fed. Further, the ruminal production of *trans*-10, *cis*-12 CLA from LIN would be associated with MFD. Three late lactation Holstein cows fitted with ruminal cannulae were fed 4x/d for ad libitum consumption of a diet based on chopped alfalfa hay and ground degermed shelled corn. Diets were adjusted over a 3-d period to 20% forage and 80% concentrate. Cows then randomly received either an oil containing LIN (93.7%) or OLE (79.5%) (Natural Lipids, Norway) for 7 d. Oils were placed directly in the rumen (2x/d) to provide a daily dose of 200 g of fatty acid. At the end of the 7-d period, cows were switched to the other oil. Feed intake and milk yields were recorded daily. Data are the last 3 d of each 7 d period. Feed intake and milk yield were not affected by oil. Rumen pH averaged 5.56. LIN resulted in higher *cis*-9, *trans*-11 CLA (10.0 vs 6.2 mg/g fat) and *trans*-10, *cis*-12 CLA (0.94 vs 0.11 mg/g fat) in milk fat than did OLE. Milk fat content was lower during the administration of LIN ($P<0.1$) compared to OLE (2.5 vs 3.4%). *Trans*-10, *cis*-12 CLA was correlated to milk fat percentage ($R^2 = 0.31$, $Y = -15.5x + 3.97$) but *cis*-9, *trans*-11 CLA was not. Feeding a low forage diet resulted in a decreased rumen pH. Under this condition, LIN converted to *trans*-10, *cis*-12 CLA caused MFD, whereas the biohydrogenation of OLE did not produce an intermediate to cause MFD.

Key Words: CLA, Milk Fat Depression, Biohydrogenation

707 Fatty acid changes in milk fat from Holstein cows fed rumen-protected CLA during the transition period. J. W. Perfield II*, G. Bernal-Santos, T. R. Overton, and D. E. Bauman, *Cornell University, Ithaca, NY.*

We observed that feeding Holstein cows rumen-protected CLA had no effect on milk or milk components immediately postpartum, but starting at wk 4 there was a decrease in the fat content of milk and a simultaneous increase in milk yield (J. Dairy Sci. 84(Suppl. 1):82). Over wk 4 to 20 postpartum, milk fat averaged 2.95 vs 3.45% ($P < 0.001$) and milk yield averaged 48.4 vs. 45.2 kg/d ($P < 0.10$) for the CLA-supplemented and control groups, respectively. Our objective was to extend these data by analyzing the fatty acid composition of milk fat. Multiparious cows were blocked into two treatments- dietary supplement of EnerGII (Bioproducts, Inc.) (control) or rumen-protected Ca-salts of CLA plus palm oil fatty acids (Agribrands Purina Canada Inc.; Bioproducts, Inc.). Supplements (100 g/d of fat) were top dressed on the TMR and the CLA supplement provided 43 g/d of CLA (predominant isomers were *trans*-8, *cis*-10 (9.2%), *cis*-9, *trans*-11 (25.1%), *trans*-10, *cis*-12 (28.9%), and *cis*-11, *trans*-13 (16.1%). Supplements began 2 wk prepartum and continued through wk 20 postpartum. Milk fatty acid composition did not differ between treatments for wk 1 to 3 postpartum. However, fatty acid composition shifted in CLA-supplemented group beginning at wk 4 concurrent with the decrease in milk fat content; differences persisted throughout the remainder of treatment. From wk 4 to 20, the CLA-supplemented group had a reduced fat content of fatty acids < C16 (23.4 vs 24.6%; $P < 0.06$), and C16 & C16:1 (26.0 vs 28.7%; $P < 0.001$), with an increased concentration of fatty acids > C16 (49.0 vs 46.0%; $P < 0.01$). *Trans*-10, *cis*-12 CLA is a potent inhibitor of milk fat. In contrast to the temporal changes in most milk fatty acids, fat content of *trans*-10, *cis*-12 CLA was immediately increased in the CLA-supplemented group and remained elevated throughout the 20 wk treatment period (0.03 vs <0.01% of fatty acids; $P < 0.001$). Overall, CLA supplementation initiated at parturition had no effect on milk fat until wk 4 postpartum when a decrease in the fat content and a major shift in fatty acid composition of milk occurred.

