1298 Effect of postpartum changes in BCS on milk components. DilipKumar Garikipati*[1], Sarjan Rao Kapa[1], and Kailash M.M.[2], [1]*College of Vety Science, Tirupati,* [2]*College of Vety Science, Bangalore.*

Body condition scoring system with 1 to 5 scale (Edmonson et al,1989) was used in 137 crossbred HF cows in early to mid lacatition to evaluate the post partum losses in body fat reserves and its influence on milk components. The effect on dry matter intake (DMI) was linear and a reduction of DMI (kg/day) with the increase in BCS ranged from 10.78 to 13 Kg/day for BCS 4.5 to 2.5 DMI decreased by 1.3 Kg/day for an additional increase in one unit of condition score. This showed that the DMI of fatty cows was less than the thin cows. As the live weight (kg) of the animals increased the BCS also increased indicated increase, in body fat reserves. Mean daily and peak milk yield over the first 6 months of lactation in relation to BCS were linear and there was a increase of 4.1 Kg and 7.8 Kg of daily milk yield and mean peak milk yield, respectively for every increase of one unit of condition score. Milk fat yield ranged from 3.1 to 3.9 percent and there was a positive response of 5 g/kg with an increase of one unit of condition score over the range 3 to 4 BCS. A positive milk protein output response was also observed with milk protein yield ranged from 32 to 34 g/kg with a meagre increase of 1g/kg over the range of 3 to 3.5 BCS and a decrease of 2g/kg for every one unit increase of BCS over the range of 3.5 to 4.5. The pattern of prediction equations for change in BCS to 120 DIM and 305 days FCM yield showed the BCS loss of 0.75 to 1.0 unit which was associated with more milk production. Higher rates of loss in BCS in second and third lactation numbers that have been associated with diminished milk production compared with its potential production. This suggested that increased feeding levels are warranted as the number of lactations advanced. Post partum decrease in BCS was observed upto three months and this was due to loss of body reserves through milk production which gradually recouped from fourth month onwards. This suggested that the increase in the post partum feeding levels will prevent the loss in BCS.

Key Words: BCS=Body Condition Score, fat, milk

1299 Evaluation of the antibacterial activities of lactoferricin derived peptides. P.-W. Chen, C.-L. Shyu, and F. C. Mao*, *National Chung Hsing University, Taichung, Taiwan.*

The hydrophobic and basic regions of N-terminal of lactoferrin, which contained 10 amino acids, originated from bovine (bLF20-29), caprine (cLF20-29), porcine(pLF20-29), human (hLF21-30) and murine (mLF20-29) were chemically synthesized. The minimal inhibition concentration (MIC) and minimal bactericidal concentration (MBC) against Gram-positive bacteria (*S. aureus* ATCC 25923 and *E. faecalis* ATCC 29212) and Gram-negative bacteria (*E. coli* ATCC 25922 and five wild strains of *E. coli* that resisted to broad spectra of antibiotics) were determined. The MIC and MBC of bovine lactoferrin and pepsin-digested bovine lactoferrin hydrolysates against selected bacteria were also determined and compared with that of synthesized peptides. The bLF20-29 had potent antibacterial activity that it inhibited and killed all the selected bacteria. The MIC for bLF20-29 was 30 μg/ml and the MBC was 60 μg/ml in selected *E. coli*. However, the peptides of cLF20-29, pLF20-29, hLF21-30 and mLF20-29 had less antibacterial activity. The MIC for these peptides were more than 500 μg/ml among the selected bacteria. According to the hydrophobic and basic pattern, two peptides modified from the bLF20-29 and cLF20-29 origin were synthesized, named LFM1 (Arg Arg Trp Trp Trp Arg Trp Arg Arg Trp) and LFM2 (Arg Arg Trp Trp Arg Arg Trp Arg Arg Trp). Both the LFM1 and LFM2 had excellent antibacterial activities. The MIC and MBC for these two peptides were similar in selected bacteria. The MIC and MBC were 2.8 μg/ml and 3.75 μg/ml in selected *E. coli*. The antibacterial activities of LFM1 and LFM2 were much better than the bLF20-29. The potent antibacterial property of these peptides could be useful in further study and field application.

