1642 Nutritional approaches to reduce phosphorus losses from dairy farms. Katie Peacock*[1], [1]*Virginia Polytechnic Institute and State University, Blacksburg, VA.*

Dietary nutrient management is a powerful and cost-effective approach to reduce the environmental impact of dairy farms. Producers overfeed phosphorus (P) to lactating dairy cows without beneficial effects on cow performance. This overfeeding is an environmental concern, because it increases excretion of P, increasing the risk of over-application of manure P to cropland. Over-application of manure P increases P runoff, leading to surface water contamination. This issue is becoming more important to producers trying to meet increasingly stringent nutrient management regulations. One way to minimize P excretion is to reduce P intake. Feeding diets that meet the P requirements of cows decreases the amount of P that is excreted compared to current feeding practices. In one study, the P content of diets was reduced from 0.49% to 0.40%, and P excretion through manure was reduced by 23%. There were no effects of dietary P on cow health or production in this study. Other research indicates that P deficiency symptoms are not observed until dietary P is reduced to .31% P or less. Despite the lack of benefit to increased dietary P, a survey of 33 Virginia dairy herds indicated that the average farm overfed P by 45%, increasing purchased feed costs by $1,059/100 cows/year. This degree of overfeeding would increase acreage required to land apply manure by 69% for farms under P-based manure application limits. Ongoing research focuses on the identification of field level indicators of P status to encourage farmers to reduce overfeeding. Producers can reduce feed costs, minimize P content of land-applied manure, and reduce environmental contamination by formulating diets to more precisely meet the P requirements of lactating cows.

Key Words: Phosphorus, Water Quality, Dairy Cattle

1643 Production of volatile fatty acids and rumen pH in dairy cattle. A.M. Reynolds*, *California Polytechnic State University, San Luis Obispo.*

Feeding cows requires the support of an environment of rumen microorganisms that share a symbiotic relationship with the cow that are affected by fluctuations in rumen pH. These changes in rumen pH will inevitably affect the production of volatile fatty acids correlating to the cow's overall milk production and milk fat synthesis. These ratios of volatile fatty acids specifically acetate to propionate, can differ as the pH in the rumen changes. Changes in rumen pH are affected by the feeding of the cow but can be controlled by certain feeding strategies. The feeding of a total mixed ration helps to alleviate rumen depressions by providing a mix of both concentrates and roughages. Multiple feedings per day versus once or twice a day has metabolic consequences by causing alterations in rumen pH, thus affecting the ratio of acetate to propionate. By providing the recommended physical effective neutral detergent fiber (peNDF) and/or a buffer can minimize the depressions in rumen pH. Optimizing the acetate to propionate ratio should be the goal when maximizing milk fat capability and milk production.

Key Words: Volatile Fatty Acids, Rumen pH, Dairy Cattle

1644 Storks and scientists. J.R. Swallow*[1], [1]*Pennsylvania State University.*

With today's cutting edge biotechnology, the age-old question, "Is it a heifer or a bull?" may be erased from our minds. New technology allows scientists to separate X and Y-chromosome bearing sperm from one another with up to 95These laboratory procedures utilize high-speed flow cytometry coupled with DNA staining to identify and separate X and Y-chromosome carrying sperm. The theory behind the machine lies in the inherent difference in DNA content between the X and Y-chromosomes. Sperm are sorted by measuring the fluorescent intensity of each individual sperm cell. Field trials using sexed semen from this procedure have shown much success in producing viable offspring in all of the major livestock species and humans. Combined with other assisted reproductive techniques (ARTs), sexed sperm should give breeders the opportunity to produce what the industry needs at a particular point in time. Many economic considerations and efficiency obstacles still stand in the way of the commercialization of sexed semen, but this new technology has the potential of turning into a readily accepted breeding standard much as AI has today.

Key Words: Sexed semen, Artificial insemination

1645 Feeding anionic rations to pre-fresh dairy cows. R Leuer*, [1]*University of Minnesota.*

Optimal management and feeding of transition cows can result in gains of 1500 to 3000 pounds of milk per lactation. Every cow experiences varying degrees of hypocalcaemia at parturition, and it is in the herdsperson's best interest to minimize this problem by effective feeding practices. Varying degrees of feeding calcium to pre-fresh cows has been used as a management tool to prevent severe hypocalcaemia, or milk fever as it is commonly called. Restricting calcium to reduce the incidences of milk fever can be difficult to achieve, as investigations have shown that intake of calcium needs to be limited to less than 15g calcium/cow/day. An alternative strategy is to add ions to induce mild acidosis. Anionic rations seek to affect the cow's acid-base balance instead of just focusing on the level of calcium fed to the animal. Balancing anionic rations takes into account the level of calcium, potassium, chlorine and sulfur that is in the diet. The desired ionic balance may be accomplished by limiting potassium and adding sources of chlorine and sulfur that carry negative charges. Monitoring of successful anionic diets can be accomplished through urine pH analysis. Acid-base balance within the animal causes the pH of the urine to change. If a pre-parturition diet is properly balanced, the dietary cation-anion balance will produce a urine pH of ¡ 6.5. A properly balanced anionic diet will result in an elevated blood calcium level at parturition, increased muscle tone, and reduction in the incidences of milk fever, displaced abomasums, udder edema, and retained placenta. Studies have shown that feeding phosphorus at a rate of over 80g phosphorus/cow/day may increase milk fever. Other research has indicated that cows can be successfully fed 150g calcium/cow/day combined with anionic salts to prevent hypocalcaemia. Anionic pre-parturition diets are a viable alternative to reduced calcium intake diets for the reason that they maintain blood calcium levels and at the same time decrease incidences of milk fever.

