

640 Genome scan of BTA1 for QTL affecting weaning weight, yearling weight and postweaning growth in Japanese Black cattle. A. E. O. Malau-Aduli*¹, T. Niibayashi¹, T. Kojima¹, K. Oshima¹, Y. Mizoguchi², Y. Sugimoto², and M. Komatsu¹, ¹Dept of Livestock & Grassland Science, National Agric Res Center for W/Region, Oda, Shimane, Japan., ²Shirakawa Institute of Animal Genetics, Fukushima, Japan.

A genome scan for chromosomal regions of bovine chromosome one (BTA1) influencing weaning weight (WT6), yearling weight (WT12) and postweaning average daily gain (PWADG) was performed using 112 half-sib progeny of 4 Japanese Black (Wagyu) sires and 98 microsatellite DNA markers. Identity-By-Descent (IBD) probabilities at specific chromosomal locations from multiple marker data were determined and a linear model containing the fixed effects of sex, parity and season of birth as well as age as a covariate, was fitted to the IBD coefficients and phenotypic data. Data were analysed by generating an F-statistic by the regression of phenotype on the IBD probabilities of inheriting an allele from the sire. Permutation tests at chromosome-wide significance thresholds were carried out over 1,000 iterations at 1cM intervals while the bootstrap with resampling procedure was followed to estimate confidence intervals and average QTL locations. All these procedures were implemented in the QTL Express Computer programme with a web-based user interface (available at: <http://qtl.cap.ed.ac.uk/>). A significant QTL (P chromosome-wide threshold = 0.05) for PWADG was identified in Sires 2 and 3 located at 27cM and 29cM (95% confidence intervals of the QTL locations being 0-132cM and 0-125cM) respectively. Another QTL for WT12 was identified at 113cM in Sire 2. No significant effect on WT6 was detected in any of the sires. Selection indices that include QTL with accurately estimated effects on carcass characteristics could reduce the amount of lengthy and costly data collection by providing a means of genetic evaluation early in the life cycle. Since PWADG is positively correlated with WT6 and WT12 in beef cattle, the identification of these QTL in Japanese Black Cattle holds a high prospect for the implementation of marker-assisted selection for the early attainment of slaughter weight in this breed.

Key Words: QTL, Japanese Black, Growth

Extension Education: Extension education and evaluation programs

642 Using the internet for exchange of dairy genetic evaluations and research information for the dairy industry. A. H. Sanders*, F. A. Ross, and H. D. Norman, *Animal Improvement Programs Laboratory, Agricultural Research Service, USDA.*

The mission of the USDA Animal Improvements Program Laboratory (AIPL) is to foster genetic improvement in dairy cattle. Practical improvement in production and profitability is achieved through the distribution of genetic evaluations used by the dairy industry to guide breeding decisions. Since 1997, evaluations have been distributed via the internet through the AIPL website (<http://aipl.arsusda.gov>) and FTP site (<ftp://aipl.arsusda.gov>). Data used to calculate evaluations is received via the FTP site from dairy record processing centers (DRPC), breed associations, and other industry cooperators. Between quarterly evaluations, 11.2 million individual animal updates, and 150,000 pedigree updates come from DRPC and breed organizations, respectively. Over 80 interactive tools assist cooperators and AIPL staff with data quality control, and access is customized by user group. Genetic evaluations are also available to the public via the website through 22 interactive queries. More than 20 quarterly or yearly reports are also available. Complete documentation of evaluation procedures is stored in the AIPL website. The user-accessible directory includes 377 Mb of data and information in 12,000 files. A full function search engine assists with site navigation. File metadata also facilitates indexing by outside engines. In 1997, the National Agricultural Statistics Service reported that 20% of all farms with over \$100,000 annual sales had internet access. In 2001 that figure was up to 58%. In the second half of 2002, over 170,000 requests for bull evaluations and 67,000 requests for cow evaluations were submitted to the AIPL website. Evaluation access quadruples during the week following evaluation release. Links accessed within the AIPL website account for 74% of all website requests. Outside requests are from links on other sites 12% of the time, others coming from bookmarks or user entry. About 25% of all requests are from the top 1% of requesters. Recent website enhancements include Spanish language availability and improved indexing. Planned improvements in-

641 Different images of putative quantitative trait loci on BTA6 for correlated milk traits. G. Freyer*¹, P. Sorensen², C. Kuehn¹, and R. Weikard¹, ¹Research Institute for the Biology of Farm Animals, ²Danish Institute for Agricultural Science.

