**360 The Pennsylvania RFID project – An overview.** K. E. Olson*[1], G. T. Cudoc[2], J. High[3], J. S. Clay[4], and J. Mattison[1], [1]*National Dairy Herd Improvement Association*, *Verona, WI*, [2]*Dairy One*, *Ithaca, NY*, [3]*Lancaster Dairy Herd Improvement Association*, *Manheim, PA*, [4]*Dairy Records Management Systems*, *Raleigh, NC*.

The Pennsylvania Department of Agriculture received funding from USDA APHIS for one of the initial cooperative agreements to facilitate implementation of the National Animal Identification System (NAIS). The overall purpose of the 'Pennsylvania Premises Identification and Animal Tracking Initiative' was verification of premise ID in the state and initial field testing of Radio Frequency Identification (RFID) technology as a tool to track animal movement with reporting of this information to the state database (PA HERDS). National DHIA, working with field service affiliates DairyOne and Lancaster DHIA, with cooperation from Dairy Records Management Systems (DRMS), implemented the dairy portion of the project which focused on RFID tagging 50,000 dairy animals, then entering their basic identification and location information into PA HERDS. DHI used its existing infrastructure, together with enhancements needed for this project, to tag animals, collect verify and transfer the needed data to the movement repository. This minimized problems for producers and assured that they did not need to develop a separate data collection system for ID. Through the dedicated effort of field staff, tags were distributed and applied in a timely manner, with validated data submitted to PA HERDS. Approximately 42 staff members from the two field service providers were involved in the effort. Data in the table were gathered by field staff from the project herds.

**Table 1. Field Preformance**

| | Dairy One | Lancaster DHIA |
|---|---|---|
| Tags Assigned | 24,750 | 25,000 |
| Unreadable tags | 5 | 6 |
| Broken preinstall | 0 | 0 |
| Broken during | 0 | 77 |
| Lost | 50 | 33 |
| Initial Retention % | ≥ 95 | ≥ 95 |
| Infection % | ≤ 5 | ≤ 5 |
| % Primary site | 50 | 20 |
| Read 2 to 4' | 75% | 100% |
| Read 4' to 6 | 25% | |
| Unique ID | 24,355 | 24,135 |
| Unique Premise | 149 | 61 |
| Total files | 204 | 163 |

NDHIA was sent 250 tags

**Key Words:** RFID, NAIS, Identification

**361 Factors affecting udder singeing in dairy cattle.** T. Harrington[1], J. Pennington*[1], Z. Johnson[2], A. H. Brown[2], D. W. Kellogg[2], C. Rosenkrans[2], M. Andrews[1], and J. Hawkins[1], [1]*University of Arkansas Cooperative Extension Service*, *Little Rock*, [2]*University of Arkansas*, *Fayetteville*.

To determine factors affecting udder singeing in dairy cattle, cattle on a 1000-cow dairy (herd S) and 120-cow dairy (herd A) were assigned to unsinged or singed (2x/year) groups. Cows were evaluated on scales of 1 to 10 for cleanliness, length of hair, ease to clean, and time to clean (i.e., udder traits). Unsinged cows in herd S were used to determine the effects of month of year (P<0.01) and breed (P<0.01) on udder traits. Hair on the udder (10=2.5 cm) was longer in the colder months of the year and shorter in the warmer months (Feb, 7.8; Mar, 7.7; May, 6.6; Jun, 7.2; Jul, 6.9; Aug, 6.6; Oct, 7.6; Nov, 8.0; Feb, 8.9). Jerseys (6.2) and Brown Swiss (6.4) had the shortest hair, followed by Holsteins (6.6), then Ayrshires (7.5) and crossbreeds (7.6); Milking Shorthorns had the longest hair (8.4). After the winter singes in both herds, udder traits were improved (P<0.01), but only length of hair improved (P<0.01) following the summer singes; other traits were improved in the days after singeing. Udder traits of Holstein cows differed (P<0.01) between herds. The time required for the singed hair to grow back to the same length as hair of unsinged cattle was approximately 80 days in both winter and summer. SCC was not affected (P >0.10) by singeing of cows in herd A, but variation in SCC was large and herd A was very clean. A shorter interval between singeing might alter the effects on SCC and improve other udder traits in the summer. Overall, these results indicated that timely singeing of the udders can be used to improve udder cleanliness and appearance, thus reducing labor for preparing cows for milking and time in the parlor for cows.

