## PRODUCTION, MANAGEMENT, AND THE ENVIRONMENT: **ECONOMICS OF DIFFERENT MANAGEMENT PRACTICES**

**0566 Effects of technology use in feedlot production systems on feedlot performance and carcass characteristics.** *C. L. Maxwell[1], B. C. Bernhard[*1], C. F. O'Neill[1], B. K. Wilson[1], C. Hixon[1], C. Haviland[1], A. Grimes[1], M. S. Calvo-Lorenzo[1], D. L. VanOverbeke[1], G. G. Mafi[1], C. J. Richards[1], D. L. Step[1], B. P. Holland[2], and C. R. Krehbiel[1], [1]Oklahoma State University, Stillwater, [2]Merck Animal Health, DeSoto, KS.*

The objectives of this study were to examine the effects of conventional feedlot production systems with and without the use of a β-adrenergic agonist compared to a natural production program on feedlot performance and carcass characteristics. Natural crossbred beef steers ($n$ = 336; initial BW = 379 ± 8 kg) were randomized to one of three treatments in a RCBD (14 steers/pen; 8 pens/treatment). Treatments consisted of a natural treatment (NAT), a conventional treatment (CONV), and a conventional treatment with a β-agonist (CONV-Z). The NAT cattle received no growth-promoting technologies. The CONV and CONV-Z cattle were implanted with 40 mg of estradiol and 200 mg of trenbolone acetate on d 0, and were fed 33 and 9 mg/kg of monensin and tylosin daily, respectively. The CONV-Z cattle were fed zilpaterol hydrochloride at 6.76 mg/kg (90% DM basis) for the last 20 DOF. There was no effect of treatment on DMI ($P$ = 0.83); however, CONV-Z steers gained 3.8% faster (1.64 vs. 1.58 kg/d; $P$ < 0.01) and were 5.3% more efficient (0.160 vs. 0.152; $P$ < 0.01) than CONV steers, and CONV steers gained 32.8% faster (1.58 vs. 1.19 kg/d; $P$ < 0.01) and were 26.7% more efficient (0.152 vs. 0.120; $P$ < 0.01) than NAT steers. Hot-carcass weight was increased by 8 kg for CONV-Z steers compared to CONV steers (394 vs. 386 kg; $P$ = 0.05) and 46 kg compared to NAT steers (394 vs. 348 kg; $P$ < 0.01). Fat thickness was less for CONV-Z compared to CONV cattle (1.10 vs. 1.22 cm; $P$ = 0.03), but not different from NAT ($P$ > 0.05). Longissimus muscle area was increased by 3.6 cm$^2$ for CONV-Z steers compared to CONV steers (92.29 vs. 88.67 cm$^2$; $P$ = 0.02) and 12.1 cm$^2$ for CONV-Z steers compared to NAT steers (92.29 vs. 80.16 cm$^2$; $P$ < 0.01), resulting in a 17.9% unit reduction in USDA YG 3 for CONV-Z steers compared to NAT steers (30.70 vs. 48.61%; $P$ < 0.05). There was no difference in marbling score for CONV steers compared to NAT steers (470 vs. 471; $P$ = 0.99); however, CONV-Z steers had a lower marbling score compared to the other treatments (432; $P$ < 0.01). The results of this experiment show that CONV-Z and CONV production results in a significant improvement in feedlot performance and USDA Yield Grade compared to NAT.

**Key Words:** conventional, beef cattle, natural

**0567 The effects of technology use in feedlot production systems on the health status of finishing steers.** B. C. Bernhard[*1], C. L. Maxwell[1], C. F. O'Neill[1], B. K. Wilson[1], C. G. Hixon[1], C. Haviland[1], A. Grimes[1], M. S. Calvo-Lorenzo[1], C. J. Richards[1], D. L. Step[1], B. P. Holland[2], and C. R. Krehbiel[1], *[1]Oklahoma State University, Stillwater, [2]Merck, Volga, SD.*

