	DMI kg/d	DM Digest-ibility	P intake g/d	P excreted g/d	SD	P avail-ability (%)	SD
Trial 1 (n=10)							
BD	19.2	64	33.0	19.8	2.4		
BD+soybean meal	20.7	63	51.3	26.0	3.4	74	24.0
BD	20.0	64	34.5	23.8	4.3		
BD+ cottonseed	20.2	66	48.1	24.4	3.7	81	20.1
Trial 2 (n=9)							
BD	18.5	67	33.3	20.9	3.9		
BD+corn gluten feed	20.7	65	66.1	29.7	8.2	73	16.2
BD	17.0	67	30.6	19.0	3.0		
BD+corn distiller grain	17.0	65	49.2	22.4	3.9	83	17.1
Trial 3 (n=10)							
BD+meat and bone meal	21.2	70	61.4	31.0	6.9	64	22.9
BD	20.2	74	40.5	23.0	4.0		
BD+dicalcium phosphate	21.7	68	65.1	26.9	7.2	85	16.0

Key Words: Phosphorus availability, Milk production

749 Phosphorus balance in Holstein cows fed normal or low-phosphorus diets for 2 lactations. R. Kohn*, T. Oleas, K. French, C. Sutcliffe, L. Scott, and T. Moreland, *University of Maryland, College Park.*.

The objective of this study was to determine phosphorus (P) balance and apparent P digestibility for Holstein cows in different stages of lactation when fed normal or low dietary P. Twelve multiparous cows (mean body weight = 698 kg) were fed diets based on corn silage, timothy hay and corn cobs (dry period) or corn silage and beat pulp (lactation period). Six cows (normal treatment) were fed diets supplemented with P using calcium phosphate in place of calcium carbonate. Two cows from each treatment did not complete the second lactation. Diets averaged 0.23 or 0.27% P for dry period, and 0.30 or 0.35% P during lactation. P balance was determined by total collection of feces, urine and milk for 5-d periods during dry, early, peak, mid and late stages of two lactations. Differences were tested with the model: Y = mean + lactation + diet + stage of lactation + interactions + cow(diet) as a random effect. P balance (g P intake # g P excretion) was #1.5 (SE=2.6) and #9.7 (SE=2.7) for low and normal P diets respectively in the first lactation, but was 12.4 (SE=2.9) and 26.4 (SE=2.8) g/d for low and normal P diets in the second lactation. In the first lactation, P balance was most negative in early (-17.2 g/d) and peak (-12.5 g/d) lactation, and greatest in the dry period (8.2 g/d). Apparent P digestibility (g/100g) was 0.41 (SE=0.03) and 0.21 (SE=0.03) for low and normal P diets respectively in the first lactation, but both increased to 0.54 (SE=0.03) in the second lactation. Milk production and intake were unaffected by diet. Long-term feeding of low-P diets can increase apparent P digestibility and P retention in different stages of lactation.

	Dry-Low	Dry-Normal	Lac-Low	Lac-Normal	Effects
Intake	30.0	40.3	62.2	76.0	L,S,D,S*L
Fecal	20.5	32.5	35.2	58.9	L,S,D,L*D
Urine	0.2	0.4	0.3	0.6	L
Milk	0	0	31.1	30.5	S,L*D
Balance	9.3	7.4	-4.4	-14.0	L,S,D,L*S,L*D,L*S*D
Digestibility	0.34	0.21	0.43	0.22	L,D,L*D,S*L

Least square means for P balance (g/d) and apparent P digestibility (g/100g) for normal and low P diets for non-lactating (Dry) and lactating (Lac) cows. Effects (P<.05) are lactation (L), stage (S), diet (D).

Key Words: phosphorus feeding, dairy cattle

Beef Species
Status and Application of Genetic Technologies in the Beef Industry

750 Consumer attitudes toward biotechnology: Impact on animal related applications. Christine Bruhn*, *University of California, Davis*.