Key Words: CLA, Milk Fat, Transition Cow

Production, Management, and the Environment
Management and Decision-Making

708 Flavoring drinking water for post-weaning pigs increases water and feed intake and improves average daily gain. M.J. Bertram*[1], J.A. Pudenz[1], and E. Roura[2], [1]*Pork Technologies, Ames, IA,* [2]*Lucta SA, Montornés del Vallés,Barcelona, Spain.*

A study was conducted to examine the impact of adding a flavoring agent to drinking water on pig water and feed intake and growth. 1292 pigs were weaned at 13 to 17 d of age and allotted by weight to one of four drinking water treatments consisting of either fresh water or water containing a flavoring agent (Luctarom TM, Lucta USA Inc, Northbrook, IL) at the rate of .141, .282, .423 g/l. Flavoring was provided for 14 days post-weaning. Pigs were penned 28 to 32 per pen in a 7.19 m x 2.87 m wean-to-finish pen and pig number was equalized across treatment with-in rep. There were 10 reps of each treatment. Water was available ad-libitum from 2 nipple drinkers per pen. All pigs were feed a common commercial diet and feed was available ad-libitum. Pig weight and feed consumption were recorded by pen on d 5, 14, 28, 42, and 61 post weaning. Water disappearance was recorded by treatment for all pigs consuming each water treatment (1 observation per treatment) on a daily basis for the first 14 d. Daily water consumption increased with increasing flavor concentration. When comparing fresh water with the highest concentration of flavored water, consumption was increased by 34% during the first 24 h and by over 4% during the 14 d treatment period. From d 0 to 61 feed consumption and body weight gain increased linearly ($P<.05$). Average pig weight at the end of each period was increased linearly ($P<.05$) as flavor concentration in the water increased and at 61 days pigs consuming water containing .282 g/l of strawberry flavor were 1.5 kg heavier than those consuming fresh water. Feed conversion was not improved with water flavor inclusion. Based on these results, adding a flavoring agent to drinking water of pigs for 14 d post-weaning improved water consumption, feed intake and growth rate.

Water Flavor Cons, g/l	0	.141	.282	.423	Lin P<
Start Wt, kg	5.05	5.07	5.05	5.07	.55
5d Wt, kg	5.68	5.71	5.75	5.85	.07
14d Wt, kg	7.49	7.63	7.64	7.80	.02
28d Wt	12.02	12.12	12.41	12.56	.01
42d Wt	18.99	19.04	19.88	19.76	.01
61d Wt, kg	33.07	33.21	34.58	34.35	.001
ADG 0-5d, g/d	126	128	140	155	.05
ADG 0-61d, g/d	455	446	476	474	.07
ADF 0-5d	123	123	133	138	.05
ADF 0-61d, g/d	702	687	733	737	.05
GF 0-5d	1.024	1.019	1.031	1.124	.17
GF 0-61d	.649	.650	.649	.644	.29
Water Disapp. d1, l/d	2.01	2.34	2.21	2.70	N/A
Water Disapp. 0-14d, l/d	2.80	2.84	2.88	2.90	N/A

Key Words: Pigs, Water, Flavor

709 Specialization and contracting in the dairy industry: the case of custom heifer growers. C.A. Wolf*, *Michigan State University.*

As dairy farms specialize in milking cows, other enterprises are often curtailed. One increasingly common example of outsourcing is utilizing a custom replacement heifer grower. By outsourcing the heifer enterprise, a dairy farmer frees up labor, management, feed, and facilities. To examine this new industry sub-sector, nation-wide survey was undertaken to examine commercial custom heifer growers. The survey was intended to: examine the size, structure, and management of the heifer grower industry; identify important practices; and examine contract and performance specification. The survey was targeted to commercial heifer growers. Surveys were sent to 187 custom dairy heifer growers in 2001. Sixty-six respondents from across the US that identified themselves as heifer growers. The average operation had 1,223 heifers with a range from 30 to 20,000. The average operation farmed 637 acres. Just over half of the respondents indicated that they were commercial heifer growers with no off-farm employment. About forty percent were heifer growers with other significant farm operations with the most common being cash crops. Fifty-four percent indicate that

they previously had a milking herd. Most growers entered the business because they saw it as a good business opportunity. Other common reasons for commercially growing heifers were to utilize crops grown and to make use of out-of-date or unused livestock facilities. Eighty-three percent of the heifer growers had more than one dairy farmer client. Heifer facility types were almost equally distributed between free-stalls, dry lots and pasture. Forty-seven percent of the heifers were first bred at 13 months; 77 percent were first bred before 15 months of age. Eighty-five percent of the custom growers had an agreement directly with the dairy farmer while the rest used a contracting agency. Sixty-nine percent of respondents had written contracts. The most common form of compensation agreement was a set daily charge per head which was used by 52 percent of respondents. Other common forms included a rate of gain based payment and an arrangement to sell and later purchase back the heifers. Ninety-seven percent of respondents indicated that they were satisfied to extremely satisfied with their contract arrangement.