**Key Words:** Dairy, Singeing, Udder

**362 CowTime: Making milking more productive and easier.** D. Klindworth*[1], R. Greenall[2], and D. Carr[1], [1]*Primary Industries Resarch Victoria (PIRVic)*, *Ellinbank, Victoria, Austalia*, [2]*University of Melbourne*, *Parkville, Victoria*.

CowTime is Australia's national learning package for milk harvesting - making milking easier and more productive. It covers all aspects of milk harvesting from the time the cows leave the paddock until after the clean up. The Program has 4 main components: 1. The Milking Monitor is a web-based milking performance benchmarking tool. Farmers answer a few questions about their milking process and receive back a personalised report benchmarking their performance against their peers. 2. The Shed Shake-up is a field day with a difference, combining structured and unstructured learning sessions with technical experts, a dairy visit and discussion. Topics covered to date include stock handling, work practices and conditions and saving power. 3. Designed to assist decision making, the CowTime Course helps participants work through the issues relevant to them when considering making major changes or building a new dairy. Currently the Course is being modified to be available on a CD-ROM format. The main sections include: First Steps - to set goals for the farm business; Future options - looks at the future scale of the business; Analyse your current system - a tool to benchmark current performance; Making the big decision - models possible change options; Plan for Change- where farmers commit to a course of action and print reports. 4. Technical resources developed to support the Program include the CowTime Guidelines (a book on best practise in Australian milk harvesting), Quick Notes (short information sheets on specific milk harvesting topics), CowCoster (a tool used to model the performance and cost of various options), and a range of training videos to support the farmer training program. Since rolling out in 2002 the project has achieved high impact with independent evaluation showing around 65% of participants had implemented changes on their farm, with a further 18% still intending to do so. Most of the CowTime information is freely available at www.cowtime.com.au

**Key Words:** Extension, Decision making, Milk harvesting

**363 Development of a stochastic simulation model to assess the potential economic benefits associated with investments in precision dairy farming technologies.** J. M. Bewley*[1], M. D. Boehlje[1], A. W. Gray[1], S. J. Kenyon[1], S. D. Eicher[2], and M. M. Schutz[1], [1]*Purdue University*, *West Lafayette, IN*, [2]*USDA-ARS*, *West Lafayette, IN*.

A dynamic, stochastic, mechanistic simulation model of a modern dairy enterprise was developed to evaluate the costs and benefits associated with investments in Precision Dairy Farming (PDF) technologies. The model was designed to represent the biological and economic complexities of a dairy system within a partial budgeting framework by examining the cost and benefit streams coinciding with investment in a PDF technology. A primary objective of this effort was to provide a flexible, user-friendly, farm-specific decision making tool for dairy producers and technology manufacturers to use in on-farm decision making. The basic deterministic model was created in Microsoft Excel. The @Risk Excel add-in was used to consider the stochastic nature of key variables in the Monte Carlo simulation. Net Present Value and break-even bid prices are the primary metrics used to assess the economic profitability of investments. Estimates of relationships within the model were obtained from the literature. U.S. means and distributions, where available, were used to describe initial herd parameters within the model. In an example to demonstrate the model's utility, investment in an automatic core body temperature monitoring system was considered. The pricing strategy of the MaGiiX™Cattle Temperature Monitoring System (CTMS) was used to estimate costs of investment. Benefits of the system were considered by estimating the impact and timeliness of interventions resulting from information provided by deviating temperatures obtained from the MaGiiX CTMS. Sensitivity analysis was conducted to identify the impact of different scenarios and benefit combinations on profitability. Monte Carlo simulation resulted in a series of net present values used to identify the probability of observing a positive net present value associated with investment in the MaGiiX CTMS. This analysis provides a framework for future economic analyses of other Precision Dairy Farming technologies.

**Key Words:** Economic analysis, Net present value, Precision dairy farming

**364 SPAC – Information on demand.** K. E. Olson*[1], K. Roy[2], B. Carlson[3], and A. F. Kertz[4], [1]*KEO Consulting*, *Schaumburg, IL*, [2]*Federation of Animal Science Societies*, *Savoy, IL*, [3]*American Dairy Science Association*, *Savoy, IL*, [4]*ANDHIL LLC*, *St Louis, MO*.