Concern about biotechnology continues to be low on consumer#s list of concerns. When asked to volunteer food-related concerns, only 2% express concerns about the safety of foods modified by biotechnology, and a minority selected biotechnology when asked to add one additional item to a food label. Most people are not aware that products modified by biotechnology are in the supermarket. People support applications that benefit the environment, with modifications that provide direct consumer benefits, such as increased nutritional value or better taste endorsed by slightly fewer people. Following the recall of products containing StarLink corn, a higher percentage of consumers believed foods containing modified products should be labeled. Most consumer research has focuses on plant applications of biotechnology; modification of animals is likely to be more emotionally charges. Since the majority of US consumers agree that #animals have rights, just like people,# it would be likely that applications of biotechnology that benefit the animal, such as increased disease resistance, would have greatest support. Environmentally friendly application would also be viewed positively. Changes that primarily benefit people would likely receive public support from a smaller percentage of consumers, at least as recorded on consumer surveys. Frequent and effective communication that addresses public concern is a prerequisite for increasing public acceptance.

Key Words: biotechnology, consumer attitudes, consumer acceptance

751 Genomic and computing strategies in optimizing the genetic component of specification beef. J.W. Wilton*, *University of Guelph, Guelph, Ontario, Canada*.

Genomics and computing are closely inter-related in beef cattle improvement. Both require the prior definition of breeding objectives, both can be used together to carry out genetic evaluations of economically important traits and both can be used in the development of selection tools for sires and dams. Effective use of both requires accurate specification of the desired product, optimum production program, and cross-breeding structure. Optimizing the genetic component of production requires information on traits of economic importance, identification and relationships of animals, information on candidate and marker genes, and information on economics. Genomic information can be used for strategies involving identified gene deletions, identified gene introgressions, marker assisted introgression, and marker assisted selection. Techniques are being developed for combining genotypic data and quantitative data into genetic evaluations, although more developments are needed to optimize the use of these techniques across the range of beef traits varying in economic importance and cost of measurement. The genetic component of economical production of specified products can be optimized with customized selection programs. An example is presented in which performance levels are predicted from genetic evaluations based on quantitative and genomic information. The implications for selection within a seedstock population are also discussed.

Key Words: Genetic improvement, Sire selection, Beef production

752 Status of bovine sperm sexing technology. J.L. Schenk*[1] and G.E. Seidel, Jr.[2], [1]*XY, Inc.*, [2]*Colorado State University*.

XY, Inc., a biotechnology company, is developing and marketing flow-sorting expertise for sexing sperm for global livestock applications. Mammalian X-chromosome-bearing sperm contain more DNA than Y-chromosome-bearing sperm (bulls; 3.8%), which is the basis of the flow-sorting procedure. Sperm stained with Hoechst 33342, a specific DNA-binding dye, fluoresce when excited with light from an argon laser. Sperm are transported past sensors at a rate of 25,000 sperm/s by a pressurized fluid stream. Properly positioned sperm sorter sensors

detect fluorescence intensity. The sperm-transporting stream is transformed into droplets that are electrically charged differently for X- and Y-chromosome-bearing sperm. Two electro-magnetically charged fields draw oppositely charged droplets towards separate collection vessels. Not all of the sperm can be sorted for a variety of reasons, for example, improper orientation of the flat surface of the sperm toward one of the sensors. Also, dead sperm are discarded in the process. For most bulls, 3000 - 5000 live sperm of each sex can be sorted/s, but sorting rates may double in the near future as technology improves. Insemination of flow-sorted sperm in six species, primarily cattle has resulted in thousands of live offspring, with an accuracy of 85 - 95% of the predicted sex. Insemination of virgin heifers with sorted frozen/thawed sperm at dosages ranging 1 - 6 x 10^6 total sperm usually results in 60-d pregnancy rates of 70 10% of unsexed controls that contain 20 x 10^6 total sperm. Rates of abortion and normality of offspring have been similar to those for unsexed controls. Bovine sex-sorted semen is currently available for purchase and commercial use in the United Kingdom, and soon will be available in other countries.