A number of publications based on various studies strongly suggest the existence of several putative quantitative trait loci (QTL) on the bovine chromosome 6 (BTA6) for the milk traits (Bovenhuis and Schrooten 2002). Further, they partly suggest equal QTL locations for different traits (e.g. Ron et al. 2001). The aim of our study was to investigate, whether previous findings of similar QTL positions for correlated milk traits are due to trait specific QTL or due to QTL with pleiotropic effects on several traits. For this reason, we applied a multitrait (co)variance component based QTL mapping method (Sorensen et al. 2003) to a data set involving five granddaughter families with 298 genotyped sons from the German Holstein cattle population. The marker map contained 16 microsatellite markers (according to Khn et al. 1999, extended), distributed across BTA6. The trait values (DYD and EBV) were provided by the VIT Verden. The multitrait-QTL approach (MTMQTL) is part of the DMU package, developed by the Danish Institute of Agricultural Sciences (DIAS) and allows analysing several traits multivariately, and specifying five different genetic submodels. A chromosome-wide significance threshold was used, because BTA6 is known to harbor QTL for several milk traits. We received significant QTL findings for milk yield (between markers BM1329 and FBN12), for yields of protein and fat (FBN9 ... FBN13), and QTL for contents of fat and protein (BM1329 ... FBN12). The multivariate analysis resulted in a significant pleiotropic QTL finding for fat yield and protein yield. The estimates of variance contribution due to the QTL were 20 % and 25 %, respectively. For fat yield and fat content, a pleiotropic QTL seems to be likely, between FBN12 and TGLA37, but these results were not fully significant. Negatively correlated milk traits are likely affected by trait specific closely linked QTL on BTA6, e.g. 24 cM apart for protein yield and fat content, according to significant results. The confidence interval CI (95%) was computed as suggested by Darvasi and Soller (1997) and ranged from 8 to 13 cM, depending on the model, in significant cases.

Key Words: Milk traits, Multivariate QTL analysis, Pleiotropic QTL

clude more-dynamic database query tools, and user account control for industry cooperators.

Key Words: Internet, Information technology, Dairy genetics

643 Effectiveness of presenting a national beef breeding management educational program via the internet. K. D. Bullock*¹, D. R. Strohbehn², E. J. Pollak³, B. L. Golden⁴, J. K. Bertrand⁵, and D. E. Wilson², ¹University of Kentucky, Lexington, Kentucky, ²Iowa State University, Ames, Iowa, ³Cornell University, Ithaca, New York, ⁴Colorado State University, Fort Collins, Colorado, ⁵University of Georgia, Athens, Georgia.

There is a great demand for beef cattle breeding and genetics information from cattle producers and animal sciences students, however, with shrinking budgets at many Universities there is often a void in expertise. A national educational program was developed to provide resource materials and train Extension beef cattle specialists, other Extension personnel, beef science instructors, graduate students, breed association representatives and beef stud company representatives in all phases of beef cattle breeding management. Seven one-hour sessions were developed that covered the following topics: basic genetic principles; using Expected Progeny Differences (EPD); future EPD; multi-breed evaluations; economically relevant traits; incorporating genomics in genetic evaluations; and applying the technologies available. Each session was developed and presented by experts in the respective fields. A web-based system was used to deliver the program. The presenter and recipient participated from their remote location. After each session the presentation and audio files were available for downloading and a CD of all sessions was distributed to participants. Additionally, at the completion of the series a survey was administered to evaluate the content, method of delivery and impact. Participants in 33 states enrolled and 31% of the enrolled participants returned a completed survey. This represented 42% faculty, 6% graduate students, 36% county/area Extension agents, and

17% other. Forty-one percent planned to use the presentations to deliver educational programs to producers, 74% planned to develop their own slides from the material for producer educational programs, 32% planned to use the material to teach undergraduate courses and 68% planned to use the information for consulting clientele. On a one to five scale from "Horrible" to "Excellent" the delivery method was rated 3.9 and the content was rated 4.1. Sixty-six percent thought the level of the content was "About Right". The estimated impact was 6808 contacts, which does not reflect the 69% that did not complete the survey or those that plan to utilize the CD. In conclusion, this genetic management series delivered via a web-based system was effective in educating a large national audience at a minimal cost.