Key Words: Contracting, specialization, Replacement heifers

710 Calculating the cost of producing milk: methods and implications. C.A. Wolf* and S.B. Harsh, *Michigan State University*.

Cost of production is a key indicator of competitiveness. Other than choosing technology and production level, a dairy farm manager primarily controls cost of production to influence profitability. Cost of producing milk is difficult to accurately and efficiently calculate because dairy farms tend to be diversified into crops, replacement heifers, and other enterprises. A comparison of cost of production calculation methods examines trade-offs between accuracy and effort and reveals patterns of errors across farms. A common method to calculate cost of production uses income tax information on business expenses (cash and depreciation). As all farm operations file income taxes, the required information is readily available. However, this method ignores important costs (e.g., unpaid labor and capital) and makes many simplifying assumption. With efficiency gains to labor and capital utilization providing the primary reason for an investment decision such as a major farm expansion, ignoring operator capital, management and labor costs leads to poor management decisions. An alternative, but much more time consuming, method is detailed enterprise accounting which breaks out the milk herd enterprise but allocates costs across all relevant enterprises on the farm. The cost of operator equity capital is calculated using financial models that account for industry and individual farm risk. Detailed enterprise accounting data from Michigan dairy farms in 1998 and 1999 are used to compare the cost of production via the income tax statement and enterprise accounting methods. Using enterprise accounting method, the largest costs of production were feed, labor and replacement heifers. Cost of replacement heifers varied significantly across farms and were not accurately captured using the income tax cost method. Accounting for risk resulted in a consistently higher cost of farm capital than standard charges used in the income tax method. The milking herd was consistently the most profitable enterprise on the farm while auxiliary enterprises, such as feed crops and replacement heifers, were often unprofitable. Farms that specialized in milk production had similar cost estimates across methods while diversified operations varied widely by method.

Key Words: Cost of production, Enterprise accounting methods

711 Managing dairy herd data via interactive visualisation techniques. A. St-Onge*[1], R. Lacroix[1], and K. M. Wade[1], [1]*McGill University, Montreal, Canada*.

The paradox of multiple data sources means that, unless properly utilised, more information has the potential to hinder, rather than aid, the decision-making process. Interactive visualization techniques are proposed as a means of organising multiple agricultural information sources so as to help with the detection of problems, discover new patterns and facilitate planning at the farm level. The ability of these techniques to provide an overall picture, as well as rapid, incremental and reversible views of information, makes them promising for dairy farming computer-based tools, given the diverse and distributed sources of information that exist. Dairy producers receive data and information from many off-farm organisations on a daily basis. Combining these off-farm databases with existing on-farm information (electrical devices, on-farm databases and even personal opinions and intuition) creates a so-called *info-fog*. The formats of these various data sources differ, and there are usually no physical links among the off-farm organisations, except that everything passes via the dairy farm itself, where all reports are stored in one format or another. Interactive visualization has the potential to be extremely useful in these kinds of situation where the development of a dynamic information retrieval system is needed in order to improve the interpretation of data. The querying of databases must be viewed as part of a larger work process, which also includes the access and analysis of data. Such an approach is proposed and outlined, whereby different sources of dairy management information are accessed and integrated, using interactive visualization techniques, and subsequently presented in an intuitive, interactive, graphical environment. The proposed system acts as a virtual workspace where all essential information can be managed through one single interface.

Key Words: Dairy Herd Management, Info-fog, Interactive Visualization

712 Effect of grain type, milling method, and diet form on dust production in a laboratory dust generator. R.C. Thaler*[1], A.J.A. Aarnink[2], K. Koch[3], and T.E. Sauber, [1]*South Dakota State University, Brookings,* [2]*IMAG, Wageningen, the Netherlands,* [3]*Northern Crops Institute, Fargo, ND,* [4]*DuPont Speciality Grains, Des Moines, IA*.