Crossbred steers ($n$ = 336; initial BW = 379 ± 8 kg) were utilized in a RCBD (24 pens; 8 pens/treatment; 14 steers/pen) to determine the effects of technology use in feedlot production systems on animal health. Treatments consisted of an all-natural treatment (receiving no growth promoting technologies; NAT), a conventional treatment (implanted with 40 mg of estradiol and 200 mg of trenbolone acetate on d 0, and fed 33 and 9 mg/kg of monensin and tylosin daily, respectively; CONV), and a CONV treatment plus the addition of a β-adrenergic agonist (zilpaterol hydrochloride at 6.76 g/ton for the last 20 DOF with a 3–4 d withdrawal; CONV-Z). Steers were observed daily for signs of respiratory disease and lameness. Blood samples were collected from seven steers/pen every 28 d until d 112 and then every 10 d during the β-agonist feeding period to determine the hemogram. At harvest, livers were observed for abscesses, and lungs were palpated for abnormalities. Three steers died during the study, with necropsies indicating bloat (1-NAT; 1-CONV-Z before the zilpaterol feeding period; 1-CON-Z during the zilpaterol feeding period) as the cause of death, and no steers required treatment for respiratory disease. All blood analytes measured were within clinically normal concentrations throughout the experiment. Treatment had no effect on red blood cells, hematocrits, reticulocytes, or platelets ($P$ > 0.34). There was a Treatment × Time interaction for total white blood cells (WBC; $P$ < 0.01) with CONV and CONV-Z cattle having greater WBC counts than NAT cattle from d 28 (9.83 and 9.54 vs. 8.60 K/μL, respectively) through d 132 (10.83 and 11.25 vs. 9.83 K/μL, respectively; $P$ < 0.03). There was a Treatment x Time interaction ($P$ < 0.01) for neutrophils with CONV and CONV-Z cattle having greater neutrophil counts than NAT cattle from d 28 (2.57 and 2.47 vs. 1.99 K/μL, respectively) through d 132 (3.51 and 3.47 vs. 2.44 K/μL, respectively; $P$ < 0.03). More monocytes were detected in the CONV and CONV-Z cattle compared to the NAT cattle (1.21 and 1.22 vs. 1.08 K/μL, respectively; $P$ < 0.01). No differences in blood analytes were observed between CONV and CONV-Z during the zilpaterol feeding period ($P$ > 0.25). There was no effect of treatment on liver abscesses ($P$ = 0.74) or lung abnormalities ($P$ > 0.09). Collectively, this experiment demonstrates that growth-promoting technologies did not affect overall health of finishing steers.

**Key Words:** β-adrenergic agonist, blood analytes, health status

**0568 Survey of BQA cattle handling practices that occurred during processing feedlot cattle.**

R. Woiwode* and T. Grandin, *Colorado State University, Fort Collins.*

The public is increasingly concerned with how animals in production agriculture are treated. The objective of this study was to ascertain feedlot performance in Beef Quality Assurance cattle handling categories. A survey was conducted to quantify prevalence of cattle handling practices that adhere to BQA guidelines. Data were collected at 28 feedlots ranging in size from 5000 to more than 100,000 head in Colorado, Kansas, and Nebraska. According to BQA guidelines, 100 cattle were observed during handling at every site except for two, where 90 and 78 head were observed due to lack of cattle. Data were collected on percentage of cattle moved with an electric prod, percentage that vocalized after capture in the squeeze chute before procedure, percentage of falls while exiting the squeeze chute, percentage stumbling while exiting, and percentage jumping and running on exit from the squeeze chute. Feedlots in this survey performed above BQA guidelines in the categories of electric prod use (5.5% vs. 10%); vocalization (1.4% vs. 5%), stumbles (6.7% vs. 10%), falls (0.8% vs. 2%), and cattle that jumped and ran from the squeeze chute (12.8% vs. 25%). The mean percentage of cattle moved with an electric prod was 5.5%, with a range of 0 to 45%; cattle that vocalized in the chute before procedure was a mean of 1.4% with a range of 0 to 5.1%. The mean percentage of cattle stumbling while exiting the squeeze chute was 6.7%, with a range of 0 to 28%; cattle falling was 0.5%, with a range of 0 to 2%. The mean percentage of cattle that jumped and ran out of the squeeze chute was 12.8%, with a range of 0.1 to 18%; cattle miscaught in the squeeze chute was 2%, with a range of 0 to 16.1%. Under BQA guidelines, there is zero tolerance for an improper catch that is not adjusted, and feedlots in this survey show some room for improvement, with a mean score of 2% vs. the BQA guideline of 0%. Of the improper catches, 60% were not adjusted. Round crowd pen handling systems were used at 25 yards, and three yards used Bud box handling systems. At one feedlot, a contract crew employee jerked out ear tags, resulting in some ear splits. Discussion with feedlot managers revealed increased awareness of the importance of moving small groups of cattle into the crowd pen and avoiding yelling.