Key Words: Beef cattle, Education, Breeding

644 Use of a dairy whole farm nutrient balance education tool (Dairy WFNBE) to teach dairy producers and their advisers about nutrient management concepts at the whole-farm level. J. H. Harrison^{*1}, T. Nennich¹, J. Gillies², and C. A. Rotz³, ¹Washington State University, ²NRCS, ³USDA/ARS, University Park, PA.

All dairies in the state of Washington were required by law to have an approved nutrient management plan by July 2002. By December 2003, these nutrient management plans must be certified that the planned practices and structures have been implemented. In early 2003, we conducted a series of nutrient management workshops to assist dairy producers and their advisers better understand the factors affecting the whole farm balance of nitrogen. The goal was to encourage active use of their nutrient management plans as a part of their overall farm management. A spreadsheet based education tool was developed in Excel[®] to demonstrate whole farm concepts related to nutrient balance with a focus on nitrogen. The goals in developing the tool were: 1) to have it viewed on a single page (worksheet), 2) to require inputs readily available on most dairy farms, and 3) to be consistent with a planning program developed by NRCS to write nutrient management plans for dairies in Washington. The inputs required to simulate a farm were: herd milk production, number of milking cows, dry cows, and heifers, DMI of lactating cows, CP content of lactating cow rations, fertilizer import, land in forage crops, yield and CP content of forage crops, soil organic matter content, estimated losses of manure nitrogen based on storage system and manure application method, and nitrogen loss due to denitrification. Output of the analysis included the manure nitrogen available to crops and the whole farm balance of nitrogen. Specific management strategies were demonstrated with the education tool, which included diet reduction of CP, level of milk production, custom raising of heifers, crop yield, and manure application method.

Key Words: Environment, Nutrient management, Extension education

645 Development of an educational program to promote the performance of dairy farms in North-East of Iran. A. Naserian and T. Vafa^{*}, Ferdowsi University of Mashhad, Khorasan, Iran.

Khorasan state is second top of milk production in Iran, which produce more than one million ton milk annually. Holstein is the dominant breed which is kept. Extension Department of Agriculture Ministry, in order to promotion of performance of dairy farms strongly recommended to herd owners employee dairy graduated person. The short course was developed in response to the desire of dairy owners to increase the skills of their employees. Extension personnel consulted with dairy producers during meetings to identify training needs. Dairy specialist from university trained these skills. The objective of present study was to evaluate the effect of dairy graduated student manager and short course training in performance of dairy herds in Khorasan. Data were collected from different farms with different sizes, between 1996-2002. Dairy farms were divided between two main class a) Farms with dairy graduated students managers (T1=DGSM), b) without dairy graduated students managers (T2=WDGSM). Each class was consisted of four herd sizes (40-60, 60-80, 90-110, 120-160). Data were analyzed using General Linear Models procedures of SAS v6.12 for ANOVA to evaluate differences among experimental groups. The design was completely randomized (unequal replicates) in a 2x4 factorial experiment. The results showed that herd owners employed DGSM had more milk and fat than other herds (P<0.0001). According to the following table, presence of graduated student manager has significant effect on milk production and fat

percentage in all herd sizes (p<0.0001). Interactions were not significant.