A 3 x 2 x 2 factorial study was conducted to determine if grain type (barley, corn, & high oil corn), milling method (hammer mill & roller mill), and diet form (meal & pellet) in sow gestation diets affected total and respirable (< 4 microns) dust production in a laboratory dust generator. There were 3 replicates/treatment, and each sample was placed in a dust generator for 24 hours. An air flow rate of 2 liters/minute was used to pull agitated dust onto filters in total and respirable dust collectors, and an airflow rate of 23 liters/minute was also used on another total dust collector. Total dust production at both flow rates was higher ($P<.01$) for barley diets than for the corn or high oil corn (HOC) diets. Respirable dust production was greater ($P<.05$) for barley diets than for HOC diets, with corn diets intermediate. No differences in dust production were observed between hammer and roller milled grains. Meal diets produced more respirable dust ($P<.01$) and tended ($P<.11$) to produce more total dust than pelleted diets. There was a grain x diet form interaction ($P<.01$) which masked some of the pelleting effect. Barley meal diets produced the most dust while barley pelleted diets produced the least amount of dust between all the treatments. During milling, regardless of which mill type was used, barley required the greatest amount of electricity while HOC required the least amount of electricity per ton. Also, the production rate (tons processed/hour) was greatest for HOC and lowest for barley. These data indicate that in laboratory dust generators, barley diets produce more dust than either corn or HOC-based diets, and at the 2 liters/minute flow rate, HOC-based diets produced numerically less dust than did corn-based diets. Also, HOC had the best production rate and energy usage of all the grains during processing.

Key Words: Dust, Respirable, High oil corn

713 Impact of nursery feeder gap adjustment and group size/density on nursery pig performance. J.F. Patience*[1], L. Smith[1], A.D. Beaulieu[1], H.W. Gonyou[1], and R.D. Boyd[2], [1]*Prairie Swine Inc., Saskatoon, SK.,* [2]*Pig Improvement Co. Franklin, KY*.

Feed access and stocking density are important factors affecting nursery performance. Data are limited on the impact of either animal density or feeder gap adjustment. This experiment was conducted to evaluate feeder gap adjustment and group size/stocking density on nursery pig performance. The experimental treatments, arranged as a 5 X 3 factorial, included 5 feeder adjustments, from 9.2 mm to 31.5 mm, and 3 group sizes/stocking densities of 24, 20 and 16 pigs per pen, providing 0.23, 0.28 or 0.35 m^2/pig, respectively. The 6 wk experiment commenced 8 d post weaning, when the average pig age was 26.2 d and average bodyweight was 7.1 kg. A total of 716 pigs started the experiment. Feeder space allowance was maintained at 4 pigs per feeder space. Feed trough coverage and feed depth were determined weekly. Time spent eating was measured using a time-lapse recorder on d 3 to 6 and d 39 to 42 of the experiment. The incidence and severity of skin lesions associated with piglet aggression were scored on the final day of the experiment. Final body weight, ADG and ADFI were improved with decreasing group size and a larger feeder gap opening ($P<0.05$). Performance was maximized with a feeder gap of 18 mm and a group size/density of 16 pigs/0.35

m m^2/pig. The group size/density effect was more pronounced at a reduced feeder gap adjustment (feeder gap x group size/density, $P<0.05$). Feeder gap had no impact on the coefficient of variation for bodyweight at 56 d, but increasing stocking density/group size had an adverse affect. Skin lesion scores were unaffected by treatment ($P>0.05$). Eating speed of pigs on d 3-6 was decreased at the tightest feeder adjustment (9.2 mm) when there were 16 or 20 pigs per pen, but not when there were 24 pigs per pen (adjustment x group size/density, $P<0.05$). Performance was maximized when at least 38% of the feeder trough was covered with feed or when the group size/density was lowest. Feed trough gap adjustment and group size/density were confirmed as important aspects of nursery management.

Key Words: Swine, Group size, Feeder adjustment

714 Factors affecting the market value of cows sold through Arkansas auction barns, part 2: perceived breed composition, color, muscle and frame. M. S. Gadberry*, T. R. Troxel, D. Urell, J. Foley, R. Wiedower, S. Cline, and G. Ford, *University of Arkansas Cooperative Extension Service, Little Rock, AR*.