Key Words: lactoferrin, lactoferricin, antibacterial peptide

1300 Local expression of IGF-1 and IGFBP-3 mRNA in mammary tissue of prepubertal heifers after treatment with growth hormone. P.M. Jobst*[1], S.D. Berry[1], M.L. McGilliard[1], D. Ayares[2], D.A. Henderson[1], W.E. Beal[1], and R.M. Akers[1], [1]*Virginia Polytechnic Institute and State University,* [2]*PPL Therapeutics Inc.*

Two experiments were conducted to determine the effects of bovine growth hormone (GH) and estradiol (E_2) on mRNA expression of insulin-like growth factor-1 (IGF-1) and IGF-binding protein-3 (IGFBP-3) in mammary tissue of prepubertal heifers. In experiment one seven heifers treated were with GH for 7d. Mammary parenchyma and stroma were collected by surgical biopsy before and after GH. Explants of parenchyma and stroma were cultured for 36h in media without or with GH (1μg/ml), E_2 (20pg/ml), GH + E_2, or IGF-1 (100ng/ml). RIA indicated serum IGF-1 and GH levels were elevated following GH treatment. Expression of IGF-1 and IGFBP-3 mRNA was not affected by GH treatment or hormones in culture. However, expression of IGF-1 mRNA was greater in stromal than parenchymal tissue. In experiment two, nine prepubertal heifers were administered placebo or GH. GH (Posilac®) was given every 14 days for three months. Blood samples were collected weekly. Heifers were sacrificed and mammary tissue collected. Stroma and parenchyma explants were cultured and analyzed for expression of mRNA as described above. Serum IGF-1 and GH levels were elevated following Posilac® treatment. Prior treatment of heifers with Posilac® did not affect the response of tissue explants in culture. However, in both parenchymal and stromal explants, IGF-1 increased (24%) expression of IGFBP-3 compared with explants in the absence of hormones. Stroma produced 27% more IGFBP-3 mRNA than parenchyma. Stroma explants cultured in E_2 or E_2 + GH produced 60% and 54% more IGF-1 mRNA respectively, compared to explants without hormones. Overall stromal explants produced 2.4-fold more IGF-1 mRNA than parenchyma explants. These data indicate that E_2 and IGF-1 elicit acute changes in the local IGF-1 axis of the bovine mammary gland.

Key Words: IGF-1, Growth hormone, Mammary gland

1301 Milk yield and constituents of Fleckvieh cattle in Bavaria:1-First lactation. Kamal Marzouk*#, #*Minia Univ.*.

Data from 3814 first lactation of Fleckvieh cattle was collected from 29 herds. This data came from milk recording organization in Bavaria, Germany. The aim of this study was to evaluate the milk yield and constituents of first lactation to erect a selection programme. The means of kg milk, 100-days for different traits of milk production and constituents were 1823.68 kg,72.40 kg,3.96%, 57.9 kg, 3.20%, 1.24%,0.75% and 2.14 MJ for milk yield, kg fat,%F,kg protein,%protein, Fat/Protein (F/P)ratio. index fP=(% fat-%protein)and energy in milk[milk energy yield (MJ)=milk yield* (0.37 * %fat+0.21* %P + 0.95)+milk yield * 0.07)], resp. The same traits at kg-milk, 200-days were 3395.42 kg, 134.14 kg, 3.95%, 111.01 kg,3.27%, 1.30%,0.67% and 2.16 MJ, resp. Also, at kg milk, 305-days the previous traits were 4553.44 kg, 183.50 kg, 4.07%, 152.4 kg, 3.32%, 1.68%, 0.76% and 2.21 MJ,resp. Effect of herd-years was significant on all milk yield and constituents traits at different periods except on fat/protein ratio at kg milk, 200-days. Seasons at calving had a significant effect on all traits at kg milk, 100-days except index fp,% fat, index fp at kg milk; 200 days and %fat, f/p ratio, index fp and energy in milk at kg milk, 305-days. On the other hand,the means of persistency=[(milk yield days 101-200/milk yield days 1-100)*100] was 82% and not affected by seasons of calving.