| Item | T1 | T2 | SEM |
|-----------|--------------------|--------------------|------|
| Milk (kg) | 26.75 ^a | 23.77 ^b | 2.73 |
| Fat % | 3.13 ^a | 3.01 ^b | 0.10 |

| | 40-60 | 60-80 | 90-110 | 120-160 |
|-----------|--------------------|--------------------|--------------------|--------------------|
| Milk (kg) | | | | |
| T1 | 26.73 ^b | 27 ^b | 26.43 ^b | 26.84 ^b |
| T2 | 23.68 ^a | 24.25 ^a | 22.9 ^a | 24.24 ^a |
| SEM | 11.41 | 8.4 | 8.4 | 5.75 |
| Fat % | | | | |
| T1 | 3.25 ^b | 3.15 ^b | 3.11 | 2.98 ^b |
| T2 | 3.08 ^a | 3 ^a | 3.09 | 3.11 ^a |
| SEM | 0.15 | 0.16 | 0.59 | 0.13 |

Key Words: Educational program, Management, Dairy cattle

646 The south Texas "Cow Camp" program. R. L. Stanko^{*1}, J. Ford², F. Escobedo², R. Mercado², B. Wymore², J. McManus², J. Lopez², R. Garza², H. Buehring², and J. C. Paschal³, ¹Texas A&M University-Kingsville, Kingsville, TX, ²Texas A&M University CEA, South Texas, ³Texas A&M University Cooperative Extension Service.

Building leadership for the future in the beef industry was the idea behind Cow Camp, a program developed and initiated in 1997 as a collaborative effort by south Texas Extension agents and Texas A&M University - Kingsville. The objectives of Cow Camp are to educate and build leadership skills of high school age youth interested in the beef cattle industry. Cow Camp was designed to provide an integrated, multifaceted three-day beef cattle program which included university experience. The camp consists of classroom, live animal laboratory, range and wildlife habitat evaluation, computer interactive, and tour sessions. Sessions provide knowledge, background, and experience in the cow-calf, feedlot, packing, marketing, breeding and selection, reproductive management, and herd health segments of the beef cattle industry. Camp instructors include faculty, Extension agents and specialists, industry professionals, and regional beef cattle producers. Campers (n=94) were selected through an application process which has resulted in 19 ± 3 students selected per yr during the past six yr. Youth have ranged in age from 14 to 18 yr (mean = 16 yr) and have originated from 44 Texas counties. A variety of race, experience, and geographical region has enhanced the experiential learning at Cow Camp. Most campers (98%) have owned cattle themselves as a result of other beef production youth activities (4-H or FFA). The remainder of campers and their parents (2%) owned no cattle. The majority (97%) of campers planned on attending college and 90% planned on majoring in an agriculture field. Success indicators include: 1) number of program participants, 2) continued support of the sponsors and donors, and 3) enhanced (P> .05) comprehension of beef cattle management and the beef cattle industry as determined by pre- and post-camp exams. This program has been successful for six consecutive years and could serve as a model for other youth livestock programs.

Key Words: Beef cattle, Youth, Extension

647 A Spanish language milker's school for Idaho dairy employees. K. S. Jensen^{*}, J. C. Dalton, W. Cook, D. Falk, and R. Norell, University of Idaho Cooperative Extension, Caldwell, ID.

A Spanish language milker's school for Idaho dairy employees was developed in response to the request of dairy producers for educational opportunities for their employees. University of Idaho Cooperative Extension personnel consulted a dairy advisory board, consisting of producers and members of allied industry, to identify critical topic areas. The program consisted of 4.5 h of classroom teaching, and was held in Caldwell, Twin Falls, Preston, and Blackfoot, Idaho. Topics included udder anatomy, cow preparation and sanitation, milk letdown, milk removal and milking unit handling, mastitis, prevention of antibiotic residues in bulk tank milk, milking systems, and the role of the dairy industry in Idaho's economy. All material was presented in Spanish. A 30-question test (true or false, fill in the blank, and multiple choice) covering various aspects of milking management was given to participants at the beginning and conclusion of the program. Fifty-six students completed the pre- and

post-test. The overall mean test score for the pre-test was 57.3%, while the mean for the post-test was 80.6%. A certificate of completion was awarded to all participants at the conclusion of the program. Additional Spanish language educational opportunities are planned due to the high level of interest among dairy producers and their employees.

