be discussed by a panel, then there will be comments on Farm Level HACCP. Animal agriculture is presented as the major contributor of water pollutants. Is the USEPA moving toward acceptable agricultural pollution through credits that allow pollution? The final session is a panel of environmental experts. Full papers will be available in independently published proceedings.

Key Words: GMO's, Prescriptive Production, Agricultural Consolidation

2 A Rational Discussion of GMOs in the Animal Food Chain. S.K. Harlander*, *BIOrational Consultants, Inc.*.

In the relatively short time since their commercial introduction in 1996, genetically modified (GM) crops have been rapidly adopted in the U.S. Over 25% of the corn, 54% of the soybeans, 61% of the cotton and 70% of the canola grown in the U.S. and Canada in 2000 were GM varieties. These crops are treated as commodities and have found their way into the vast majority of ingredients used for human food products and animal feed. Because FDA considers these crops "substantially equivalent" to their traditional counterparts, no special labeling is required for ingredients derived from GM crops in the U.S. Crops are typically not identity preserved or segregated from their non-GM counterparts and co-mingling is common in the supply chain. Certain consumers who wish to avoid GM foods have raised concerns about the use of GM crops in animal feed. They question the safety and fate of DNA and protein derived from GM crops once they are consumed by animals. Some have suggested that animals that have consumed GM crops should be labeled as such. International scientific organizations agree that GM crops are as safe or safer than conventional crops. The DNA and protein present in GM crops is digested in the same manner as endogenous DNA and protein present in the food supply. Numerous studies have also demonstrated that protein and DNA from GM crops is not detectable in various organs, meat, milk or eggs. Animal feeding studies in a variety of animal model systems have confirmed that GM crops are nutritionally equivalent to their conventional counterparts. Further, animal performance is equivalent for conventional and GM varieties. The techniques of genetic engineering can be applied to animals in a variety of ways to improve animal performance, alter composition, or to engineer animals to produce pharmaceuticals in their milk or blood. This presentation will provide a rational discussion of the broad applications of genetic engineering to the animal food chain and the logistical, regulatory and consumer acceptance issues created by this emerging capability.

Key Words: Genetically modified crops, Fate of DNA and protein, Labeling

3 The Economics of the Animal Protein Chain. A Barkema*[1], M Drabenstott[1], and N Novack[1], [1] *Federal Reserve Bank of Kansas City.*

One of the most striking developments in the animal protein industry in recent years is its rapid consolidation, highlighted by three recent events. First, recent census data indicate just a tenth of the nation's farms account for fully two-thirds of U.S. agriculture's output of food and fiber. Second, the share of the nation's steers and heifers slaughtered by the four largest meat processors edged up to more than 81 percent in 1999, up from slightly more than a third in 1980. Third, Wal-Mart recently took the lead as the nation's largest food retailer, boosting the market share held by the four largest food retailers to about a third.

method and time combination. After the heat treatment, 25 gm of meat was rapidly mixed with 225 ml chilled UVM broth to terminate heating effect. Microwave heating effectively eliminated the Listeria monocytogenes cultures after 2 minutes for the long term ham and 1 minute for short term ham slices. Oven heating resulted in no viable cultures remaining after 8 minutes for the long term and short term cured products. Griddle heating eliminated populations after 45 sec for short term aged slices and after 60 sec for long term aged sliced. The efficacy of eliminating Listeria monocytogenes from country cured ham slices is dependent upon time, temperature, and cookery method used.

Key Words: Listeria monocytogenes, Country-cured ham, cookery

83 Analysis of postmortem tenderization in porcine *longissimus dorsi* muscle. C.P. Allison*, R.J. Tempelman, and M.E. Doumit, *Michigan State University, East Lansing, MI.*