A study was conducted to determine the factors affecting the market price of cull cows. Data was collected from 15 auction barns in the spring (14 wk) and fall (13 wk) of 2001. The final dataset represented 43.5% of the cows marketed. The impact of cull cow characteristics for perceived breed composition, color, muscle and frame on unit price were examined. Cow characteristics were analyzed individually. They included cow type, replacement cows (R) vs. slaughter cows (S) and cow type by cow characteristic interactions. Week, cow age and weight served as covariates. All values are reported on a 45.45 kg basis. There were significant interactions ($P < 0.001$) for cow type and characteristics. In all instances, R received a higher price ($P < 0.001$). Breeds and colors were designated different at $P \leq 0.01$. Angus (A) x Charolais (C; \$50.96), A, A with 25% Brahman (B), C x Hereford (H), A x H, Limousin (L), and A x H with 25% B were the seven highest R breeds and did not differ. Limousin (\$41.80) was also valued high for S and differed from all others breed compositions except C x L (\$41.24), C x B (\$40.55), continental with 25% B (\$40.38), continental cross (\$40.32), and B cross (\$40.11). Black R (\$49.59) sold for a higher price than all colors except gray and yellow, white face. However, black S (\$39.29) was intermediate in value and differed from yellow (\$40.26), white (\$40.14), spotted (\$38.57) and red, white face (\$38.38). Price differed ($P < 0.001$) between frame sizes \$47.08, \$49.46, and \$48.11; and \$40.19, \$39.07 and \$35.28 for large, medium and small R and S, respectively. Number 1 and 2 muscled R was similarly valued ($P = 0.11$) and both were higher ($P < 0.001$) than 3's. Price was highest for number 1 and lowest for number 3 ($P < 0.001$) S. The results indicated that cow type, R vs. S, affected sale price and the affect of cull cow characteristics on sale price differed between R and S cows.

Key Words: Value, Replacement cows, Slaughter cows

715 Evaluating the Use of Benchmarks or Expert Opinion in Making Herd Management Decisions. C.N. Vierhout*[1] and J.S. Clay, [1]*North Carolina State University*.

In their daily decision-making, dairy producers often must choose between the advice of expert opinion and benchmarks of the performance of other herds. Each form of advice is readily available in popular dairy press articles, web sites and in person. But, rarely are both experts and benchmark comparisons available from a single source that encourages customization. DairyMetrics is a web-based system of dairy farm performance information that enables users to combine both experts and benchmarks in a customizable form. With this application, dairy producers, consultants and extension personnel can choose from a series of experts to evaluate herd performance. They also can filter herds for comparison depending on 85 parameters from 14,200 herds with 1.7M cows. The combination of expert opinion and benchmark comparison provides insight to what is ideal and achievable. DairyMetrics provides information about the specific herd plus means, minimums and maximums for cohort herds. It also presents percentiles for each herd performance parameter in comparison to the cohort group. Users can view and print graphs of specific performance measures for the herd and for the cohorts using monthly data from the recent year or annual data from the previous five years. Optional expert opinions can identify herd parameters that trigger either an alarm or approval. Herd parameters that are acceptable are distinguished from alarms and approved values. Consultants can register for expert status and must provide justification of their opinions.

Key Words: DairyMetrics, Benchmarking, Dairy Management

716 Effects of neck rail position on dairy cattle behavior. Cassandra Tucker* and Daniel Weary, *University of British Columbia Vancouver BC Canada*.

Dairy producers are faced with a variety of recommendations for free-stall design, but the effects of these design options on cow behavior have received little systematic research. In a series of experiments we have assessed the effects of neck rail position on cow behavior and stall cleanliness. In one experiment, we compared 4 levels of neck rail height (none, 100, 113, and 125 cm) in a preference test. Eleven Holstein cows were individually housed with access to 4 free-stalls. Cows showed no preference based on neck rail height and when the cows were restricted to each of the 4 stalls, there was little effect of height on how long cows spent lying in stalls. However, cows spent 1.0 h / day longer standing in stalls with no neck rail compared to stalls with a 100 or 113 cm rail (repeated measures ANOVA, $P < 0.05$). In a second experiment, we examined neck rail placement in relation to distance from the curb, when height was held constant at 125 cm. Although distance of the neck rail from the curb did not affect total time spent standing in the stall, it did affect the type of standing. When the neck rail was farther from the curb (168 cm compared with 150 cm from the curb), animals averaged 15 min/day more standing with all four hooves in the stall and an had an equivalent reduction in the amount of time spent standing with only front hooves in the stall (paired t-test, $P < 0.05$). In a third experiment, we compared defecation behavior (cow position and location of defecation or urination) of 14 heifers with and without a 123 cm neck rail in a cross-over design. When the heifers stood with all four hooves in the stall, in the absence of the neck rail, defecation and urination were twice as likely to contact the stall surface (paired t-test, $P < 0.05$)