Each year regional, national and international conferences provide cutting edge information on a wide range of topics for individuals participating in the conferences. Presentation information is frequently captured in proceedings; however, awareness of and access to this information is often limited to conference participants. The ADSA Foundation recognized the interest among producers, animal professionals, extension and researchers in this information and supported development of the 'Searchable Proceedings of Animal Conferences' (SPAC) as a tool to provide ready access to this valuable resource. SPAC is available on-line at http://spac.adsa.org/index.asp . An electronic copy of each individual proceeding article is stored as a PDF file in the SPAC database, and is available to subscribers. A search engine allows complete user-defined searches of all files to identify articles of potential interest as well as facilitating conventional searches such as author, conference, year and title. The search engine lists articles in order based upon how closely they match the requested search. Over a dozen conferences have made their proceedings available for distribution through SPAC. In many cases proceedings from several years are available. In addition, abstracts from recent ADSA and ASAS meetings are included in the database. Additional conferences will continue to be added to the database as well as new proceedings from existing conferences.

**Key Words:** SPAC, Proceedings

**365 Choosing the best forage species for a dairy farm - The Whole-farm approach.** M. Neal*[1], J. Neal[2,3], and W. Fulkerson[3], [1]*Risk and Sustainable Management Group, University of Queensland*, *Brisbane, Queensland, Australia*, [2]*New South Wales Department of Primary Industries*, *Camden, New South Wales, Australia*, [3]*Faculty of Veterinary Science, University of Sydney*, *Camden, New South Wales, Australia*.

Although a handful of forage species such as perennial ryegrass are predominant, there are a wide range of forage species that can be grown in sub tropical and temperate regions in Australia as dairy pastures. These species have differing seasonal yields, nutrient quality and water use efficiency characteristics, as demonstrated in a large water use efficiency study of 30 species being undertaken at the University of Sydney in New South Wales, Australia. Some species can be grazed, while others require mechanical harvesting that incurs a further cost. Previous comparisons of species that relied on yields of dry matter per unit of some input (typically land or water) cannot simultaneously take into account the season in which forage is produced, or other factors related to the costs of production and delivery to the cows. To effectively compare the profitability of individual species, or combinations of species, requires the use of a whole-farm model. Linear programming was used to find the most profitable mix of forage species for an irrigated dairy farm. It was concluded that a mix of species was most profitable under the conditions faced by a typical dairy farmer situated in an irrigation region of New South Wales, Australia.

**Key Words:** Forage, Whole-farm model, Linear programming

**366 Choosing corn hybrids for silage: A partial budget approach.** M. S. Allen*, *Michigan State University*, *East Lansing*.

Genetic differences in corn hybrids allow the opportunity to increase farm profits by selecting hybrids with the optimal combination of yield and quality traits. Determining this optimum combination is complex because hybrids vary in several different economically important traits that affect the amount of land required, supplemental feeds, and milk yield. Selection indices simplify ranking corn hybrids for silage by combining yield and quality differences among hybrids into a single number. However, selection indices fail to consider many important biological and cost differences and cannot accurately rank hybrids according to farm profitability across farms. CornPicker is a spreadsheet developed to calculate a partial budget for evaluating effects on farm profits among different corn hybrids for silage. Calculations include only those costs and returns that change in response to the hybrids being compared and ignore those not affected. Input variables include data about specific hybrids related to yield and quality, relevant farm practices, and prices (e.g. for milk, corn grain, and soybean meal). Forage NDF concentration is used to calculate the corn silage concentration in diets because it limits feed intake and diets normally are formulated to the same or similar forage NDF concentrations. The cost of producing the required amount of corn silage is calculated as the total costs for seed, land, and other production costs, as well as

the costs and DM losses for harvesting, storing, and feeding the corn silage. Cost adjustments are then made for differences in supplemental feed and milk yield. Differences in concentrations of NDF and CP between hybrids affect the amount of corn grain and soybean meal fed per year, and in vitro NDF digestibility differences affect milk yield and feed intake of lactating cows. CornPicker output is an estimate of the land required and production costs of hybrids being compared. Corn hybrids for silage should be selected using this partial budget approach because it accounts for economically important factors related to hybrid selection that vary from farm to farm and over time.