**Key Words:** cattle handling, BQA guidelines, feedlots

**0569 The effects of technology use in feedlot production systems on cattle behavior and mobility.**

B. C. Bernhard*[1], C. L. Maxwell[1], C. F. O'Neill[1], B. K. Wilson[1], C. Haviland[1], A. Grimes[1], M. S. Calvo-Lorenzo[1], C. J. Richards[1], D. L. Step[1], B. P. Holland[2], C. R. Krehbiel[1], and C. G. Hixon[1], *[1]Oklahoma State University, Stillwater, [2]Merck, Volga, SD.*

Crossbred steers ($n$ = 336; initial BW = 379 ± 8 kg) were utilized in a randomized complete block design (24 pens; 8 pens/treatment; 14 steers/pen) to determine the effects of technology use in feedlot production systems on animal behavior and mobility. Treatments consisted of an all-natural treatment (defined as cattle receiving no growth promoting technologies; NAT), a conventional treatment (implanted with 40 mg of estradiol and 200 mg of trenbolone acetate on d 0, and fed 33 and 9 mg/kg of monensin and tylosin daily, respectively; CONV), and a CONV treatment plus the addition of a β-adrenergic agonist (zilpaterol hydrochloride at 6.76 g/ton for the last 20 d on feed with a 3–4-d withdrawal; CONV-Z). Handling assistance, temperament, and exit scores at the chute and temperament in each home pen were collected every 28 d until d 112, and then every 10 d during the β-agonist feeding period. On the d of shipment, cattle mobility was scored before loading at the feedlot and while unloading at the abattoir. There was no effect of treatment on cattle requiring assistance to enter the squeeze chute ($P$ = 0.35). There was a Treatment x Time interaction for chute temperament score ($P$ = 0.03), with NAT cattle being more restless than CONV cattle at d 56 (2.24 vs. 1.98; $P$ = 0.02) and CONV-Z cattle intermediary (2.14). Pen temperament was not affected by treatment ($P$ = 0.14). Overall temperament score resulted in CONV-Z cattle being numerically calmer than NAT cattle (1.47 vs. 1.61; $P < 0.02$) and CONV cattle intermediary (1.57). Chute exit scores resulted in a Treatment x Time interaction ($P < 0.01$), with NAT cattle having a greater exit score than CONV and CONV-Z cattle (2.24 vs. 1.93 and 1.87; $P <$ 0.03) on d 132. There were no differences in exit velocity ($P >$ 0.37). Treatment displayed no effect on cattle mobility before loading or during unloading ($P \geq 0.14$), but numerically, cattle had a more difficult time moving at the abattoir than at the feedlot. The results of this experiment suggest that growth-promoting technologies have no negative effects on cattle mobility and could potentially improve cattle temperament at the end of the finishing period.