Key Words: Free-stall design, Cow comfort, Preference testing

717 Explanations associated with non-optimal culling rates. G. Hadley*[1], C. Wolf[2], and S. Harsh[2], [1]*University of Wisconsin - River Falls, Agricultural Economics Department,* [2]*Michigan State University, Department of Agricultural Economics*.

Average annual culling rates in the United States are consistently and significantly higher than the #optimal# culling rate estimated by researchers. Since 1996, DHIA data shows that Midwestern dairy farms exhibit average annual culling rates of 38 percent. Conversely, research conducted by Jones (2001) estimated that optimal culling rates for Wisconsin herds should range between 22 and 24%. The objective of this paper is to account for the discrepancy between actual and optimal culling rates. Using DHIA data on individual herd culling practices for 10 Midwestern and Northeastern states from 1985 - 2000, four culling rate discrepancy explanations were examined: manager error (informational problems such as incorrect genetic improvement rates and inaccurate replacement heifer costs), herd health issues (inaccurate herd health cull probabilities), omitted farm effects (labor constraints and initial farm conditions), and omitted industry and market effects (relative prices). When overly optimistic genetic improvement rates or undervalued replacement heifer costs were substituted into a culling decision model, higher culling rates were favored. Using herd health culling probabilities that more accurately reflected those encountered in the two geographical regions resulted in an estimated #optimal# culling rate that was more reflective of actual rates. Incorporating different labor constraints and initial farm conditions (i.e., constant herd size versus expanding herd size) resulted in different optimal culling rates. An OLS regression was used to determine the effects of relative prices on culling rates for Michigan DHIA herds. Significant variables included the cull cattle price # replacement heifer cost spread, the milk-feed price ratio, interest rates, and wages.

Key Words: Culling, Dairy, Farm Management

718 Issues initial expanders should consider before expanding a dairy farm. G. Hadley*[1], C. Wolf[2], and S. Harsh[2], [1]*University of Wisconsin - River Falls, Agricultural Economics Department,* [2]*Michigan State University, Department of Agricultural Economics*.

This paper's objective is to describe issues initial expanders (managers without prior expansion experience) should consider before making an expansion decision. The key issues considered in this paper were synthesized from a case study of 20 dairy farm expansions in the Upper Midwest. An initial expander should determine why he or she desires to expand a dairy operation. The majority of successful operations in the case study expanded for economic improvement reasons. Next, the initial expander should determine whether or not someone with expansion expertise should be consulted. While previous expansion experience was nearly perfectly correlated with expansion success in the case study, having an expansion consultant improved the initial expander#s probability of success. Key expansion management skills identified in the case study included human resource, operations, financial, herd, strategic and public relations management. Managers who do not possess these skills should consider taking coursework, hiring the expertise, or partner with other managers who do. Initial expanders should consider different expansion options. When modernization occurred with expansion, the expansions were more successful from a production, herd health, and financial perspective than expansions that added on to antiquated facilities. Initial expanders should also be flexible in sizing their expansion. Many of the initial expanders in the case study originally planned to expand to a smaller herd size. After conducting feasibility studies, these managers found that the smaller expansions were not financially viable. A second size consideration is to make sure that the herd is large enough to fully compensate all managing partners for their labor, capital and management. For the fourteen farms choosing to report financial information, thirteen posted positive Net Farm Incomes the first two years following expansion. Unfortunately, only two fully compensated their owners for their unpaid labor, capital and management.

Key Words: Expansion, Dairy, Farm Management

719 Identification and characterization of location factors for relocating dairy farms. J. E. Winkler* and N. R. St-Pierre, *The Ohio State University, Columbus*.