**Key Words:** Corn silage hybrids, Selection, Profitability

**367 Review of Wisconsin corn silage milk per ton models.** R. Shaver* and J. Lauer, *University of Wisconsin*, *Madison*.

An index of forage quality, milk per ton of forage DM, was originally developed using an energy value of forage predicted from ADF content and DMI potential of forage predicted from NDF content as its basis (MILK1991; Undersander et al., 1993). In vitro DMD was included in a later revision of the milk per ton model (MILK1995). The milk per ton model was later modified specifically for corn silage (Schwab et al., 2003) using as its basis an energy value derived from summative equations that included in vitro NDF digestibility (NDFD, % of NDF) and starch digestibility predicted from whole-plant DM content and kernel processing, and DMI potential predicted from both NDF content and in vitro NDFD. This milk per ton quality index (MILK2000) has become a focal point for corn silage hybrid-performance trials and hybrid-breeding programs in academia and the seed-corn industry (Lauer et al., 2005). An update to the MILK2000 milk per ton model has been developed (MILK2006). Analysis of correlations between corn silage NDF, NDFD, starch, and starch digestibility and milk per ton estimates from MILK2006, 2000, 1995, and 1991 models (n = 3727 treatment means) is presented in the Table. MILK2000 model was the first milk per ton model to recognize NDFD as an important quality parameter, while the earlier models were influenced mostly by whole-plant starch (grain) content. The MILK2006 milk per ton model relative to MILK2000 reflects the relatively minor fine-tuning of equations, but the spreadsheet will allow for more user-defined flexibility. Model comparisons using other datasets and evaluation of models for potential effects on hybrid rankings are in progress. Future development of laboratory methods for determining starch digestibility may influence its relationship to milk per ton estimates relative to the other quality measures.

**Table 1. Correlations for selected corn silage nutrients and their digestibility coefficients with milk per ton estimates.**

| r-values | MILK2006 | MILK2000 | MILK1995 | MILK1991 |
|---|---|---|---|---|
| NDF% | -0.46 | -0.40 | -0.94 | -0.99 |
| Starch% | 0.48 | 0.44 | 0.75 | 0.74 |
| NDFD, % NDF | 0.49 | 0.70 | 0.16 | -0.10 |
| StarchD, % Starch | 0.30 | 0.21 | -0.25 | -0.27 |

**Key Words:** Corn silage, Milk per ton, NDFD

**368 Sustainable self-financed producer study groups in Oregon.** W. Lane*, *Lane Livestock Services*, *Roseburg, OR*.

Forage management and nutrition are complex topics that require ongoing education for successful application. Our university-based education system is primarily designed for young adults who have no family responsibilities or decision-making roles in their farms. In contrast, adult producers obtain information through a patchwork of occasional workshops, the Internet, Extension agents, and neighbors. This strategy may not deliver the complex, integrated training needed by professional graziers. Livestock producers in Oregon have addressed this problem by forming three private, fee-based study groups that meet regularly to obtain information and share experiences: Umpqua Valley Forage Study Group (UVFSG, formed 1995, 15 current members), Forage And Nutrition Group (FANG, 2000, 10 current members), and Willamette Valley Grazing And Nutrition Group (WVGANG, 2002, 25 current members). These groups are financially self-supporting with annual membership fees of $150-200 per operation, Each group maintains a bank account and hires a facilitator to coordinate meetings. Membership crosses county lines, but new members must have prerequisite knowledge, either through formal education or suitable experience. Members include livestock operations raising beef, dairy, sheep, meat goats, horses, or hay, and also seed companies, feedstores, and government agencies. Marketing goals include commercial, seedstock, direct, grass-fed, and organic. Meetings occur monthly at sites rotating among member ranches or alternative sites and are closed to non-members. Each meeting lasts 3+ hr and includes a pasture walk and an in-depth discussion of a focus topic. Extension agents are invited as courtesy guests. From July 1995 through January 2006, these groups conducted 211 meetings and included a total of 73 member operations. In addition to supplying technical information, these Producer Study Groups have also provided mutual support for new ideas, facilitated cooperative financial arrangements, and acted as venues for on-farm research, special workshops, tours, and guest speakers. As fee-based organizations, private Producer Study Groups are relatively insulated from the vagaries of public budgets.