**Key Words:** behavior, β-adrenergic agonist, mobility

**0570 Predicting dry matter intake by growing and finishing beef cattle: evaluation of current methods and equation development.** U. Y. Anele*[1], E. M. Domby[2] and M. L. Galyean[3], [1]*Lethbridge Research Centre, Agriculture and Agri-Food Canada, AB,* [2]*Cargill Animal Nutrition, Amarillo, TX,* [3]*Texas Tech University, Lubbock.*

The NRC (1996) equation for predicting DMI by growing-finishing beef cattle, which is based on dietary NEm concentration and average $BW^{0.75}$, has been reported to over- and underpredict DMI depending on dietary and animal conditions. Our objectives were to: 1) develop more robust equations for predicting DMI from BW and dietary NEm concentration; and 2) evaluate the use of NE requirements and dietary NE concentrations to determine the DMI required (DMIR) by feedlot cattle. Two DMI prediction equations were developed from a literature data set that covered a wide range of dietary NEm concentrations, which represented treatment means from published experiments from 1980 to 2011. Predicted DMI from the two equations, which were based on NEm concentration and either the ending BW for a feeding period or the DMI per unit of average BW (End BW and DMI/BW, respectively), accounted for 61 and 58% of the variation in observed DMI, respectively, vs. 48% for the 1996 NRC equation. When validated with four independent data sets that included 7751 pen and individual observations of DMI by animals of varying BW and feeding periods of varying length, DMI predicted by the 1996 NRC equation, the End BW and DMI/BW equations, and the DMIR method accounted for 13.1 to 82.9% of the variation in observed DMI, with higher $r^2$ values for two feedlot pen data sets and lower values for pen and individual data sets that included animals on lower-energy, growing diets, as well as those in feedlot settings. The DMIR method yielded the greatest $r^2$ values and least prediction errors across the four data sets, but mean biases ($P < 0.01$) were evident for all the equations, ranging from as high as 1.01 kg for the DMIR method to -1.03 kg for the 1996 NRC equation. Negative linear bias was evident in virtually all cases, suggesting that prediction errors changed as DMI increased. Despite an expanded literature database for equation development, other than a trend for lower standard errors of prediction with the DMI/BW equation, the two new equations did not offer major advantages over the 1996 NRC equation when applied to the validation data sets. The DMIR method accounted for the greatest percentage of variation in observed DMI and had the least RMSE values in all data sets evaluated, indicating that this approach should be considered as a means of predicting DMI.

**Key Words:** beef cattle, dry matter intake prediction, feed intake

**0571 Optimizing concurrently dairy farm profitability and environmental performance.** D. Liang* and V. Cabrera, *University of Wisconsin, Madison.*

The objective of this analysis was to assess economic and environmental impacts of a dairy farm milk production using the Integrated Farm System Model (IFSM, version 4.0, University Park, PA). The IFSM was applied to integrate crop growth, feed storage, machinery usage, and herd management to simulate the highest possible milk production with the available on-farm resources and purchased feed. A representative Wisconsin dairy farm system was defined as a typical farm with 100 milking cows and 247 acres of cropland. Farm performance was then simulated using 25 yr of daily weather data (1986 to 2010). A sensitivity analysis was conducted by increasing the input target milk production starting at 9837 kg/cow per yr. The fat-protein-corrected milk production (FPCM) increased linearly as the target milk production was increased to 10,457 kg/cow per yr. Followed, the FPCM increased nonlinearly (at a decreasing rate) until the target milk production was increased to 10,980 kg/cow per yr. Thereafter, FPCM remained flat regardless of higher target milk production input. The per-kg FPCM net return ($/kg FPCM) showed a similar trend, increasing from $4.08 ± 2.32 to $6.20 ± 2.19, and then to $6.78 ± 2.18, respectively. Given the farm carbon footprint (kg $CO_2$eq/kg FPCM) as the result of dividing the net greenhouse gas emission (including methane, nitrous oxide, and carbon dioxide) by the FPCM, it decreased from 0.69 ± 0.04, to 0.67 ± 0.04, and then to 0.65 ± 0.04, respectively, as the FPCM and the net return increased. We concluded that increasing productivity using only farm available resources would elevate the net return and decrease carbon footprint at the same time. Further research is required to explore management strategies that determine increased productivity within farm-specific conditions.