Key Words: Spanish, Milker, Dairy

648 A novel method to aid in determining focus of 4-H youth programming. J. A. Nadeau*¹, E. A. McCabe-Alger², K. Chameroy¹, and T. Hoagland¹, ¹University of Connecticut, Dept. of Animal Science, ²University of Connecticut, Dept. of Extension.

General knowledge exams have been conducted as a part of the activities at the Eastern States New England 4-H Horse Show, the conclusion of a year of work for most New England 4-Hers. Until now, the exams were graded and ribbons awarded based on score. In 2002, an extension specialist and an extension educator wanted to develop an exam that may determine strengths and weaknesses of the youth from states participating in an event. They planned to use these results to enhance program planning statewide. One hundred multiple-choice questions were placed into 10 categories with 10 questions in each category. Questions were randomized so that each category was dispersed throughout the exam. The test was administered to approximately 100 4-Hers. Exams were photocopied and the copies scored immediately at the show. The original exams were scored by Scan-Tron and data were evaluated. Information on name, birth date, number of years attending the event, discipline (hunt seat, saddle seat, western, or junior leaders), and state was gathered. An average score for each category was calculated. The final result for each category calculated as percentage correct revealed how the strength or weakness of the state was in that area of the exam. This information was distributed to each state leader with the recommendation that the information be dispersed throughout the state. It was hoped that these results could then be used to help determine topics to include when developing statewide events, such as a state workshop day. The use of a randomized, categorized exam should be considered when feedback on strengths and weaknesses is desired. This system may also offer a way to determine a 4-Her's progress over time. This method, due to its simplicity and potential benefit to coaches, extension educators, extension specialists and 4-H youth, might also have potential for inclusion in hippology contests.

Key Words: Exam, Youth, Program planning

649 Arkansas 4-H dairy and meat goat conferences. J. A. Pennington*, University of Arkansas Cooperative Extension Service, Little Rock.

The Arkansas 4-H Dairy Goat Conference was initiated in 1994 at the request of dairy goat producers in the State. Topics included primarily management practices related to fitting and showing dairy goats which were presented at a county fairgrounds on Saturday in the spring. The next year, the conference moved to the Arkansas 4-H Center and topics were related to routine feeding and management in the morning and fitting and showing in the afternoon. In 1998, topics concerning meat goats were added, and the conference evolved into the Arkansas 4-H Goat Conference. In 2000 the conferences were split, and both dairy and meat goat conferences were conducted with the locations alternating yearly between northwest Arkansas and the 4-H Center in central Arkansas. Present topics include feeding, health, facilities, parasites, marketing and routine management plus fitting and showing. Youth are usually separated from adults for some sessions. Speakers are primarily Extension agents, industry personnel, and a scientist from Langston University. Participants in the conferences vary each year but are approximately 1/3 youth, 1/2 adults from industry and parents of youth, plus educators and speakers. Each year, a planning committee composed of goat breeders reviews comments from the previous year as they plan the program. Evaluations averaged 4.6 on a 5.0 scale last year and comments were positive, indicating that the conferences were well received by attendees.

Key Words: Dairy goat, Meat goat, Youth

650 Reducing catastrophic injury through helmet safety awareness. J. A. Nadeau¹, E. A. McCabe-Alger*², and A. Bialczak², ¹University of Connecticut, Dept. of Animal Science, ²University of Connecticut, Dept. of Extension.

The Connecticut Helmet Safety Program was developed to increase awareness of helmet safety throughout New England, especially Connecticut. This program was funded by USDA Farm Safety funds. According to recent medical examiner reports, 60% or more of horse related deaths result from head injuries. Helmets can reduce this risk by 70-80%. The program began with development of a peer-reviewed brochure and a web site. The brochure highlighted important facts about helmet safety and was distributed at various horse-related events throughout the year. A web site was developed that features information on helmet safety, proper fitting and care of helmets, types of helmets available, and links to other horse related sites such as the University of Connecticut Animal Science department and horse specialist web pages. Additionally, age appropriate techniques of promoting helmet safety awareness were developed. The program developers also attended various equine events throughout the year, presenting information about helmet safety through distribution of brochures, showing the video "Every Time, Every Ride," and sponsoring a drawing for helmets, "Every Time, Every Ride" videos and other prizes. In the future, a "train the trainer" curriculum will be developed in which interested volunteers will be educated about helmet safety and speak to interested groups. This will be accomplished through a training course and distribution of a pre-developed presentation on compact disc (CD). In the future the program will target equine groups who have historically failed to adopt helmets as a necessary safety feature. The Connecticut Helmet Safety Program offers many ideas on how to promote helmet safety awareness to all horse owners. This program can be used as a model for use in other states. Training others to effectively disseminate information on behalf of program developers such as extension specialists and extension educators can enhance the scope and impact of important programs.