Key Words: Milk yield and constituents, Milk energy, Persistency

ASAS/ADSA Extension Education and ASAS/ADSA Teaching Undergraduate and Graduate Education

1302 Dairy farm HACCP: PMO bulk tank temperature and wash cycle compliance on 10 Minnesota dairies. S. Nagel and J. K. Reneau*, *University of Minnesota, St. Paul, MN, USA.*

Bulk tank temperatures should be a critical control point in a dairy farm HACCP plan. This study used temperature recording data loggers to observe bulk tank temperature patterns on 12 Minnesota dairies. From a list of potential cooperators supplied by the Minnesota Department of Agriculture, 12 dairies were selected by geographical distribution and herd size. Onset Computers' HOBO® temperature recording data loggers were placed inside bulk tanks near the outlet. The thermometers

were programmed to record temperature every 10 min for 24 hr/d ranging from 2-14 mo. On one farm, the data logger failed and the data was irretrievable; on another, the electronic data was inadvertently lost. Electronic data was downloaded monthly and imported into a spreadsheet where descriptive statistical calculations and graphic presentations of data were accomplished. A total of 333,537 individual bulk tank temperatures were recorded at 10-min intervals in 11 bulk tanks on 10 of the farms. Preliminary analysis of a data subset indicated that maintaining commingled raw milk temperatures <50°F at subsequent milkings was a common problem. Farm 9 had a cooling failure. The tank's digital thermometer read 40°F but the tank was cooling milk at 50°F. During summer 1998, the tank on Farm 3 routinely recorded commingled milk at temperatures >50°F. With the exception of Farms 3, 5 and 9, all other bulk tanks appeared to meet PMO requirements to cool raw milk to <45°F within 2 hr after end of milking. In general, cooling milk to 45°F by 2 hr after end of milking did not seem to be a problem except on Farm 9 where the bulk tank was not functioning properly. Data loggers also recorded wash cycles. An average of 97% of the time, bulk tanks were sanitized after each milk pickup. Since herds were not randomly selected, it cannot be assumed that observations in these case studies accurately reflect bulk tank function or wash cycle compliance of the Minnesota dairy industry in general. As a pilot program, these findings support the need for further study. Monitoring bulk tank temperatures should be part of a dairy farm HACCP plan.

Key Words: HACCP, bulk tank, temperature

1303 Environmental mastitis pathogens in fresh bedding material. V. Eckes, M.A. LaValle, R.F. Bey, R.J. Farnsworth, and J.K. Reneau*, *University of Minnesota, St. Paul, MN, USA*.

Bedding type and particle size influence bacterial growth. Bedding samples were separated into three different particle sizes using a No. 8 and No. 18 mesh screen. Fifty ml of each particle size and 50 ml of the original unseparated bedding were each transferred into separate plastic Whirl-pak® bags and labeled. 100 ml of sterile distilled water was added to each Whirl-pak® bag and carefully mixed with the bedding. The mixture was then allowed to settle for 20-30 min. The supernate was pipetted (0.2 ml) from the Whirl-pak® bag and spread onto both CNA and MacConkey plates. Where necessary, serial ten-fold dilutions were prepared before plating the supernate on culture media. Bedding materials were incubated at 37°C and sampled at 0, 24, 48, and 72 hr. All plates were incubated 24 hr at 37°C. Bacterial counts were made to determine number of colony-forming units per cubic centimeter in the bedding materials. Bacteria were identified using biochemical reactions. Results indicate that all bedding materials supported growth of environmental pathogens. The degree to which growth occurred varied with the bedding material type and particle size. Large particulate bedding materials supported the least amount of growth while fine materials supported the greatest amount of bacterial growth. Ground sunflower hulls and chopped straw best supported growth, while pine wood shavings supported the least amount of growth. From these studies, it appears that ground sunflower hulls, hardwood shavings, straw, and fine material of any type are least desirable. The best bedding materials were sand and large pine shavings. Examples of intermediate bedding materials were paper dots, aspen, and a mixture of hard (oak) and soft (pine) wood. Particle size is a critical determinant in the ability of bedding material to support bacterial growth. When selecting bedding material, the type of bedding material and particle size must be carefully considered.