**Key Words:** whole-farm simulation model, farm profit, greenhouse gas emission

**Table 0571.**

| Input target milk production (kg/cow per yr) | Simulated actual milk production (kg/cow per yr) | Fat-protein-corrected milk production (FPCM; kg/cow per yr) | Net return per kg of FPCM (FPCM; $/kg FPCM) | Carbon footprint (kg CO2 eq/kg FPCM) |
|---|---|---|---|---|
| 9834 | 9834 ± 0.00 | 9079 ± 0.00 | 4.80 ± 2.32 | 0.69 ± 0.04 |
| 10,457 | 10,455 ± 9.54 | 9652 ± 9.54 | 6.20 ± 2.19 | 0.67 ± 0.04 |
| 10,980 | 10,748 ± 96.82 | 9922 ± 89.54 | 6.78 ± 2.18 | 0.65 ± 0.04 |
| 11,457 | 10,746 ± 87.27 | 9921 ± 80.45 | 6.78 ± 2.15 | 0.65 ± 0.04 |

**0572 Economics of transition cow management of dairy herds.** G. M. Schuenemann[*1] and K. N. Galvão[2], *[1]Dep. of Veterinary Preventive Medicine, The Ohio State University, Columbus, [2]Dep. of Large Animal Clinical Sciences, University of Florida, Gainesville.*

It is common to observe large among-herd variation in culling risk within 60 DIM. The objective was to assess the effect of two culling risks within 60 DIM (6% vs. 12%) on the economic outcomes of dairy herds with the same reproductive performance using an individual cow-based model. For the simulation, two culling risks (6% vs. 12%) and two cow sale prices ($1.85 vs. $1.37 per kg) were compared using the same reproductive program and performance. Cows were enrolled in an Ovsynch (OVS) preceded by Presynch with two injections of PGF 14 d apart, and OVS for resynchronization of open cows at 32 d after AI. Also, cows undergo estrous detection (ED) and AI after first AI, and cows diagnosed open 32 d after AI are resynchronized using OVS. Cows were not inseminated after 365 DIM, and open cows were culled after 450 DIM. Culled cows were immediately replaced with primiparous cows. Herd was maintained at 1000 cows. Mortality was set at 6% and abortion at 11.3%. The dry period and VWP was 60 d. Conception rate to first service was set to 32% (decreased by 2.5% for every subsequent service), and ED was set to 60%. Accuracy of ED and compliance with each injection were set at 95%. Net daily value was calculated by subtracting the costs associated with replacement heifers ($1,600/heifer), feeding costs ($0.25/kg of lactating cow diet; $0.15/kg of dry cow diet), breeding costs ($0.15/cow/d for ED; $2.65/dose PGF; $2.4/dose GnRH; $0.25/injection administration), and other costs ($2.5/d) from the daily income with milk sales ($0.44/kg milk), cow sales ($1.85 or $1.37/kg live weight), and calf sales ($240/calf). Simulation was performed until steady state was reached (4000 d), then average daily values for the subsequent 1000 d were used to calculate profit ($/yr). According to the model (same herd size, synchronization program, reproductive performance, and feeding costs), the annual profit was $55,480 higher for herds with 6% compared to 12% culling risk within 60 DIM. When the cow sale price was $1.37/kg and replacement costs remain the same, the annual profit was $80,300 higher for herds with 6% compared to 12% culling risk within 60 DIM. Early removal of lactating cows from the milking herd affects the bottom line of dairy operations.

**Key Words:** culling risk, economics, dairy herds

**0573 The impact of selected milking, feeding, and housing management systems on the profitability of Quebec dairy herds.** H. A. Delgado[*1], R. I. Cue[2], A. Sewalem[3], R. Lacroix[4], D. Lefevre[4], E. Bouchard[5], D. Haine[5], and K. Wade[1], *[1]McGill University, Ste-Anne-de-Bellevue, QC, Canada, [2]McGill University, Dep. of Animal Science, Ste-Anne-de-Bellevue, QC, Canada, [3]Agriculture and Agri-food Canada AAFC, Guelph, ON, Canada, [4]Valacta, Ste-Anne-de-Bellevue, QC, Canada, [5]University of Montreal, Ste-Hyacinthe, QC, Canada.*