Our objective was to quantify the rate and extent of postmortem tenderization in porcine *longissimus dorsi* (LD) muscle and determine if proteolysis of desmin corresponds to mechanical measures of tenderness. Berkshire (n=32) and Yorkshire (n=16) sired pigs were harvested on two days at a commercial abattoir. Four 5.72-cm sections of the LD were removed at d 1 from the 11th rib to the 3rd lumbar vertebrae. Loin sections were randomly assigned to aging treatments of 1, 3, 7 and 14 d, vacuum packaged and stored at 4°C. After storage, two 2.5-cm thick chops were cooked to an internal temperature of 71°C on Farberware Open Hearth^{TM} broilers. Chops were cooled overnight at 4°C and three 1.27-cm diameter cores per chop were sheared with a Warner-Bratzler Shear (WBS) machine. No differences in WBS values were observed between breed or loin location (P>.05). Shear values decreased (P<.0001) from 4.1 kg at d 1 to 3.6 kg and 3.2 kg at d 3 and d 7, respectively. Chops aged for 7 and 14 d had similar WBS values (P>.05). Western blot analysis of desmin from 4 tender (<4 kg) and 4 less tender (>4.7 kg) samples at d 1 revealed that desmin degradation paralleled decreases in WBS. Intact desmin was typically undetectable in tender samples by d 7 and in less tender samples by d 14. Tenderization of most pork loin chops is complete by d 7, however some chops exhibit additional tenderization and desmin degradation between 7 and 14 d postmortem.

Key Words: Pork, Tenderness, Desmin

84 Desmin degradation influences water-holding capacity and tenderness of fresh pork. L.J. Rowe*[1], E. Huff-Lonergan[1], and S.M. Lonergan[1], *Iowa State University Ames, Iowa.*

Proteolysis of desmin and troponin-T has been related to increased tenderness of meat. Degradation of desmin may also influence water-holding capacity (WHC) by disrupting linkages among adjacent myofibrils as well as myofibrils and the sarcolemma which would allow more space for fluid to reside in the tissue. We hypothesized decreased proteolysis of the myofibril-associated protein desmin would result in reduced WHC and tenderness. The objective was to determine if degradation of desmin was related to WHC and/or tenderness of pork. Halothane negative Duroc pigs (n=82) were harvested and pH measurements of the longissimus dorsi (LD) were taken at 45 min and 24 h postmortem (PM). Drip loss was measured on LD chops taken at 24 h and held at 4°C for an additional 24 h. Warner-Bratzler shear (WBS) force measurements were made on chops held 5 d PM at 4°C. LD samples taken at 1 d PM and 5 d PM were analyzed by immunoblotting using antibodies for desmin and troponin-T. Immunoreactive bands were quantified using densitometry. Desmin degradation was indicated by a decrease in intensity of an approximately 55 kDa immunoreactive band while troponin-T degradation was indicated by an increase in a 30 kDa band. 24 h drip loss was significantly correlated with 45-min pH (-.372) and 24 h pH (-.329). Drip loss at 24 h was not correlated with 5 d troponin-T degradation (-.119, P=.28) but was correlated with desmin degradation (.437, P < .01) indicating that products with less desmin degradation may have greater drip loss. 45 min pH and 24 h pH measurements were also significantly correlated with 5 d desmin degradation (-.254, -.377 respectively) indicating higher pH products tended to have greater desmin degradation. WBS at 5 d was significantly correlated with 5 d desmin degradation (.295) and 5 d troponin-T degradation (-.295). These results indicated increased drip loss and decreased tenderness of pork may be related to reduced proteolysis of proteins like desmin. (This work was supported by the National Pork Producers Council.)

Key Words: Water-holding capacity, Tenderness, Desmin

85 Dietary Conjugated Linoleic Acid and IGF-I Transgene Effects on Pork Quality. J. S. Eastridge*[1], M. B. Solomon[1], V. G. Pursel[1], A. D. Mitchell[1], and A. Arguello[2], [1]*USDA-ARS, BARC,* [2]*Univ. de las Palmas de Gran Canaria, Spain.*