Key Words: bedding, mastitis pathogens, particle size

1304 Phosphorus adsorption implications on phosphorus management on dairies. T Downing* and J Hart, *Oregon State University*.

Management of phosphorus application and accumulation on dairies is a challenge in most established dairy regions in the US. In many areas, continual manure application has increased soil P above amounts sufficient for optimum crop yields leading to increased P loading to surface water, both in solution and attached to soil particles. The dairy industry has traditionally used soil testing to monitor P accumulations and crop needs. A significant dairy industry existed along the Oregon coast for over 100 years. For approximately the last 25 years, most dairies have over applied phosphorus from an agronomic standpoint. Soil test P concentrations as determined by Bray P1 test indicate many dairy soils are deficient in available phosphorus. This observation has lead many dairymen to purchase large quantities of commercial phosphorus fertilizer, even though most are over applying P with their manure applications. In addition, plant tissue phosphorus values and yield data indicate no shortage of phosphorus. The apparent contradiction among P application rates, soil test value and tissue P concentration caused us to evaluate the phosphorus adsorption capabilities of six major soil types on dairies along the coast. Soils were analyzed using the Bray P1 and phosphorus sorption isotherms were constructed by adding one gram of soil to increasing quantities of P ranging from 1 to 1000 mg/l. All assays were performed in triplicate. Bray P1 soil test values ranged from 8 to 83 ppm and averaged 29 ± 11.3. Solution P values ranged from .07 to .51 mg/l and averaged .31 mg/l ± .27 mg/l. Phosphorus adsorption characteristics were significantly different between soil types as determined by regression. These results indicate coastal soils in Oregon will respond differently to similar levels of phosphorus loading. These data also indicate that these soils have high absorption capabilities, compared to other results reported nationally. This study has increased our understanding of phosphorus management, but has also increased our interest in desorption possibilities.

Key Words: phosphorus adsorption, sorption isotherms

1305 Evaluation of dairy farmers' use of financial long-range planning. G. W. Robb*, S. B. Nott, and B. A. Dartt, *Michigan State University*.

The objectives of this study were to assess the farmer's use of financial long-range budgeting software output, and identify input factors that could improve accuracy of future projections. Twenty-nine Michigan and nine Minnesota dairy farmers, who had previously completed a Finlrb, Financial Long Range Planning, program within Finpack, University of Minnesota, were personally interviewed. Electronic files containing their projected budgets, as well as actual values invested in completed expansions were collected and compared. Overall usefulness of the program was rated very or extremely useful by 84% of the farms and 100% would recommend its use to their neighbors. The quality of technical assistance from the ten Extension personnel conducting the Finlrb was reported as very or extremely good by 95% of the farms. If charged for the Finlrb projection farmers would have paid an average of $750. Thirty-one of the 38 farms completed investments at the time of the survey. They reported actual investments totaling $12,802,161 for a median of $284,550 per farm. The Finlrb projections of added capital totaled $10,567,634. As a group the farms spent 21% more $2,234,527 in their projects than investment numbers used in the Finlrb projection. Excavating, concrete, farm building labor, cattle prices and replacement animal costs were often under estimated. Many other differences between projected and actual investments were due to changes between time of the projection and project completion. Fourteen farms had Finpack's Year End Financial Analysis (Finan) completed for the year following construction completion. Net farm income achieved in the Finan was lower than the Finlrb projection on 71% of the farms while actual milk price received was higher than projected on 85% of farms. Four farms had a negative net farm income. Cow numbers and milk production per cow goals were met on 65% and 70% of the farms respectively. Actual feed and hired labor costs increased on 58% and 75% of the farms respectively. Finlrb was considered a useful decision-making tool. The analyzed Finans showed farmers were more successful in achieving herd size and production per cow goals than limiting feed and hired labor costs.