Key Words: Pre-fresh, Anionic, Milk fever

1646 Mastitis: Prevention is the best cure. I. F. Jackson III*[1], [1]*University of Georgia.*

Controlling mastitis has been a major challenge to the dairy industry. With the advances in animal technology, there have been many things done to lessen the effect mastitis has had on an individual and an entire herd. The most important improvements being made today are the changes in milking procedure. More care is being taken to prevent mastitis from occurring in dairy cattle. This has proven to be a cost effective way of controlling mastitis in today?s larger dairies. No matter how good and fine tuned a procedure is, there will always be that one cow that comes down with mastitis and treatment is needed. There are also improvements in the way dairy cattle are treated for mastitis, therefore lessening the chance of reoccurrence and the possibility of spreading mastitis to other cattle in the herd. Dry cow antibiotic preparations have also been proven to be a vital asset to the dairy farmer. Other advances have allowed treatments to be manufactured that have a shorter withdrawal time, therefore reducing the number of milkings that have to be dumped from a treated individual. It all boils down to proper milking procedures and correct handling of dairy cattle to reduce and control mastitis in a herd.

Key Words: Mastitis, Controlling Mastitis, Preventing Mastitis

1647 The effect of dietary tribasic copper chloride, Availa®Cu copper amino acid complex, zinc oxide, and combinations on nursery pig growth performance. Terry L. Ward*[1], Timothy M. Fakler[1], Murray J. Pettitt[2], and Eduardo Beltranena[2], [1]*Zinpro Corporation,* [2]*Prairie Swine Centre Inc.*.

Five hundred-twelve pigs weaned at 19.70.7 d were used to compare the effects of the dietary inclusion of Cu from $Cu_2(OH)_3Cl$ (TBCC) or Availa-Cu (CuAA), Zn from ZnO, and combinations to Phase 1 (0-14 d) and Phase 2 (15-35 d) nursery diets on ADG, ADFI, and feed:gain (F:G).

Eight pigs per pen (4 males and 4 females) were randomly assigned to 8 treatments within 4 location blocks within 2 rooms. Treatment diets for Phase 1 included 1) a control diet (C), 2) C + 200 ppm Cu as TBCC, 3) C + 100 ppm Cu as CuAA, 4) C + 100 ppm Cu as CuAA, 5) C + 3000 ppm Zn as ZnO, 6) C + 200 ppm Cu as TBCC + 3000 ppm Zn as ZnO, 7) C + 100 ppm Cu as CuAA + 3000 ppm Zn as ZnO, 8) Control + 3000 ppm Zn as ZnO. In Phase 2, treatments were the same, with the exception of 4) C + 50 ppm Cu as CuAA and 8) C + 100 ppm Cu as CuAA. In Phase 1, pigs fed CuAA, TBCC, or ZnO had increased ADG (P ¡ 0.02) and ADFI (P ¡ 0.10). Pigs fed CuAA had decreased (P ¡ 0.04) F:G. Pigs fed TBCC or ZnO tended to have increased F:G, but pigs fed the combination of TBCC and ZnO had decreased F:G (TBCC x ZnO, P ¡ 0.08). In Phase 2, pigs fed TBCC had decreased (P ¡ 0.01) ADG and ADFI. Pigs fed ZnO had increased (P ¡ 0.07) ADG and ADFI. The inclusion of ZnO partially ameliorated the negative effect of TBCC on ADG (TBCC x ZnO, P ¡ 0.06). Pigs fed CuAA had higher (P ¡ 0.01) ADG and ADFI, and lower (P ¡ 0.10) F:G compared to pigs fed TBCC. During d 0-35, pigs fed CuAA had increased ADG and decreased F:G (P ¡ 0.02). Pigs fed ZnO had increased (P ¡ 0.02) ADG and ADFI. Pigs fed TBCC had decreased ADG (P ¡ 0.10) and ADFI (P ¡ 0.06). The inclusion of TBCC decreased ADG and increased F:G but not in the presence of ZnO (TBCC x ZnO, P ¡ 0.02). Pigs fed CuAA had greater ADG and ADFI, but lower F:G than pigs fed TBCC (P ¡ 0.04). Overall, these results indicate that inclusion of Availa-Cu or ZnO in nursery pig diets improved growth performance, but TBCC decreased growth performance.

