450 Plotting covariance functions from random regression models. A. Legarra*[1], I. Misztal[1], and J. Jamrozik[2], [1]*University of Georgia, Athens, GA,* [2]*University of Guelph, Guelph, ON, Canada.*

Covariance functions estimated by fitting random regression models can contain artifacts (e.g. very high variances or correlations) due to small data sets, data structure or limitations of random regression models. These functions contain variances along trajectories and covariances between any two points for any given combination of traits. However, their high dimensionality makes it difficult to thoroughly check all these aspects. A library of functions was written in a matrix-algebra package to visualize time-dependent (co)variances and correlations among and within traits for different effects (additive direct and maternal, permanent...). Two sets of parameter estimates were analyzed. The first set, obtained using 4th order Legendre polynomials, is used in routine test-day evaluation of Canadian Holstein for 12 traits: milk, fat and protein yields and somatic cell scores in three parities. Covariance functions generally showed smooth patterns. Correlations decreased regularly with time within the same trait or among production traits. Correlations of yields with somatic cell score exhibited a more undulating shape. Values were generally small and negative, oscillating between 0.19 and -0.25, with high positive values seen only in the extremes of the trajectories. The second set, obtained using cubic Legendre polynomials, was an analysis of sequential weights of animals up to 2 years of age in Brasilian Nellore, fitting direct and maternal effects. Small peaks in the correlation patterns occurred relatively frequently. Correlations among maternal and direct additive effects dependent on the age oscillated between 0.35 and -0.65. Negative values were seen along most of the trajectory, and the value of 0.35 was observed in the correlation between direct additive effect at day 10 and maternal additive effect at day 570. Visual analysis of (co)variances and correlations allows to observe problems and can aid in constructing covariance functions without artifacts.

Key Words: Covariance functions, Random regression

451 Joint optimisation of the number of animals to test and to select. M.E. Goddard*, *University of Melbourne and Victorian Institute of Animal Science, Australia.*

Some species, especially with the aid of modern reproductive technology, can produce a very large number of gametes, so that the number of breeding stock needed to replace the herd does not limit the number that must be selected. Therefore the number selected can be optimised to balance the benefits from intense selection against the disadvantages of small effective population size. The intensity of selection also depends on the number available for selection (the number tested) and this can also be optimised to balance selection intensity against the costs of breeding and testing more animals. By differentiating a formula for the net benefit of selection, expressions for the optimum number to test and to select have been found. The optimum number to select depends largely on the ratio of the benefit from selection to the cost of low effective population size. The optimum number to test depends largely on the ratio of the cost of testing to the benefit from selection. The accuracy of selection can sometimes be increased usually at an increased cost. The approach used makes it possible to optimise the accuracy of selection jointly with the other two variables. As an example, the accuracy of a progeny testing was optimised by optimising the number of daughters per bull. Some of the costs of testing are proportional to the number of bulls tested and some are proportional to the total number of daughters. If these costs are decreased, the optimum solution changes very little in total costs, but the number of bulls increases as the cost per bull decreased and the number of daughters per bull increased as the costs per daughter decreased. In practice there is usually some selection of bulls prior to progeny testing. This can be optimised by optimising the number tested and selected at all stages in the process. Even if selection prior to progeny testing is of low accuracy, the optimum is to select intensely at this stage provided the cost per bull is small compared to the cost of progeny testing. This has implications for the use of DNA markers that might be used to select bulls for progeny testing.

Key Words: Progeny testing, Marker assisted selection

Extension Education: Management and profitability

452 Entrepreneurial characteristics of dairy farming differences between Dutch and Pennsylvania farmers. R.H.M. Bergevoet*[1] and L. A. Holden[2], [1]*Wageningen University,* [2]*Penn State University.*

The objective was to investigate the impact of different farming environments, European Union (EU) versus the northeastern US, on the dairy farmer's goals, values, and strategies for success. Dairy farmers in the Netherlands and Pennsylvania completed a common questionnaire assessing their goals, objectives, assessment of their business environment, and perception of success. Netherlands questionnaires (n=256) were completed by mail and Pennsylvania questionnaires were completed in person (n=73). The Mann-Whitney test was used to evaluate differences between groups of farmers. Results indicated that the main reasons for becoming involved in farming for both groups were more freedom, owning a business, and the potential for high income; however the degree of importance of these factors differed ($P<.05$) by group. Both groups placed a higher value on non-economic goals compared to economic goals, but with differing degrees of importance ($P<.05$). Both groups considered the image of their product and the development of the Internet as opportunities and legislation and local planning as threats, but they value consumer's concerns about the environment, animal welfare and food safety differently ($P<.05$). Netherlands farmers considered consumer concerns as opportunities while Pennsylvania farmers viewed them as threats ($P<.01$). Both groups valued farming in an "environment friendly" way, and neither group saw "going organic" as a serious option. Netherlands farmers especially evaluated their success on the criteria: ability to expand, net farm income and cost of production per hundredweight of milk. Pennsylvania farmers placed the most emphasis on net farm income. With different economic systems between the EU and northeastern US, there were common goals, values and business strategies shared by dairy farmers.