Key Words: Dairy, Extension, Finanical planning

1306 A training workshop for the National Dairy InfoBase. M. A. Varner*[1], [1] *University of Maryland*.

The National Dairy InfoBase (NDIB Ver. 4) has been published on CD-ROM and the Internet by the not-for-profit Agricultural Databases for Decision Support organization (www.adds.org). Use of the NDIB can be accentuated by providing training on the program's use. A hands-on training program was planned for dairy producers and advisors as a pre-conference workshop for the Maryland Dairy Industry Association. The workshop was held in a networked computer lab at a local community college. Registration was limited by ten computers. Two people per computer were allowed, and twelve individuals participated. After completion of the workshop, the goal was for the participants to

be able to: 1) install the ADDS National Dairy InfoBase (NDIB, Ver. 4) from the CD to the hard disk of their computer; 2) start the NDIB on their computer; navigate the various windows within Folio Views; 3) browse through publications in the various subjects; 4) Search the NDIB with single word, multiple word and phrase searches; 5) print various amounts of a publication and 6) use the NDIB over the Internet. The workshop was held in a two hour time period. Introductory remarks were made before each of the six sections and then individuals were encouraged to complete the step-by-step tutorials that would allow them to accomplish the desired tasks when returning home with their CD-ROM disk. After approximately 15 minutes, a short summary was presented and an introduction was made for the next topic. The workshop was presented by one instructor and the time between presentations was spent answering individual questions. All participants were able to complete the workshop in the two hour time frame. Conducting the hands-on workshop for the NDIB as a pre-conference program was desirable as participants could maximize their educational efforts on that day. A copy of the training materials used in the workshop are available at http://www.wam.umd.edu/ markv/NDIB.pdf.

Key Words: Dairy, Computer, Training

1307 Teaching pork producers breeding and gestation herd management skills via the Internet. M.T. See* and B.A. Belstra, *North Carolina State University, Raleigh NC.*

To enable distance education for pork producers and their employees a nationally developed curriculum was transformed into an Internet course comprised of interactive HTML lessons, images, and self-grading quizzes. The Breeding and Gestation Herd Management Curriculum is divided into six sections. These sections are not separated to be equal in length but rather to break at distinct phases of breeding and gestation management. The Internet course was pilot tested in cooperation with the National Pork Producers Council during the spring of 2000. In the pilot class 39 participants enrolled and 26 completed the course. Participants were from 17 states (AK, AR, CA, FL, GA, IA, ID, IN, IL, MI, MN, MO, NC, NE, NH, OH, OK), Ecuador, Colombia and the Philippines. Of the 26 participants completing the course 14 were owner/operators, 6 were farm managers, 2 were breeding and gestation managers, 3 were employees and 1 was an educator. Of the 26 completing the course 20 were male and 6 were female. After completion of the six lessons and quizzes students were asked to complete a survey response. Average time spent on this course was 12 hours per student and most students worked on the material in the evenings. The completion of the pilot Internet course resulted in an average quiz score of 88.2%. Ninety-six percent of the participants completing the course agreed that Breeding and Gestation Herd Management provided him or her with an opportunity to improve their job skills. When asked about their improvement of knowledge on 14 key concepts the average responses ranged from 2.0 to 2.5 for every concept where 1 is Strongly Agree and 5 is Strongly Disagree. Furthermore 46% of the completing students indicated that they planned to make changes in their breeding and gestation barn practices based on information they learned in Breeding and Gestation Herd Management. Ninety-six percent of respondents also indicated that they would be interested in taking additional courses over the Internet. These results demonstrate that distance education programs not only makes information readily available at a time convenient to the clientele but that it is also effective in delivery and can result in improved knowledge and job skills.