In Quebec, management of dairy herds is affected by various combinations of milking systems (milk line, milking parlor, or milking robot), housing systems (tie-stall or free-stall), and feeding systems (traditional feeding, automatic forage distribution, automatic concentrate distribution, computerized automatic concentrate distribution, automatic silage and concentrate distribution, and total mixed ration). The objective of this research was to determine if there were differences in the lifetime profitability of dairy cows, based on common Quebec management conditions, specifically with regard to their associated production and health costs. Grouping the three variables resulted in eight existing management combinations that contained data (e.g., milk line + tie-stall + total mixed ration). Health and production data for individual animals were provided by the Quebec Animal Health Files (DSA) and Quebec DHI (Valacta), respectively. Herds were required to have at least 12 calvings per year, resulting in a data set of 70 Holstein herds with both health and production data for the period 2000 though 2010, inclusive. Individual cumulative values by parity, as well as the last cumulative lifetime record, were computed for each animal. Four profitability measures were examined to account for different criteria, such as variable costs, opportunity costs, and discounted net present value, and mixed-model methodologies were used to test differences among those profitability measures for the different management combinations. Of the 70 herds, 58 used a milk line, seven used a milking parlor, and five used robotic milkers. There were significant differences among the management combinations for the four different profitability measures examined. Management groups associated with a milking parlor had the lowest estimated lifetime cumulative feed cost: $3,968 (± 73) vs. $4,297 (± 36) for milk lines and $4,057 (±86) for robotic milkers. They also had animals with an earlier age at first calving (1.1 mo earlier than those in groups with milk lines). Management groups with robotic milkers had the lowest lifetime cumulative health cost, explained in part by the lower average number of mastitis events per animal per parity: 0.12 (± 0.034) vs. 0.20 (± 0.028) for milking parlor groups and 0.23 (±0.020) for milk line groups. There were significant variations in profitability measures of milk-line groups that were attributable to feeding system. Variation in lifetime profitability of individual animals is, therefore, not

only explained by the obvious feed and health factors but also by the various management systems in which they occur.

**Key Words:** profitability, management, dairy cows

**0574 Grazing alfalfa as an alternative to reduce production costs in intensive milk production systems.**

F. A. Kuwahara[1], A. M. Pedroso[*2], G. B. Souza[3], and R. P. Ferreira[3], *[1]UNESP/FMVZ, Botucatu, Brazil, [2]EMBRAPA, São Carlos, Brazil, [3]EMBRAPA, Sao Carlos, Brazil.*

Intensively managed grass-based milk production systems in Brazil are highly dependent on concentrate supplementation of the milking cows to achieve high productivity levels. Depending on feed prices, the production costs can be very high, leading to low profitability. This study aimed to evaluate the use of grazing alfalfa (*Medicago sativa, sp*.) as an alternative to reduce concentrate inputs and reduce production costs. The trial was conducted at EMBRAPA's (Brazilian Agricultural Research Corporation) research station, located in Sao Carlos, SP, in the southeast region of Brazil. Thirty-six lactating dairy cows were used on a complete blocks design to evaluate the effect of allowing the cows to graze alfalfa for different periods on milk production, dry matter intake, and feed efficiency. Cows were allocated to four experimental treatments (A = control, no alfalfa grazing; B = access to alfalfa paddocks for 1 h; C = access to alfalfa paddocks for 2 h; D = access to alfalfa paddocks for 4 h) according to stage of lactation and milk production. All cows rotationally grazed tropical grass paddocks and were supplemented with different concentrate quantities (9.82, 9.32, 9.03, and 8.73 kg of DM daily for treatments A, B, C, and D, respectively) Cows on treatment A had no access to alfalfa, and cows on the other treatments had access to alfalfa paddocks for 1, 2 or 4 h immediately after the morning milking. Results are shown on Table 0574. Data were analyzed using PROC MIXED of SAS and averages were compared with Tukey test. Treatment differences were considered significant at $P < 0.05$. No effects were observed among treatments for any parameter analyzed. Based on the results, alfalfa grazing may be a good strategy to reduce production costs, depending on the prices of the concentrate supplements.