Key Words: Helmet, Safety, Program planning

651 Fish farmer certification: In-depth classes for producers of catfish or freshwater prawns. G. J. Burtle*, University of Georgia, Tifton, GA/USA.

Interest in alternatives to conventional farm crops is creating a demand for detailed instruction in fish farm management. Catfish culture and freshwater prawn culture are the most popular aquacultural enterprises in Georgia. Instructional programs were developed to teach catfish culture over five days and freshwater prawn culture over three days in order to provide information in-depth and allow for hands-on learning during each session. A certificate of completion was offered for successful completion of each course. Letters describing course content were provided as material for business plan documentation. The catfish course consisted of five Saturday sessions from January to June. The freshwater prawn course began on a Thursday in October, in order to demonstrate harvesting, and included Saturdays in November and December. The first session was devoted to economics of production and processing, harvesting and marketing topics. Lectures in subsequent sessions covered facility design and construction, nutrition, water quality, animal health, hatchery, and nursery topics. Laboratory activities included economic spreadsheet use, water analysis, fish processing, disease recognition, and hatchery techniques. These sessions were fee-based to limit participation to those in earnest and extension personnel were given substantially discounted rates. Enrollment was allowed on a session-by-session basis. The courses drew 14 students for catfish training and 17 students for prawn training. Students have utilized their training to start processing operations, develop investment proposals, construct fish farms, or determine that they were not prepared to enter the business. Extension personnel comprised 25.8% of the students and were willing to invest the time to learn more about aquacultural enterprises.

Key Words: Aquaculture, Catfish, Freshwater prawn

652 Comparison of IgG concentrations and total protein concentration in the blood plasma of newborn dairy calves. D. T. Vines*, R. Rodgers, A. B. Bodine, and W. C. Bridges, Clemson University, Clemson, SC, USA.

Previous studies at other laboratories suggest a relatively high regression coefficient for plasma IgG and protein when measured by a hand held refractometer. Jugular blood samples were collected from 2-4 day

post-partum Holstein and Jersey calves at the Clemson University Dairy. Plasma was collected following centrifugation and stored at -20°C until assayed. Protein values were determined by placing one drop ($50\ \mu\text{l}$) on a refractometer window (Model RHC-200 ATC clinical refractometer, Westover Scientific) and reading value at $\text{g}/100\text{mL}$. IgG values were determined by a sandwich ELISA procedure using a monoclonal antibody against bovine IgG (Sigma Chem). Plasma samples were diluted at 1:20,000 with PBS containing 0.2% ovalbumin. The data obtained were analyzed by regression procedure for correlation and by regression analysis. Mean values ($n=148$) for IgG was $1947\ \text{mg}/100\text{mL}$ (S.E. $=\pm 47$). Mean value ($n=148$) for protein was $6.13\ \text{g}/100\text{mL}$ (S.E. $=\pm 0.07$). Mean IgG values ($n=97$) for Holsteins was 1889 (S.E. $=\pm 55.8$) and for Jersey

($n=51$) was 2059 (S.E. $=\pm 86.2$). Mean protein values ($n=97$) for Holsteins was 6.06 (S.E. $=\pm 0.09$) and for Jerseys ($n=51$), 6.20 (S.E. $=\pm 0.13$). Data analysis by the above statistical procedures revealed an r value of 0.26 with extensive skewness at $2000\ \text{mg}/100\text{mL}$ IgG. Within an assay there appeared to be a good positive correlation; increased protein similarly increased IgG. However, assay to assay variation was too great to result in an overall significant correlation between protein and IgG. In addition, comparison of refractometer protein readings to a standard protein analysis procedure could possibly suggest an insensitivity of the refractometer to major protein changes in plasma.