**Key Words:** Training, Discussion groups, Forages

**369 Methodology of Connecticut's horse industry survey: Results and implications for future studies.** J. Nadeau*[1], F. Shah[1], A. Chaudhry[2], and J. Maripani[1,2], [1]*University of Connecticut*, *Storrs*, [2]*University of Wyoming*, *Laramie*, [3]*University of Magallanes*, *Punta Arenas, Chile*.

Surveys of the horse industry have been undertaken more frequently in recent years with the realization that it has a significant economic impact on individual states and the nation as a whole. Our survey of Connecticut's horse industry was designed to arrive at an accurate horse count and determine the demographic and economic characteristics of Connecticu'ts horse industry. In order to gather this data, three survey instruments were developed: one for veterinarians to determine the horse count, one for horse owners to describe the industry's demographic characteristics, and one for businesses to evaluate economic impact of the industry. Included in the horse owners' survey were questions about the owner's willingness to sell the horse at fair market value. One of the fundamental limitations of previous horse surveys is that enumeration of horses is based on a survey of owners. With the incomplete nature of mailing lists, it is difficult to predict the margin of error using this method. By surveying a complete mailing list of veterinarians obtained from the state veterinary association, we determined that there are approximately 43,059 horses in Connecticut. This number correlates well with anecdotal reports. Of horse owners surveyed, 80% would not be willing to sell their horses at fair market value. The implication is that any statewide value of horses based on market prices alone is likely to seriously underestimate the true social value of horses. The methodology used in our survey may be of use

to other states in order to get accurate horse counts and true values of horses. In addition to surveying veterinarians, a cross check of results could be obtained by surveying other service providers such as farriers or feed stores. The inclusion of the question about willingness to sell at fair market value question is also justified based on our findings. Finally, even though our three survey instruments attempt to reach the major interest groups associated with the industry, a wider population may need to be included to more accurately estimate the aesthetic and recreational value of horses.

**Key Words:** Survey, Demographic, Horse

## Nonruminant Nutrition: Amino Acid Nutrition - Nursery to Finisher

**370 True ileal digstible isoleucine requirement and ratio in 12 to 22 kg pigs.** S. X. Fu*[1], A. M. Gaines[1], R. W. Fent[1], G. L. Allee[1], and J. L. Usry[2], [1]*University of Missouri*, *Columbia*, [2]*Ajinomoto Heartland, LLC*, *Chicago, IL*.

Two experiments were conducted to determine the true ileal digestible (TID) Ile requirement and ratio of late-nursery pigs (TR-4×C22). In Exp. 1, 924 pigs were used in a five-point TID Ile titration (0.597, 0.662, 0.726, 0.791, and 0.856%, respectively) with seven replicate pens per treatment (21 to 23 pigs/pen). The basal diet (0.70% L-Lys HCl) was formulated to contain 1.30% TID lysine. Graded levels of L-Ile were added to increase the TID Ile level from 0.597 to 0.856%. Both ADG and ADFI were not affected by dietary TID Ile level. A quadratic response in G:F (P = 0.04) was observed with increasing dietary TID Ile. Based on these data, the TID Ile requirement of late-nursery pigs is not greater than 0.597% in corn-soybean meal diets. In Exp. 2, 297 barrows were used to determine the effects of protein source on the TID Ile:Lys ratio in 12 to 22 kg pigs with five replicate pens per treatment (five to six pigs/pen). Diet 1 was a corn-soybean meal control diet with an inclusion of 0.30% L-Lys HCl. Diets 2 to 11 were a 2 × 5 factorial design. The factors included: two protein sources 17% soybean meal (SBM) plus crystalline amino acids or 10.75% spray-dried blood cells (SDBC) and five TID Ile:Lys ratios (46, 53, 60, 67, and 74%, respectively). Diet 1 contained 1.20% TID lysine and all other diets were formulated to contain 1.10%. Pigs fed the control diet had improved growth performance (P ≤ 0.05) indicating that lysine was indeed limiting in diets 2 to 11. In corn-soybean meal diets, no response was observed with increasing TID Ile:lys ratio. However, increasing the TID Ile:Lys ratio in corn-SDBC diets improved ADG (linear and quadratic (P ≤ 0.01) and G:F (linear and quadratic P ≤ 0.001). The TID Ile:Lys ratio of 12 to 22 kg barrows fed corn-SDBC diets was estimated to be 65.7% for G:F and at least 70.3% for ADG.