**Key Words:** milk production, grazing, alfalfa

**Table 0574.**

| | Treatment A | Treatment B | Treatment C | Treatment D |
|---|---|---|---|---|
| DMI, kg/d | 15.68 | 15.84 | 15.81 | 15.09 |
| Milk, kg/d | 23.86 | 23.28 | 23.41 | 24.21 |
| FE, kg/kg | 1.605 | 1.566 | 1.549 | 1.656 |

**0575 Comparison of productivity and management practices on Dairy Herd Improvement Association (DHIA) and non-DHIA herds in the United States.**

J. E. Lombard*, C. A. Kopral, M. A. Parke,r and C. A. Haley, *USDA:APHIS:VS: Center for Epidemiology and Animal Health, National Animal Health Monitoring System, Fort Collins, CO.*

The objective of this investigation was to compare productivity and management practices between DHIA and non-DHIA herds. Data for this comparison were collected as part of the National Animal Health Monitoring System¢s Dairy 2007 study, which surveyed 2194 randomly selected dairy herds in 17 top dairy states. The survey design was a stratified random sample, and all respondent data were statistically weighted to ensure that samples reflected the study population. Regression analyses were conducted and included multiple outcome variables of interest, herd size, region, and whether the operation participated in DHIA. *P*-values < 0.05 were considered significant. Almost half of herds in the study (46.0%) used DHIA for individual-animal recordkeeping. The average size for DHIA herds was 416 cows compared with 448 cows for non-DHIA herds. A higher percentage of herds in the east region (46.7%) were enrolled in DHIA compared with herds in the west region (37.3%). There were significant productivity differences between DHIA and non-DHIA herds. DHIA herds had a higher mean rolling herd average milk production than non-DHIA herds (9873 kg and 8521 kg, respectively) and a longer mean calving interval (13.6 and 13.0 mo, respectively). The percentage of DHIA herds that used bovine somatotropin was more than triple that of non-DHIA herds (23.8 and 7.8%, respectively). In addition, DHIA herds reported lower mortality rates for preweaned heifers than non-DHIA herds (8.3 and 9.5%, respectively). Best management practices, in general, were more widely adopted by DHIA herds than non-DHIA herds. A significantly higher percentage of DHIA herds were enrolled in quality assurance programs, used forage test results to balance rations, and fed a total mixed ration. Similarly, biosecurity practices were generally adopted by a significantly higher percentage of DHIA herds than non-DHIA herds. A lower percentage of DHIA herds than non-DHIA herds introduced new cattle to the operation during 2006 (36.9 and 40.9%, respectively). Brucellosis vaccinations were also administered on a higher percentage of DHIA herds than non -DHIA herds (51.7 and 33.0%, respectively). Common cow vaccinations (BVD, IBR, PI3, and BRSV) were administered on 87.9% of DHIA herds and 68.5% of non-DHIA herds. DHIA herds had higher milk production than non-DHIA herds, and a higher percentage of DHIA herds implemented best management practices compared with non-DHIA herds.

**Key Words:** DHIA, productivity, management, biosecurity

**0576 Optimization of reproductive management programs using lift chart analysis and cost-sensitive evaluation of classification errors.**
S. Shahinfar*[1], J. N. Guenther[1], D. Page[2], A. Samia- Kalantari[1], V. Cabrera[3], P. M. Fricke[1], and K. A. Weigel[3], *[1]Dep. of Dairy Science, University of Wisconsin–Madison, Madison, [2]Dep. of Biostatistics and Medical Informatics and Dep. of Computer Science, University of Wisconsin–Madison, Madison, [3]Unversity of Wisconsin–Madison, Madison.*