Key Words: Copper Amino Acid Complex, Growth Performance, Nursery Pig

1648 Cow response to summer environmental conditions within tunnel-ventilated and naturally ventilated dairy freestall facilities. R.R. Stowell[1], C.A. Gooch[1], S.F. Inglis[1], N.R. St. Pierre[1], and E.J. Beiler[1], [1]*Biological Systems Engineering,* [2]*University of Nebraska-Lincoln, Lincoln,* [3]*Cornell University, Ithaca, NY,* [4] *The Ohio State University, Columbus, and* [5]*Mercer County, Celina, OH.*

Cows in three pairs of naturally ventilated and tunnel-ventilated dairy barns were monitored during the summer of 2000 to compare cow activity, respiration rates, and milk production of the animals housed within barns with the differing systems. Supplemental cooling fans were used within each of the naturally ventilated barns to direct airflow onto the cows. Ambient air temperatures during midsummer were cooler than normal in New York and Ohio, but both states had near-normal cooling seasons. No consistent differences existed between activity levels of cows within naturally ventilated and tunnel-ventilated barns. Average levels of productive activity (eating or resting) within the study barns ranged from 60-77%. Statistically significant differences in activity levels existed between regionally paired barns in Ohio, but the differences conflicted. As interior THI rose, the trends were for the shares of cows at the bunk to increase very slightly, cows lying in stalls to decrease fairly steadily, and, subsequently, cows resting or eating to decrease. Similar trends existed for the variables regressed against interior airspeed. Measured respiration rates of resting cows within 2 of the 3 tunnel-ventilated barns were higher than within the corresponding naturally ventilated barns. The respiration rates measured in this study may show some negative effects of reduced air velocity within stall areas of tunnel-ventilated barns. The data do not represent the status of all cows in the barns very well, however, since the status of cows standing within the barns was not ascertained. Respiration rate was moderately correlated to THI within the representative quadrant. Respiration rate did not appear to be as associated with airspeed and airflow through the barns as was cow activity. Associations between milk yield per cow and air temperature and wind speed were evident for both ventilation systems. No difference in the net impact of ventilation system selection on milk yield could be determined in this study. Risk management approaches should be used to evaluated these systems.

Key Words: Cow Behavior, Heat Stress, Milk Yield

1649 Effect of high fat diet on reproduction in replacement beef heifers. D. L. Cuddy*, J. B. Hall, W. E. Beal, and W. S. Swecker, *Virginia Tech, Blacksburg, VA.*

High fat diets may affect reproduction in cows. The objectives were to examine the effects of feeding a high fat diet to peripubertal beef heifers on puberty, estrus response to synchronization, pregnancy rates, and ovarian structures. During a two yr study, crossbred heifers (n = 44/yr), blocked by BW, received a high fat which contained whole cottonseed, (HF; 5.0% fat) or a normal (NORM; <2.0% fat) diet. Silage based diets, formulated to be isonitrogenous, isocaloric and meet NRC requirements for replacement heifers, were fed for 100 d. Heifers were weighed every 14 d. Starting on d 42 of the trial, heifers were estrous synchronized using the MGA-PGF system (0.5mg MGA/hd/d for 14 d with an injection of 25mg PGF2α 19 d after cessation of MGA feeding). Estrus was monitored by the Heat Watch® estrus detection system. From d 75 to d 100, heifers were artificially inseminated (AI) 12 h after estrus. Ten d after the end of the AI period, heifers were exposed to a fertile bull for 30 d. During year one, ultrasonography of ovarian structures was performed on d 59, 75 and 78 of the experiment, and data from 5 heifers from each treatment analyzed. Weights of HF and NORM heifers were similar (P = 0.8) after receiving their respective diets for 100d. HF and NORM heifers were similar for diameter of the dominant follicle after MGA (n=41; P = 0.7), size of the CL at injection of PGF2α (n = 31; P = 0.3), and diameter of the ovulatory follicle 3 d after PGF2α injection (n = 10; P = 0.6). Similar numbers of HF and NORM heifers exhibited estrus following PGF2α (P = .3). No treatment differences were detected for synchronized AI (S-AI; P = .28) and total AI (T-AI; P = .18) pregnancy rate. Pregnancy rates to S-AI were 52.3% (23/44) and 38.6% (17/44), whereas T-AI pregnancy rates were 70.5% and 56.8% for HF and NORM heifers, respectively. However, fewer HF than NORM heifers (P=.1) were pregnant to natural service. Feeding a high fat diet to replacement beef heifers did not improve reproduction, but effects on pregnancy rate may warrant further study.

Key Words: Heifers, Dietary fat, Reproduction