Key Words: Pigs, Internet, Breeding

1308 Undergraduate education: exposing first- and second-year students to laboratory research. G. F. Erf*, W. G. Bottje, H. D. Chapman, M. Iqbal, R. Okimoto, and M. S. Parcells, *University of Arkansas, Fayetteville, AR, USA.*

In agricultural colleges with a strong research base, there are many research opportunities for undergraduate students in formal and informal settings (e.g., special problems courses, internships, work study and honors programs, etc.). However, entry-level undergraduate students interested in research opportunities may not pursue these interests due, in part, to limited exposure to the research environment, a lack of confidence, and difficulties in identifying a research mentor. The laboratory course entitled Rotations in Agricultural Laboratory Research described below was developed to provide first- and second-year undergraduates interested in science-based agricultural programs with the opportunity to conduct hands-on, interdisciplinary, team-based research. During the first 8 wk, students were taught research techniques and approaches during a 4-h structured laboratory and a 1-h discussion-session per wk. The teachers involved were researchers from three disciplines. For example, during Year 1, nine students conducted laboratory exercises in parasitology, immunology, and molecular virology. During wk 9, the students split into two groups and, with the aid of their teachers, each group developed a 4-wk research project integrating techniques used from at least two of the three disciplines. The teachers served as mentors for projects involving their discipline throughout the project period. The students reported their project and final results in an oral presentation and a written abstract. Students were evaluated based on the quality of their laboratory notebook, weekly quizzes on concepts learned in the laboratory, and their final abstract and presentation. Although still at the experimental stage, this course was very successful in providing students with confidence, enthusiasm, and the contacts to successfully pursue laboratory research opportunities. Currently (Year 2), disciplines taught are cellular physiology, immunology, and molecular genetics.

Key Words: Education, Laboratory course, Experiential learning

ASAS/ADSA International Animal Agriculture

1309 Interaction between chopping length of corn silage and long hay on chewing activity of dry cows. Paolo Berzaghi*[1,2], Giulio Cozzi[1], Flaviana Gottardo[1], and Igino Andrighetto[1], [1]*University of Padova, Italy,* [2]*US Dairy Forage Research Center, Madison, WI.*

Five Holstein dry cows were used in a 5 x 5 Latin square design with periods of 14d. Diets consisted of corn silage chopped at 6.7mm (S) and 14mm (L), long grass hay (H), and a combination of hay (20 %DM of the forages) with the short (SH) and the long (LH) corn silage. In all of the diets, soybean meal and a mineral premix were mixed to the forages to obtain a TMR with a CP concentration of 10 % DM. Diets were fed ad libitum (10% refusals) once a day. Chewing activity was monitored during the last 5d of each period using a portable APEC device (INRA, Clermont Ferrand, France) connected to a foam filled balloon placed under the lower jaw of the cows. The greater NDF content of grass hay (71.1 %DM) than the corn silages (44.6 %DM) reduced ($P < .01$) DM intake of H diet, but it maximized its NDF intake (7.0 *vs.* 5.6 kg; $P < .001$) in comparison to the four corn silage based diets. In diet S 2.6 % of the particles were retained by a 19mm screen. The coarser chopping of L diet increased this value up to 7.2 %. The different particles size did not affect DM intake and eating time, but it resulted in longer rumination time (491 vs. 389 min/d; $P < .02$) for L compared to S diet. The addition of hay to the corn silage diets resulted in a higher content (+3.7 %DM) and intake of dietary NDF (5.9 *vs.* 5.3 kg/d; $P < .02$). However, the rumination time of SH and LH diets was similar, leading to a significant ($P < .03$) hay addition x silage chopping length interaction. The same interaction tended to be significant ($P < .06$) for effective NDF, measured as time spent chewing per kg of NDF intake. The results indicate that chewing activity is affected by the particle size of the forage and by associative effects among forages with different composition and particle size. These results would also support the suggestion that in dry cows normal chewing activity is maintained by providing diets with 10-15 % of forage particles retained by a 19mm screen.

Key Words: corn silage, chopping length, chewing activity

1310 The peruvian dairy sector: farmers' perpectives, development strategies and policy options. Thomas Bernet[1] and Carlos Gomez*[2], [1]*International Potato Center,Lima/Swiss Agency for Development and Cooperation,* [2]*Universidad Nacional Agraria La Molina,Lima.*

This work assesses how expected market changes, farm strategies, and policy interventions might affect typical milk producers within the main Peruvian milksheds: Arequipa (coast), Lima (coast) and Cajamarca