agroterrorism through such actions as the establishment of the Counterterrorism Policy Council and the Plum Island Animal Disease Center. The development of a national defense strategy against agroterrorism is a necessity if the safety and stability of American agriculture are to be ensured.

Key Words: Agroterrorism

2002 The Advantages and Disadvantages of Accelerated Heifer Growth. M.H. London*, *University of Kentucky Dairy Club*.

Accelerating the growth rate of heifers can help decrease the age at first calving, but this objective must be accomplished without compromising first-lactation or lifetime milk production. Many classical studies done prior to 1990 showed that prepubertal heifers severely overfed energy had decreased amounts of ductal tissue, which resulted in decreased first-lactation milk yields. Studies have shown that heifers from 3 to 12 months of age fed to gain up to 1000 g/d did not result in excessive fattening. However, other research demonstrated a decrease in milk production of 7.1% when heifers were fed to gain 1000 g/d in comparison to 700 g/d with the accelerated-growth heifers reaching puberty 32 days earlier. Using data present in the literature, VandeHaar concluded that 61% of variation in mammary impairments was attributed to the protein to energy ratio being fed. In another study, feeding a diet with a crude protein to metabolizable energy ratio of 50:1 compared to 61:1 g/ Mcal improved feed efficiency, increased structural and overall growth rates, and decreased body condition scores in heifers from 28 to 48 weeks of age. More recent studies also have seen decreases in actual first-lactation milk yield in heifers reared on diets formulated for 1000 g/d gain prepartum. After breeding, all heifers were fed a common diet ad libitum and heifers fed to gain 680 g/d prepubertally showed compensatory gain after puberty with no difference in body condition at calving. These changes in growth after puberty explained most of the differences seen in milk production between the prepartum treatments. Therefore, prepubertal gain may only explain part of the decreases seen in first-lactation milk production. More research needs to be conducted to develop feeding and management programs, which allow for early calving and optimum milk production.

Key Words: dairy heifers, growth

Original Research/Independent Study Undergraduate Paper Presentations

2003 Genetic relationships among electrical conductivity of milk, somatic cell scores and mastitis. R.C. Goodling*[1], G.W. Rogers[1], J.B. Cooper[1], and B. Rune[2], [1]*Pennsylvania State University*, [2]*SAE Afikim, Kibbutz Afikim, Israel*.

Electrical conductivity of milk (EC) increases during mastitis and can be routinely measured during each milking of dairy cattle. The objectives of the study were to examine the relationships among EC, somatic cell scores and mastitis. The Afikim computerized milking and management system measures composite EC in millimho (mmho) during milking and records daily averages for EC. Analyses were performed on 3503 cows sired by 259 bulls in eight herds. Heritabilities for EC were determined using the PROC MIXED procedure of SAS® with a model that included herd-year-season, age at calving, and sire. Heritabilities for lactation 1 ranged from .27 to .39; lactation 2 ranged from .21 to .23. Regression of daughter EC on sire PTASCS were all highly significant (.80 for lactation 1 and .67 in lactation 2). Genetic correlations among EC and clinical mastitis incidence were also estimated using a subset of the data where clinical mastitis was present. Bulls with higher PTASCS had daughters with significantly higher EC. The positive regressions and moderate heritabilities from this study indicate that EC might be useful in selecting for mastitis resistance in dairy cattle.

Key Words: Conductivity of Milk, Heritability, Mastitis Resistance

2004 Effects of Propylene Glycol or Fat Drench on Plasma Metabolites and Liver Composition of Transition Dairy Cows. M. M. Pickett*, M. S. Piepenbrink, and T. R. Overton, *Cornell University, Ithaca, NY*.

Forty eight Holstein cows were used to test the effects of short-term oral drenching of propylene glycol (PG) and EnerG II (Ca soaps of palm oil fatty acids, Bioproducts Inc., Fairlawn, OH) on milk production, blood metabolites, and liver triglyceride composition during the first three weeks of lactation. Treatments (2 X 2 factorial arrangement) given orally once daily for the first three days postcalving were water (Control), 500 ml PG, 454 g EnerG II (Fat), or 500 ml PG plus 454 g Fat brought to a volume of 2.5 L, using warm water. Concentrations of non-esterified fatty acids (NEFA) in plasma tended ($P = 0.11$) to decrease from day 2 through 7 in cows treated with PG (694.0, 570.7, 684.8, 582.4 μ E/L for control, PG, Fat and PG + Fat, respectively). Concentrations of β -hydroxybutyrate (BHB) in plasma tended ($P = 0.09$) to decrease from day 2 through 7 in cows treated with PG (10.1, 8.3, 8.9, 8.1 mg/dl). There was a tendency for an interaction of PG and Fat for plasma glucose concentrations ($P = 0.07$) for days 2 through 7 (36.3, 38.3, 39.4, 37.1 mg/dl), such that concentrations were greater for PG and Fat compared with the control or PG + Fat. Concentrations of triglyceride in liver on d 7 postcalving were not affected by treatment ($P > 0.15$; 10.82, 6.10, 10.01, 9.96%). Cows drenched with Fat tended to have lower DMI ($P = 0.13$; 38.0, 39.6, 37.3, 34.9 kg/d) and milk yield ($P = 0.13$; 36.5, 36.1, 32.5, 34.8 kg/d) during the first 21 d of lactation. There was no effect of treatment on milk composition. There was an interaction of PG and Fat for milk fat yield ($P = 0.14$; 1.7, 1.5, 1.5, 1.6 kg/d) which led to a trend ($P = 0.15$) in 3.5% fat corrected milk yield (42.9, 40.3, 38.1, 41.6 kg), such that yields were higher in the control and PG + Fat treatments compared with the other two treatments. Short term drenching of PG as described in this experiment has a slight beneficial effect on concentrations of NEFA and BHB while fat drenches appear to not affect concentrations of these metabolites in early postpartum cows.

Key Words: Propylene Glycol, Fat, Transition Cow

Meat Thermoprocessing: Products and Processes

2005 Thermal Processing of Meat Products. Romeo Toledo*[1], [1]*University of Georgia* .

Meat products are heated to eliminate the bloody red color, set the cured meat color, heat set proteins to form a gel and develop the texture, and thermally inactivate pathogenic and spoilage microorganisms. A number of RTE meat products are water cooked in a flexible film package, cooled, and then the covering is stripped followed by reheating to develop a roast and/or smoked flavor and color. Heating rates must be optimized to maximize color development and minimize purge. Too slow a heating rate will slow down production and may result in excessive shrink. A very fast heating rate will overcook the outer sections before the center reaches the endpoint temperature and results in excessive purge on cooling. Heat transfer mechanisms of conduciton, convection, and radiation govern heating rates and different mechanisms predominate in a particular equipment. Surface heat transfer coefficients play a major role in heating but when the Biot number gets too high, the effect is more on the surface than the interior where conduction becomes the rate limiting mechanism. Radiant heating systems have extremely high surface heat transfer coefficients and are effective for controlling purge and shrink in a post-processing pasteurization process.

Key Words: Heating rates, Post-processing pasteurization, Shrink and purge