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.

< 0.01) whereas OT and AK were correlated at -0.61 ($P < 0.01$) and OT and SS at -0.70 ($P < 0.0001$). Respective correlation coefficients between MT and WB, AK and SS were -0.70, -0.59 and -0.60; while simple correlation coefficients between CT and WB, AK and SS were -0.66, -0.60 and -0.51, respectively. As expected, correlation coefficients among sensory measures were high (> 0.9, $P < 0.01$). These data indicate that the common mechanical measurements of beef tenderness are highly correlated to each other and they are highly correlated to trained sensory measures of beef tenderness, although the apparent lower correlation between SS and OT as compare to WB and AK may be due to differences in cooking method (belt grill vs. electric grill).

Key Words: beef, shear force, tenderness

1561 Quality evaluation of case-ready beef steaks from various USDA grades. J. M. Behrends*[1], W. B. Mikel[1], C. L. Armstrong[1], Y. L. Xiong[1], and S. Harris[2], [1]*University of Kentucky,* [2]*Cryovac/Sealed Air Corporation.*

Introduction of case-ready fresh meats to the marketplace has demonstrated a need to evaluate the benefits of this technology. The objectives of this study were to evaluate visual and chemical attributes of three different USDA quality grades (High Choice and above, Low Choice, Select) and three different muscles (semimembranosus, semitendinosus, and biceps femoris) of beef steaks encased in high-oxygen (80% O2/20% CO2) modified atmosphere packaging (MAP). Steaks from each treatment group (3 muscles, 3 grades, 2 packaging types) were displayed under retail conditions for 1, 3, 5, 7, and 10 d. Three steaks from each muscle-grade-package type combination were evaluated on each day by a five-member trained panel for visual color (lean color, discoloration, overall acceptability) and analyzed with a Minolta Chroma Meter CR-300 for L* a* b* values (lightness, redness, yellowness). Chemical analysis included percent metmyoglobin and lipid oxidation (TBARS). There were no grade x packaging interactions ($P > 0.05$) for lean color, discoloration, overall appearance, or L*, a* and b* values. However, the main effect of grades for these quality parameters was significant, with Low Choice and Select being higher than High Choice for L* values and Low Choice being more desirable than both High Choice and Select for lean color, discoloration, overall appearance, and a* and b* values. There were no grade x packaging interactions for percent metmyoglobin and TBARS values, however, grade had a main effect ($P < 0.05$) on percent metmyoglobin content, with High Choice being higher than both Low Choice and Select. TBARS values also differed ($P < 0.05$) among grades. These findings indicate quality grade has a major influence on color stability of high-oxygen packaged beef steaks. Regardless of muscle type and grade, however, whole muscle steaks from the round can achieve an extended shelf-life by use of novel MAP technology.

Key Words: Case-ready, Quality, Oxidation

1562 Diverse birth and rearing housing systems: effects on pig growth, meat quality and muscle fiber types. J. G. Gentry*, J. R. Blanton, Jr., J. J. McGlone, and M. F. Miller, *Texas Tech University, Lubbock.*

The objective of this experiment was to examine the effects of diverse birth and rearing environments on pig growth, meat quality and muscle fiber types. Barrows (n=48, 6 pigs/pen) were randomly selected from a group of indoor-born and outdoor-born pigs at weaning and placed into an indoor or outdoor growing/finishing environment. The outdoor environment consisted of 4 pens (212 m^2/pig) on alfalfa pasture. The 4 indoor pens (1.2 m^2/pig) had concrete slatted flooring. Pigs were slaughtered at an average weight of 114 kg at a commercial facility. Fiber type samples were taken from the *longissimus* (LD) and *semimembranosus* (SM) muscles at 4 hr postmortem and stored at -80°C until analysis. Samples (12-m thick) were stained histochemically with ATPase after acid pre-incubation (pH= 4.3) to detect I, IIA and IIB fiber types. Boneless loins were collected following 24 hr chilling and aged for 14 d. Chops (2.54 cm thick) were cut for sensory and shear force analysis. Data were analyzed using the GLM procedures of SAS (1995) with pen as the experimental unit. Outdoor-born pigs grew faster than indoor-born pigs (ADG, kg/d: .81 vs .72 .03, $P < .05$). Outdoor reared pigs had more backfat, higher NPPC color scores and lower CIE L∗ values than the indoor reared pigs ($P < .05$). Sensory panel scores for pork flavor intensity were 6.07 and 6.48 .10 for the indoor and outdoor-born groups, respectively ($P < .05$). Shear force values were lower for the group finished outdoors (2.0 vs 2.2 kg .06, $P < .05$). LD and SM from the outdoor reared group had a lower percentage of type IIB fibers (LD: 66.6% vs 73.2% 2.0, SM: 53.6% vs 65.1% 3.1; $P < .05$). Type I fibers in the SM represented 13.8% and 24.6% 3.1 for the indoor and outdoor reared pigs, respectively ($P < .05$). Outdoor rearing of pigs may improve pig growth, pork color and tenderness. Further studies should be conducted to link pork quality measures with muscle fiber types and environmental housing systems.