Key Words: DNA, Hoechst 33342, sex, sperm

Animal Health
Transition Cow Health

753 Effects of nonesterified fatty acids on lymphocyte functions in dairy heifers. U. Bernabucci*, D. Scalia, O. Franci, B. Ronchi, A. Nardone, and N. Lacetera, *Dipartimento di Produzioni Animali, Viterbo, Italy*.

This in vitro study was carried out to assess the effects of nonesterified fatty acids (NEFA) on DNA synthesis, immunoglobulin M (IgM), and interferon gamma (IFN-gamma) secretion of cows peripheral blood mononuclear cells (PBMCs). Concentrations of NEFA were designed to mimic those in healthy cows and cows affected with subclinical or clinical ketosis. Nine pregnant, non lactating, and non ketotic Holstein heifers were utilized as blood donors. After isolation, the PBMCs were incubated with various concentrations of NEFA (0, 0.0625, 0.125, 0.250, 0.5, 1, and 2 mmol/l). The first three concentrations of NEFA were intended to mimic those of healthy cows, whereas the others were intended to mimic those of ketotic cows. The mixture of NEFA was represented by C16:0 (30%), C16:1 (5%), C18:0 (15%), C18:1 (45%), and C18:2 (5%). The DNA synthesis was measured after stimulation of PBMCs with phytohemagglutinin (PHA, 2.5 microg/ml), concanavalin A (Con-A, 2.5 microg/ml), or pokeweed mitogen (PWM, 1 microg/ml); the IgM secretion was measured after stimulation of PBMCs with PWM (0.2 microg/ml); the IFN-gamma secretion was measured after stimulation of PBMCs with Con-A (2.5 microg/ml). Under the present culture conditions, the addition of NEFA to cell cultures was responsible for significant impairment of PBMCs functions. The DNA synthesis in PHA-, Con-A-, and PWM-stimulated PBMCs was inhibited at concentrations of NEFA of 2, 1, and 0.5 mmol/l (P ranging from ≤ 0.0001 and ≤ 0.05). The IgM secretion in PWM-stimulated PBMCs was diminished at concentrations of NEFA of 2, 1, 0.5, and 0.25 mmol/l ($P \leq 0.05$). Secretion of IFN-gamma in Con-A stimulated PMBCs was depressed at concentrations of NEFA of 2, 1, 0.5, 0.25, and 0.125 mmol/l (P ranging from ≤ 0.0001 and ≤ 0.005). Results of the present study indicate that the increases of plasma NEFA might contribute to explain the impairment of the immune response or higher incidence of infections reported for cows suffering from subclinical or clinical ketosis.

Key Words: Cows, Nonesterified fatty acids, Immunoresponse

754 Acute phase response indicates inflammatory conditions may play a role in the pathogenesis of fatty liver in dairy cows. B. N. Ametaj*, B. J. Bradford, G. Bobe, Y. Lu, R. Nafikov, R. N. Sonon, J. W. Young, and D. C. Beitz, [1]*Iowa State University, Ames, IA*.