Transgenic (T) pigs produced with a fusion gene composed of avian skeletal α-actin regulatory sequences and cDNA encoding human IGF-I have exhibited increased lean tissue and less fat than normal (N) controls. While the use of T-pigs for meat production has not yet been approved, it is worthwhile to explore the quality of the meat from these pigs. Thirty pigs (14 T and 16 N siblings) were finished on a control (CO) growing-finishing diet or with added conjugated linoleic acid (CLA) to 120 kg. Carcass weight for N pigs was heavier (P<.01) than for T (92.5 vs 87.4 kg, respectively); however T loin eye area (38.1 cm^2) was 16% larger than in N (32.5 cm^2). Backfat thickness was lower (P<.05) for T-CLA-fed pigs (21.4 mm) than for N-CO, N-CLA and T-CO pigs (29.8, 27.5 and 27.0 mm, respectively). Although pH at 45 min was higher (P<.01) in N (6.10) compared to T (6.01), there were no differences detected in ultimate pH (N=5.65 vs T=5.59). CLA affected pH at 45 min (5.99 vs 6.13 for CO and CLA, respectively) but not ultimate pH (CO=5.58; CLA=5.66). Gene and diet effects on pork quality traits of ultimate pH, amount of purge after 21 d, cook yield and shear force values were not different. Shear force for N vs T (6.3 vs 5.8 kg) and for CO vs CLA (6.1 vs 5.9 kg) was not different. Malonaldehyde (TBARS) formation after 5 d fresh, 21 d fresh and 6 mo frozen storage was not influenced by gene or diet. CLA added to growing-finishing diet may help reduce carcass fatness. Based on the present study, the muscle hypertrophy induced by the IGF-I transgene has no detrimental effects on quality of meat as compared to control.

Key Words: Pork quality, IGF-I transgenic pig, Conjugated linoleic acid

86 Enhanced rates of postmortem muscle glycolysis differ across porcine genotypes. M. D. Spires*, B. C. Bowker, J. E. Hammelman, A. P. Schinckel, A. L. Grant, and D. E. Gerrard, *Purdue University, West Lafayette,IN.*

Pork quality development varies with genotype. Mechanisms responsible for this variation likely involve postmortem muscle metabolism. Curiously, many genotypes do not develop adverse pork quality unless they are subjected to pre-slaughter stress or postmortem mishandling. The objective of this study was to challenge pork carcasses of different genotypes using electrical stimulation (ES) to determine if some genotypes are more susceptible than others to exaggerated postmortem muscle metabolism. Three different genotypes, fifty pigs each, were slaughtered, then subjected to ES (100V or 200V, 13 pulses, 2 sec on / 2 sec off) at 15 or 25 min post-exsanguination, or no stimulation (NS). Longissimus muscle (LM) pH and temperature were recorded at 1, 10, 20, 30, 40, 50, and 60 min, and 24 h postmortem. Samples were collected from LM at 1, 30, and 60 min, and 24 h and analyzed for glycogen, glucose, glucose-6-phosphate (G6P), and lactate concentration. Muscle pH, but not temperature, differed (P < .05) across genotype. Genotype altered (P < .05) muscle glucose, glycogen, G6P, and lactate concentrations postmortem. In particular, G6P decreased (P < .05) from 1 to 60 min postmortem for all genotypes; however, G6P at 24 h accumulated to concentrations equivalent to 1 min levels for one genotype, but only accumulated to concentrations equivalent to 30 min levels for the other genotypes. Genotype effects were not observed for color, firmness, drip loss, 24 h pH, or CIE L*, a*, b* values. These data show that genotypes respond differently to postmortem perturbation by altering muscle glycolysis.

Key Words: Genotype, Pigs, Muscle Metabolism

87 Effect of processing plant on pork quality. E. Hambrecht*[1] and M.W.A. Verstegen[2], [1]*Nutreco,* [2]*Wageningen University.*

The objective of the present study was to compare meat quality of pigs processed at three different plants. Plant A and B worked with head-to-heart electrical stunning (Midas®, Stork) while plant C had a CO_2-dip-lift system (87% CO_2, Butina). Line speed varied from 420 (plant B) to 500 pigs/hour (plant A and C). In plant A carcasses passed through a 3-phase rapid chilling tunnel (-15/-10/-1°C, air velocity (AV) 2-3m/s, 90 min), in plant B through a pre-cooling tunnel (4-5°C, AV 3-3.5m/s, 30