The common practice on most commercial dairy farms is to inseminate all cows that are eligible for breeding, while ignoring (or absorbing) the costs associated with semen and labor directed toward lowly fertile cows that are unlikely to conceive. Modern analytical methods, such as machine learning algorithms, can be applied to cow-specific explanatory variables for the purpose of computing the probabilities of success or failure associated with upcoming insemination events. Lift chart analysis can identify subsets of high fertility cows that are likely to conceive and are therefore appropriate targets for insemination (e.g., with conventional AI semen or expensive gender-enhanced semen), as well as subsets of low fertility cows that are unlikely to conceive and should therefore be passed over at that point in time. While such a strategy might be economically viable, the management, environmental, and financial conditions on one farm might differ widely from conditions on the next, and hence the reproductive management recommendations derived from such a tool may be suboptimal for specific farms. When coupled with cost-sensitive evaluation of misclassified and correctly classified insemination events, it can be potentially powerful tool for optimizing the reproductive management of individual farms. In the present study, lift chart analysis and cost-sensitive evaluation were applied to a data set consisting of 54,806 insemination events of primiparous Holstein cows (as experimental unit) on 26 Wisconsin farms, as well as a data set with 17,197 insemination events of primiparous Holstein cows on three Wisconsin farms, where the latter had more detailed information regarding health events of individual cows. In the first data set, the gains in profit associated with limiting inseminations to subsets of 79 to 97% of the most fertile eligible cows ranged from $0.44 to $2.18 per eligible cow, depending on days in milk at breeding and milk yield relative to contemporaries. In the second data set, the strategy of inseminating only a subset consisting of 59% of the most fertile cows conferred a gain in profit of $5.21 per eligible cow. These results suggest that, when used with a powerful classification algorithm, lift chart analysis and cost-sensitive evaluation of correctly classified and misclassified insemination events can enhance the performance and profitability of reproductive management programs on commercial dairy farms. Note: In machine learning methods, *P*-value is not a criteria of decision-making as it is in classic statistics.

**Key Words:** machine learning, reproductive management, cost-sensitive

**0577 The cost of clinical mastitis in the first 30 d of lactation: an economic assessment tool.**
E. Rollin*[1] and M. W. Overton[2], *[1]University Of Georgia College of Veterinary Medicine, Athens, [2]Elanco Animal Health– Dairy, Athens, GA*

Mastitis results in considerable economic losses for dairy producers and is most commonly diagnosed in early lactation. The objective of this study was to create a tool to estimate the predicted economic impact of clinical mastitis occurring during the first 30 d of lactation for a representative North American dairy. A deterministic partial budget model was created in spreadsheet software to estimate the projected direct and indirect costs per case of clinical mastitis occurring during the first 30 d of lactation in a typical dairy. The cost calculator was built by adapting published estimates from recent peer reviewed literature covering mastitis incidence, pathogen prevalence, recurrence risk, culling effects, reproductive effects, and milk production effects to estimate the value of projected future production, culling, death, and reproductive losses. Herd specific data including milk price, reproductive performance, lactational culling risk, diagnostic costs, treatment protocol costs, replacement costs, market cow prices, feed costs, labor costs, and veterinary costs are input to allow full customization of the projection model. The average case of clinical mastitis resulted in a net economic loss of $458, including $135 in direct costs and $323 in indirect costs. Direct costs included diagnostics ($3), therapeutics ($42), discarded milk ($20), veterinary service ($15), labor ($30), and death loss ($26). Indirect costs included future milk production loss ($135), future culling and replacement loss ($162), future reproductive loss ($21), and ongoing monitoring costs ($5). Accurate decision-making regarding mastitis control relies on understanding all of the economic impacts of clinical mastitis, especially the longer-term indirect costs that represent 71% of the total costs per case of mastitis. Future milk production loss represents 29% of total costs, and future culling and replacement loss represents 35% of the total costs of a case of clinical mastitis. In contrast to older estimates, these values represent the current dairy economic climate, including milk price ($0.48/kg), feed price ($0.286/kg DM), replacement costs ($2000), and use the latest estimates on the production and culling effects of clinical mastitis. This economic model is designed to be customizable for specific dairy producers and their herd characteristics to better aid them in developing mastitis control strategies.

**Key Words:** mastitis, economics, transition