**Key Words:** Isoleucine, Blood cells, Pigs

**371 Branched chain amino acid interactions and isoleucine imbalance in late-finishing pigs.** S. X. Fu*[1], R. W. Fent[1], G. L. Allee[1], and J. L. Usry[2], [1]*University of Missouri*, *Columbia*, [2]*Ajinomoto Heartland, LLC*, *Chicago, IL*.

Two experiments were conducted to explore why late-finishing (TR4 × C22) fed corn-spray-dried blood cell (SDBC) diets require higher Ile to maximize growth performance than pigs fed corn-soybean meal (SBM) diets. The positive control (basal diet) was a corn-SBM diet with 3% SBM and 0.32% L-Lysine HCl and the negative control diet contained 3.85% SDBC. All diets contained 0.52% TID lysine and a TID Ile:Lys of 54%. In Exp. 1, 120 pigs were used with six replicate pens of five pigs per treatment to determine the effects of excess Val and Leu. Crystalline L-Val and L-Leu were added to the basal diet to achieve the same level of Val and Leu as the negative control. An additional high protein corn-SBM control diet (0.15% added L-Lysine HCl) was also included. Pigs fed the positive control diet had comparable ADG, ADFI, but tended to have lower G:F (P = 0.06) than pigs fed the high protein control diet. With the same dietary TID Ile:Lys of 54%, pigs on corn-SDBC diet had reduced (P ≤ 0.04) ADG, ADFI, and G:F compared to pigs on corn-SBM diet. Adding Val and Leu to the corn-SBM basal diet resulted in similar ADG and G:F, but tended to reduce ADFI (P = 0.09). In Exp. 2, 60 individually penned pigs with 10 replications per treatment were used. Adding graded levels of Val and Leu to a corn-SBM basal diet resulted in a linear decrease in ADG (P = 0.05) and ADFI (P = 0.02), and tended to linearly reduce final BW (P = 0.10). The G:F was not affected by excess Val and Leu. Plasma free Val, Leu (P ≤ 0.01), and blood urea nitrogen (P = 0.05) increased linearly as dietary Val and Leu level increased while plasma free Ile decreased linearly (P = 0.004). Adding Val and Leu to the corn-SBM basal diet to the levels of corn-SDBC diet resulted in similar performance as the high protein corn-SBM control diet. Adding Val, Leu, His, and Phe to the corn-SBM control diet reduced (P ≤ 0.05) final BW, ADG, ADFI, and plasma free Ile and increased serum urea nitrogen (P = 0.02), which resulted in a similar final BW, ADG, ADFI, and G:F as pigs fed the corn-SDBC diet.

**Key Words:** Branch chain amino acid, Imbalance, Isoleucine

**372 Branched chain amino acid interactions increases isoleucine requirement in late-finishing pigs.** S. X. Fu*[1], R. W. Fent[1], G. L. Allee[1], and J. L. Usry[2], [1]*University of Missouri*, *Columbia*, [2]*Ajinomoto Heartland, LLC*, *Chicago, IL*.

Two experiments utilizing 10 individual pigs per treatment were conducted to explore why late-finishing pigs (TR-4 × C22) fed corn-spray-dried blood cell (SDBC) diets require higher Ile to maximize growth performance than pigs fed corn-soybean (SBM) diets. The positive control (basal diet) was a corn-SBM diet with 3% SBM and 0.32% L-Lys HCl and the negative control diet contained 3.85% SDBC. All diets contained 0.52% TID lysine and a basal TID Ile:Lys of 54%. L-Val, L-Leu and/or L-Phe, L-His were added to the basal diet to achieve the same as the negative control. In Exp. 1, adding Val and Leu to the corn-SBM basal diet to the levels present in the corn-SDBC diet did not affect performance. However, adding Leu alone to corn-SBM basal diet resulted in reduced (P = 0.05) ADG, final BW, and G:F. In the corn-SBM basal diet, excess of Val, Leu, His, and Phe did not affect G:F (P = 0.20), but reduced ADFI (P = 0.03),