The goal of the present study was to search for the presence of acute phase response in normal and fatty liver cows. Liver and blood samples of multiparous Holstein cows with elevated (n=4) and normal (n=4) triacylglycerols (TAG) concentrations in liver were obtained at d -4, 3, 8, 12, 14, 22, 27, and 36 postpartum and analyzed for concentrations of total lipid in liver (TLL) and tumor necrosis factor-alpha (TNF-alpha), serum amyloid A (SAA), haptoglobin (Hp), calcitonin gene-related peptide (CGRP), prostaglandin E2 (PGE2), cortisol, total cholesterol (TC), triacylglycerols (TAG), lactate, non-esterified fatty acids (NEFA), glucose, and bilirubin in plasma. Fatty liver cows reached peak TLL concentrations at d 3, 8, and 12 postpartum with 11 % (wet weight), respectively, compared with 6 % in normal cows, respectively ($P < 0.05$). Cows with fatty liver had before parturition greater plasma TNF-alpha, NEFA, and lower lactate concentrations than did cows with normal liver ($P < 0.1$). Cows with fatty liver had at the time of peak TLL concentrations, at least at one time-point, higher plasma Hp, SAA, cortisol, and NEFA concentrations and lower plasma lactate and TNF-alpha concentrations than did cows with normal liver ($P < 0.1$). Concentrations of TLL at d 12 postpartum were a) correlated positively with concentrations of plasma TNF-alpha and NEFA at 0.96 and 0.75, respectively, and negatively with plasma CGRP at -0.75 before calving, b) correlated positively with concentrations of plasma Hp, SAA, and NEFA at 0.71, 0.80, and 0.74, respectively, and negatively with plasma PGE2, CGRP, and TC at -0.70, -0.75, and -0.72, respectively, at d 3, 8, and 12 postpartum, and c) correlated positively with concentrations of plasma bilirubin and cortisol at 0.70 and negatively with plasma glucose and lactate at -0.69 and -0.75 after d 12 postpartum ($P < 0.1$). Results of this study indicate that inflammatory conditions may play a role in the pathogenesis of fatty liver. (Partly supported under CREES-USDA agreement 99-35005-8576).

Key Words: acute phase response, fatty liver, dairy cows

755 Titration of the proper dose of calcium propionate (NutroCAL) to be included in an oral drench for fresh cows. J.P. Goff*[1], T.F. Brown[2], S.R. Stokes[3], C.L. Brawley[2], and F.R. Valdez[4], [1]*USDA-Agricultural Research Service,* [2]*Tarleton State University,* [3]*Texas A&M University,* [4]*Kemin Industries*.

Periparturient cows typically suffer some degree of hypocalcemia and negative energy balance. Calcium propionate (CaProp) is a rapidly absorbed source of Ca and gluconeogenic precursors included in drenches for fresh cows. An effective dose will raise blood Ca and improve energy status . A safe dose will not excessively increase blood Ca. Seventeen cows were assigned to one of 4 treatments; 0, 0.68, 1.02, or 1.36 kg of CaProp (NutroCAL, Kemin, Des Moines, IA) in 9 L water administered using an esophageal pump at calving. Blood was collected 0, 1, 2, 3, 4, 5, 6, 12, and 24 h post-drench. Plasma Ca at time zero averaged 7.19 mg/dl. Plasma calcium levels were significantly affected ($P<.0001$) by drench. Blood Ca concentration decreased in cows receiving water only reaching a nadir of 6.16 mg/dl 3 h post calving. Drenching cows with 0.68 kg CaProp at calving significantly increased blood Ca concentration above 8.0 mg/dl within 2 h and maintained this level through the next 24h. In cows receiving 1.02 or 1.36 kg CaProp, plasma Ca concentration exceeded 10 mg/dl within 12 h. In 2 of 4 cows receiving 1.36 kg CaProp, plasma Ca exceeded 11 mg/dl within 2 h and in 1 of those 2 cows blood Ca exceeded 15 mg/dl for more than 3 hrs, which should be considered toxic. Blood B-hydroxybutyrate (OH-butyr) increased in cows not receiving CaProp, suggesting decreased energy balance. However, plasma OH-butyr decreased in cows treated with any dose of CaProp ($P=0.0025$), an indication that energy status had improved in these cows. While no problems were observed with the 1.02 kg CaProp dose, there was no advantages in terms of blood OH-butyr. Since the 1.36 kg dose of CaProp proved toxic to 1 cow, it would seem prudent to maintain at least a 2:1 toxic/therapeutic index when dosing cows. We propose that a safe and effective dose of Ca propionate is 0.68 kg in Holstein cows.

Key Words: Drench, Calcium propionate, Gluconeogenesis