Key Words: IgG, Dairy calves, Refractometer

Growth & Development

681 Effects of conjugated linoleic acid (CLA) and trans- $C_{18:1}$ fatty acids (TFA) on energetic metabolites and subcutaneous adipose tissue fatty acid composition. L. H. Baumgard^{*1}, S. R. Sanders¹, C. Davis¹, B. A. Corl², J. W. Perfield, II², D. E. Bauman², and G. C. Duff¹, ¹The University of Arizona, Tucson, ²Cornell University, Ithaca NY.

Finishing beef cattle ($n=30$, $359\ \text{kg BW}$), which were studied in an immune trial were also utilized in this experiment. Cattle were fed isoenergetic diets (steam-flaked sorghum based) supplemented (top dressed) with rumen protected (RP) palm oil ($559\ \text{g}/\text{d}$; EnerGII[®][EII]; control), RP TFA ($594\ \text{g}/\text{d}$) or RP CLA ($609\ \text{g}/\text{d}$) for 35d. Each treatment provided $475\ \text{g lipid}/\text{d}$ and RP TFA consisted of 17.2% italicizetrans-6-8, 8.7% trans-9, 8.8% italicizetrans-10, 5.8% trans-11 and 7.3% italicizetrans-12 $C_{18:1}$ and the RP CLA contained 6.5% cis-9, trans-11, 5.4% c/t-8, c/t-10, 8.25% c/t-11, c/t-13 and 7.9% italicizetrans-10, cis-12 CLA. All bull calves were weighed and blood collected on d 0, 7, 13, 21, 28 and 35. Subcutaneous adipose biopsies were taken from the tail head on d 35. Overall, CLA supplementation decreased DMI ($P = 0.04$; 7.6, 7.4 and $6.1\ \text{kg}/\text{d}$ for EII, TFA and CLA, respectively) and did not effect G:F or ADG. CLA supplementation tended ($P = 0.10$) to increase NEFA concentrations (196^a , 213^{ab} and $258^b\ \mu\text{mole}/\text{L}$, for EII, TFA and CLA, respectively) and this was not dependent upon time. Supplementing CLA reduced ($P=0.04$) plasma glucose levels (5.4%) compared to EII and there was no trt \times time interaction. Compared to EII cattle fed TFA had increased ($P<0.01$) concentrations of trans-6-8 (120%), trans-9 (113%), italicizetrans-11 (30%) and trans-12 (62%) $C_{18:1}$ fatty acids, but did not change italicizetrans-10 $C_{18:1}$ ($64\ \text{mg}/\text{g fat}$) and also increased cis-9, trans-11 CLA (10%). Irrespective of treatment the content of italicizetrans-10 was 3.8 fold more than italicizetrans-11 $C_{18:1}$. CLA supplementation did not alter the trans- $C_{18:1}$ profile but increased italicizetrans-9, trans-11 and trans-10, cis-12 CLA content by 8 and 50% respectively. There was no treatment effect on total unsaturated fatty acid content (54%) or on the Δ^9 -desaturase index (42.5) nor any of the specific Δ^9 -desaturase ratios. These data indicate the Δ^9 -desaturase system contributes to the cis-9, trans-11 CLA content in beef adipose tissue.

Key Words: CLA, Δ^9 -desaturase

682 Effect of conjugated linoleic acid on DNA fragmentation in cultured adipocytes. K. M. Hargrave^{*} and J. L. Miner, University of Nebraska.