Key Words: Goals and objectives, Farmer characteristics, Assessment of environment

453 Whole farm planning for the production of grass-finished beef. T. M. Johnson*[1], R. E. Morrow[1], C. A. Wells[1], M. L. Thomas[1], and J. K. Apple[2], [1]*National Center for Appropriate Technology, Fayetteville, AR,* [2]*University of Arkansas, Fayetteville.*

Beef calves in the US are predominately produced on small farms then transported to feedlots prior to harvest. Some beef producers with adequate resources have been attempting to improve sustainability and capture more value by selling retail beef products; however, challenges exist that must be overcome to make the production of retail beef possible on the farmstead. In Northwest Arkansas, 11 farms participated in a SARE project to evaluate the potential of producing and direct marketing, grass-finished beef. In this pilot study, 50 crossbred calves from 11 producers were moved to a common site and rotationally grazed on wheat, cereal rye and annual rye pastures, from December 3, 2001 until June 25, 2002. No grain was fed. Calf initial weight was 307 $\pm$ 10.5 kg. Thirty-four calves were harvested from May 6 to June 25 in four groups when body condition score reached 6 when palpated by hand. Number of days grazed was 175 $\pm$ 3.9 d. Harvest weight was 456 $\pm$ 11.9 kg with an ADG of 0.86 $\pm$ 0.029 kg. The following carcass characteristics were observed: 54.4 $\pm$ 0.28% dressing percent, 249 $\pm$ 7.4 kg hot carcass weight, 2.01 $\pm$ 0.099 yield grade, with 85% of the carcasses grading select, 12% standard and 3% choice. Carcasses were dry-aged an average of 21-d and the retail yield was 145 $\pm$ 4.3 kg. Carcasses were processed into 25 retail cuts, with emphasis on boneless product. Products have been marketed through word of mouth, newspaper advertising, radio features, presentations to civic organizations, and a display booth during a local community fair. Sales during the first six months resulted in 36% of the product being sold. Data from this project has been presented at 11 meetings or workshops for beef producers and will be used in beef marketing publications produced on the ATTRA project. As a result, nine of these producers have formed a limited liability corporation, hired a professional marketing firm, and are pursuing additional marketing opportunities for grass-finished beef.

Key Words: Grass-finished Beef, Marketing, Sustainability

454 A model for data collection and reporting for cow/calf and feedlot operations. M. Coe*[1], D. ZoBell[2], and B. Bowman[2], [1]*Global Animal Management/Schering-Plough Animal Health,* [2]*Utah State University.*

The livestock industry has been working for several years to develop data collection and reporting models. The need for completion and implementation of traceability from birth to slaughter and eventually consumption has been elevated with the passage of the latest farm bill and specifically Mandatory Country of Origin Labeling. To be successful, individual data collection requires additional input costs associated with the labor, equipment, and software necessary to read, record, and store the individual animal data at each of the production segments. Data systems must be reliable, efficient, easy to use and include identification beginning at an early age and allow for data collection throughout the animal's life cycle. Realization of value requires the ability to coordinate and share data across all industry segments. A collaborative industry/Utah State University effort evaluated and demonstrated a Windows based desktop/PDA Palm based software application for collecting cattle registration records, health observations, diagnoses, and treatments for new calves in the university cow herd. A second Windows based desktop software application was evaluated to collect processing information at arrival in the University feedlot. An internet-based portal application was utilized to provide a secured environment for warehousing relevant business data for reporting, analysis, and information exchange. The data collected was made available locally and was uploaded to off-site data storage for disaster data protection and consolidated data reports. The use of a large database in conjunction with the internet allowed for reports to be generated at the production facility as often as management demanded. This model will also allow facilitation of audit or verification systems and electronic record delivery systems necessary for Country of Origin Labeling.

Key Words: Beef cattle, Identification, Data collection

455 Comparison of feedyard performance and profitability by percent Bos indicus in TAMU Ranch to Rail-South steers. J. C. Paschal*[1], N. C. Tipton III[2], M. J. De la Zerda[3], S. F. Allen[1], and J. W. McNeill[2], [1]*Texas Cooperative Extension,* [2]*Texas A&M University,* [3]*Texas Beef Council.*