Key Words: Pigs, Housing systems, Pork quality

1563 Goat kids meat quality: artificial rearing and weight at slaughter effects. A. Arguello*[1], A. Marichal[1], J.F. Capote[2], and J.L. Lopez[1], [1]*Animal Production Unit, Las Palmas de Gran Canaria University, Arucas, Spain.,* [2]*ICIA, La Laguna, Spain..*

The objective of our study was to examine the effects of the rearing system and weight at slaughter on meat quality in young Canary Caprine Group kids. Forty twin, male kids were allotted to one of four groups based on feeding regimens: kids nursed by their dams (ND, n: 10), or kids fed a commercial milk replacer (23.7 percent CP and 22.8 percent fat) and controlled intake (CR, n: 10), and live weight at slaughter: 6 kg (WS6, n: 10), or 10 kg (WS10, n: 10). Immediately after slaughter, pH was measured on the Longissimus dorsii (LD). The carcasses were chilled at 4 C for 24 h, and pH, Warner-Brazler shear force (WBSF), color (Lightness, L, Croma, C, Hue, H), water holding capacity (WHC), chemical composition (moisture, protein, fat, ash, collagen and his solubility), muscle fiber types proportions and their areas, were determined in the LD muscle. No interactions were observed in any parameter between rearing method and weight at slaughter. No statistic effect were founded in pH values, although the ND kids showed a higher pH values when the weight at slaughter increased, the evolution in CR kids were opposite. Compared with the WS10 kids, the LD muscle from WS6 kids had higher L ($P<.05$), but no differences were founded in Croma or Hue. Rearing method and weight at slaughter did not affect to WBSF, but a relation between WBSF and solubility collagen may be observed. The meat from ND animals were more exudative than CR kids ($P<.001$), while no statistic effect was observed by weight at slaughter. The chemical composition changed lightly, reducing moisture percentage ($P<.001$) and increasing protein proportion ($P<.001$) in WS10, probably due to hypertrophy growth muscle fiber areas were higher. No effects were described in muscle fiber type population. The WS10 muscle fiber area was higher than WS6 ($P<.05$), but in opposite the rearing system did not show statistic effects. Thus, the results show that using milk replacers in goat kids and increasing the weight at slaughter did not affect negatively to meat quality.

Key Words: Kid meat quality, Rearing system, Weight at slaughter

1564 Comparison of breed and diet on factors associated with tenderness in two muscles. P. S. Kuber*[1], J. R. Busboom[1], S. K. Duckett[2], D. J. Marks[1], P. S. Mir[3], Z. Mir[3], R. G. McCormick[4], C. T. Gaskins[1], J. D. Cronrath[1], and M. V. Dodson[1], [1]*Washington State University, Pullman, WA,* [2]*University of Idaho, Moscow, ID,* [3]*Agriculture and Agri-food Canada, Lethbridge, AB,* [4]*University of Wyoming, Laramie, WY.*

The objective of this study was to evaluate attributes associated with tenderness in divergent breeds, Wagyu (**W n=12**), Limousin (**L n=12**) and F1-cross cattle (**WxL n=12**), fed two dietary treatments (either 0 or 6% sunflower oil). Data were analyzed using GLM procedures with breed and diet as main effects in a 2 x 3 factorial arrangement of treatments. Cattle were fed a barley-based diet for an average period of 259 d. Twenty-four hours post mortem (**PM**), steaks from the *longissimus* (**LD**) and *semitendinosus* (**ST**) were sliced, vacuum packed, aged (1, 3, 7, 14, 28 and 56 d PM) at 2°C and frozen (-40°C) until analyzed. Breed differences in Warner-Bratzler shear force (**WBS**) existed ($P < 0.05$) across aging times in LD. A WBS breed x day interaction existed in ST ($P < 0.05$) and tended to exist in LD ($P = .11$). On d 14, W LD ($P < 0.05$) required 0.77 kg less force to shear than L. Comparatively, W were more desirable in d 14 LD sensory panel sustained tenderness ($P < 0.05$) than L. In the ST, WxL ($P < 0.1$) required 0.60 kg less force to shear than L, but no difference ($P > 0.1$) in ST panel initial or sustained tenderness was evident. Wagyu LD and ST samples were slower ($P < 0.05$) in pH decline, and more rapid ($P < 0.05$) in temperature decline than L or WxL. Breed and diet did not affect ($P > 0.1$) free calcium (**FC**) over time (0, 1, 3, 7 and 14 d PM), 0 h calpastatin activity (**CA**), d 1 % collagen (**OH-Pro**), or d 1 collagen cross-linking (**HP**) in LD;