Dietary conjugated linoleic acid (CLA) causes body fat loss and DNA fragmentation in adipose tissue of mice. DNA fragmentation is an indication that CLA may cause apoptosis, either in preadipocytes or adipocytes. We recently reported that CLA promoted DNA fragmentation in cultured preadipocytes. The present study was designed to determine if mature 3T3-L1 adipocytes are susceptible to this effect of CLA. 3T3-L1 preadipocytes were seeded into 12-well plates with DMEM plus 10% calf serum, grown to confluence, and stimulated to differentiate with dexamethasone, IBMX, insulin, and fetal bovine serum. Differentiated cells were maintained in DMEM plus 10% fetal bovine serum for 7 to 9 d and then 0, 50, 100, or $200\ \mu\text{M}$ linoleic acid (LA) or trans-10, cis-12 CLA, complexed to albumin (6.6:1), or 50, 500, or $1\ \text{nM}$ staurosporine. Media were changed every 2 d. Cells were collected on d 2, 4, and 6 of treatment. Attached and detached cell number, DNA fragmentation, cellular triglyceride content, and glycerol content of media were determined. CLA did not increase DNA fragmentation compared to either the control or LA on any day. CLA, at the 50 and $100\ \mu\text{M}$ doses,

reduced ($P < 0.01$) cell number on d 2 but not on d 4 or 6. LA and CLA did not alter cellular triglyceride content on any day. CLA also had no effect on glycerol content of the media. However, $200\ \mu\text{M}$ LA increased ($P < 0.05$) glycerol in the media on d 2 (790 vs $1370\ \mu\text{g}$ for control vs $200\ \mu\text{M}$ LA, respectively). Staurosporine reduced ($P < 0.05$) total DNA on each day by 20 to 90% and appeared to increase DNA fragmentation on d 2. Additionally, 50 and $500\ \text{nM}$ staurosporine reduced ($P < 0.05$) cellular triglyceride content on d 2 by 42 and 65%, respectively, and increased the glycerol content of the media on each day, compared to the control. In conclusion, CLA did not cause an increase in DNA fragmentation in mature 3T3-L1 adipocytes. This indicates that the DNA fragmentation observed in fat pads of mice fed CLA may be attributed to preadipocytes and not to adipocytes.

Key Words: Conjugated linoleic acid, Adipocytes, DNA Fragmentation

683 IGF-I infusion alters gene expression profile of prepubertal bovine mammary parenchyma. B. E. Etchebarne^{*}, L.F.P. Silva, G.J.M. Rosa, P. M. Coussens, M. S. Weber Nielsen, and M. J. VandeHaar, Michigan State University.

Insulin-like growth factor-I (IGF-I) stimulates proliferation of bovine mammary epithelial cells in vitro and in vivo. Our objective was to identify key genes that mediate the IGF-I mitogenic response in prepubertal mammary parenchyma. IGF-I was infused via the streak canal into two quarters of six prepubertal Holstein heifers at $10\ \mu\text{g}/\text{quarter}$ per d; other quarters received saline plus BSA. After 7 d, heifers were killed and mammary parenchymal tissue was collected. IGF-I increased the percentage of epithelial cells in the S-phase by 30%, as reported in a separate abstract. To date, gene expression profiles of total parenchymal mRNA from each quarter of 2 animals have been examined using a bovine-specific cDNA microarray system containing 796 unique expressed sequence tags and 539 amplicons representing known genes. A loop design was used with cDNA from each quarter of each cow labeled with Cy3 or Cy5 dyes prior to microarray hybridization. Gene expression data were normalized for dye intensity using control genes. Significance levels of differential gene expression among treatments were assessed using a mixed model approach with the procedures LOESS and MIXED of SAS. IGF-I increased expression of several genes. Of particular interest, IGF-I upregulated nuclear receptor coactivator 6 interacting protein, an activator of the STAT3 pathway; beta-1,4-N-acetylglucosaminyltransferase IV, which influences cell cycle progression and susceptibility to apoptotic stimuli; MHC Ovar-DR-alpha, which interacts with the STAT1 pathway; and nickel-specific induction protein (Cap43), a marker for rapidly proliferating breast cancer cells. Expression of these 4 genes was increased 70 to 100% ($P < 0.008$). We are currently evaluating the other 4 animals in the study, verifying changes with real-time PCR, and employing laser capture microdissection to measure expression profiles of epithelial and stromal cell types separately. We conclude that IGF-I infusion into prepubertal bovine mammary glands induces changes in expression of genes affecting STAT signaling, mammary cell apoptosis, and cell cycling.

Key Words: IGF-I, Microarray, Mammary development