Steers enrolled in the Texas A&M Ranch to Rail Program from 1992 until 2001 were compared for feedyard performance and profitability by percent Bos indicus (B) influence. Steers were categorized as either 0 (n=687), 25 (n=3248), 37.5 (n=1452), 50 (n=1380), or 100% (n=218) based on reported sire and dam breed composition. Data were analyzed using GLM procedures of SAS with year and percent Bos indicus as main effects. Data included on feed weight, ADG, final weight, days on feed (DOF), medicine costs, total cost of gain and feeding and marketing margins. On feed weights (kg), ADG (kg/d), final weights (kg) and DOF were 268, 1.4, 543 and 199; 274, 1.38, 541 and 194; 273, 1.42, 544 and 192; 273, 1.4, 532 and 187; and 292, 1.37, 510 and 163 for 0, 25, 37.5, 50 and 100% B, resp. Medicine costs, feed cost of gains, and net profitability ($/hd) were $6.63, $59.25, and $58.04; $5.25, $59.30, and $48.06; $5.66, $58.16, and $58.66; $4.06, $58.23 and $64.63; and $.79, $56.36, and $111.24 for 0, 25, 37.5, 50 and 100% B, resp. Feeding and marketing margins ($/hd) were $14.13 and $43.91; $13.55 and $34.52; $26.14 and $32.51; $21.72 and $42.91; and $41.66 and $69.58 for 0, 25, 37.5, 50 and 100% B, resp. There were few significant differences except for 100% B which were heaviest on feed, had less DOF, were lighter for final weight, had less medicine costs and the highest feeding and marketing margin and greatest net returns. These results show few differences in feedyard performance and profitability between 0 and 50 %Bos indicus steers.

Key Words: Feedyard performance, Profitabilty, Bos indicus

456 Comparison of carcass merit and tenderness by percent Bos indicus in TAMU Ranch to Rail-South steers. J. C. Paschal*[1], N. C. Tipton III[2], M. J. De La Zerda[3], S. F. Allen[1], and J. W. McNeill[2], [1]*Texas Cooperative Extension,* [2]*Texas A&M University,* [3]*Texas Beef Council.*

Steers enrolled in the Texas A&M Ranch to Rail Program from 1992 until 2001 were compared for measures of carcass merit and tenderness by percent Bos indicus (B) influence. Steers were categorized as either 0 (n=687), 25 (n=3248), 37.5 (n=1452), 50 (n=1380), or 100% (n=218) based on reported sire and dam breed composition. Data were analyzed using GLM procedures of SAS with year and percent Bos indicus as main effects. Data included on carcass weight (CW), fat thickness (FAT), REA, KPH fat, USDA Yield (YG) and Quality (QG) grades and Warner-Bratzler shear force (WBS). Carcass data was collected 36 h postmortem. All carcasses were electrically stimulated. Carcass weight (kg), FAT (cm), REA (cm2), and KPH (%) were 346, .13, 94.2, and 2.09; 344, .15, 91.6, and 2.16; 345, .17, 87.7, and 2.19, 338, .17, 85.8, and 2.19; and 321, .13, 80 and 2.05 for 0, 25, 37.5, 50 and 100% B, resp. USDA YG and QG were 2.03 and Se77, 2.3 and Se70, 2.6 and Se65, 2.66 and Se61, and 2.55 and Se60 for 0, 25, 37.5, 50 and 100% B, resp. Carcasses were sampled for WBS (0, n=54; 25, n=181; 37.5, n=85; 50, n=70; and 100, n=9) and recorded after 14 d ageing. WBS was 2.74, 2.75, 2.94, 3.26 and 3 kg for 0, 25, 37.5, 50 and 100% B, resp. There were few significant differences between % B except that 100 B had lighter CW and smaller REA. As % B increased CW, REA and QG decreased and FAT, KPH, YG and WBS increased but not significantly. These results show few differences in carcass merit and tenderness between 0 and 50% Bos indicus steers

Key Words: Carcass merit, Tenderness, Bos indicus

457 CalfTrack: A system of dairy calf workforce management, training, and evaluation and health evaluation. A. J. Heinrichs*[1], C. M. Jones[1], L. R. VanRoekel[2], and M. A. Fowler[2], [1]*The Pennsylvania State University,* [2]*Land O'Lakes Animal Milk Products, Co.*

Getting calves off to a good start is the first step in producing healthy, well grown replacement animals that are ready to enter the milking herd at 22 to 24 months of age. To meet this goal, employees must provide consistent, quality care for calves, particularly during the preweaning period. Several years of extension programming in the calf management area have culminated in the development of a comprehensive program entitled Calf Track. The Calf Track, Calf Management Training System is farm administered and employee oriented, and most materials are available in both English and Spanish. Calf Track is a complete training, education, and development program designed to ensure that employees consistently meet the biological, managerial, personnel, and resource requirements of the calf. The program includes an orientation video; chore plans, which are instruction sheets that sequentially teach new or experienced employees the standardized procedures required to perform a calf care task; a trainers guide containing detailed technical information for the herdsman; and a health scoring system. The chore plans cover a range of topics, including calving assistance, colostrum feeding, use of an esophageal feeder, mixing and feeding milk replacer, evaluating calf environments, normal appearance and behavior, and routine health treatments. The scoring system teaches animal monitoring and observation techniques; provides an action-oriented method of evaluating calf health, administering treatment, and recording health history; and offers a simple system of employee evaluation. The complete Calf Track Calf Management Training System is designed to help employees master daily calf-raising chores with confidence, independence, and a sense of accomplishment, while raising healthy dairy calves that can become productive and profitable herd replacements. This is an educational and training program that helps farm employees understand how to do their job and why it is important. In addition, the program outlines standard procedures for common calf care tasks and provides managers with an employee evaluation system.

Key Words: Calf management, Calf health, Calf nutrition