A survey was conducted to determine the importance of various location factors during the location decision process of relocating dairy farms. The objectives of this study were 1) to identify the importance of location decision factors (LDF) and 2) to characterize how the importance of LDF differs among respondents with different demographic characteristics. Information was collected from randomly sampled populations of Grade A milk producers from the top 35 milk producing states in the United States and agribusiness professionals using a mailed questionnaire. Location factors (n=110) were rated in terms of importance on a numerical scale of 0 to 10, where 0 = not important and 10 = critically important. Demographic data were collected from each respondent. Of the 906 respondents, 72.4% identified their primary occupation as dairy producer. The five most important LDF overall were: availability of fresh water supplies (9.16 0.047); availability of land for waste management (8.94 0.052); average mailbox price of milk (8.79 0.050); quality of fresh water supply (8.41 0.061); and complexity of laws governing waste management (8.35 0.064). Other factors relative to dairy production activities, such as the cost of feeds, and current implications of animal agriculture were among the upper quartile in terms of importance. The four least important factors were: local presence of established niche markets (4.14 0.096); proximity to an airport (4.11 0.084); proximity to cultural centers (3.36 0.078); and proximity to recreational areas (3.24 0.081). A multivariate analysis indicated that region ($P < 0.001$) and herd size ($P < 0.01$) had a significant effect upon the overall importance of LDF. The relative importance of factors differed between western and eastern regions ($P < 0.05$). Age ($P < 0.01$), gender ($P < 0.05$), and education ($P < 0.01$) also significantly influenced the relative importance of factors. No significant difference was found between dairy producers and agribusiness respondents. The differences in importance of factors among respondents from various demographic backgrounds indicate that economic development organizations interested in enhancing their local dairy industry might benefit from targeted marketing programs.

Key Words: Farm Location

720 Real Option Analysis to evaluate products used in dairy production. D. T. Galligan[1], H Groenendaal[1], J. D. Ferguson[1], and G Azzaro[2], [1]*University of Pennsylvania,* [2]*Consorzio Ricerca Filiera Lattiero Casearia*.

A real option analysis approach was used to evaluate the economic value of a product where dairy managers can exert discretion about the continued use of the product. Traditional net present value analysis (partial budgeting analysis) ignores the potential value for management to respond to resolved uncertainty at a certain time point and thus under estimates the true value of a product. Bovine somatotropin was used as the example product since production response data is available as well as knowledge about its variability (mean response of 5 kg/d with a STD of 1.3). An abandonment decision option was modeled using @Risk software in Excel where response on a herd was described as a random variable. With current milk (10 dollars per cwt) prices, marginal feed cost (3 cents/lb), product cost/cow/day 41 cents; traditional partial budget analysis yielded a 35 cent profit/day. Real option analysis, where it was assumed that management would intervene and assess production response after 1 year, suggested that this estimate was low by 9 percent. As the time to resolution of uncertainty increased, the disparity between real option analysis and traditional partial budget analysis decreased. If the variability of response was increased the difference in value between traditional analysis and real option analysis also increased. Investments what have a variability component, which can influence value and where management decisions can respond to resolved uncertainty and have better decisions will be undervalued if traditional economic approaches are used.

Key Words: Real Options, Managerial Flexibility, Net Present Value

721 The use of ear tags and injectable transponders for the electronic identification and traceability of pigs. G. Caja*, M. Hernandez-Jover, D. Garin, C. Conill, X. Alabern, B. Farriol, and J. Ghirardi, *Universitat Autonoma de Barcelona, Bellaterra, Spain.*.

A total of 557 piglets were identified between wk 1 and 3 of age by using different devices: 1) control button tags (**C**, n= 348); 2) two electronic ear tag types (**E1**, n= 106; and, **E2**, n= 103); and, 3) five sizes of injectable transponders grouped as: small (**S**) of 12- (n= 90) and 13-mm (n= 87), medium (**M**) of 23-mm (n= 89), and large (**L**) of 31- (n= 86) and 34-mm (n= 91). Injects were placed in two body sites: s.c. in auricle base (**AB**; n= 248) and intraperitoneally in the ventral abdomen (**IP**; n= 309). Pigs were slaughtered at 100 kg BW. Readability and traceability were recorded for all devices during the fattening period and throughout slaughtering. No negative effects were observed after the application of any device. On farm results showed that ear tag losses differed according to the device (C, 1.1%; E1, 8.8%; and E2, 44.9%; $P<0.001$). Electronic failures were lower ($P<0.001$) for E1 (5.5%) than E2 (55.1%) and total unreadable were 14.3% and 100% for E1 and E2, respectively. Injects losses in the farm varied ($P<0.001$) according to injection site and transponder size. Losses in AB (S, 19.5%; M, 29.8%; and, L, 63.0%) only differed ($P<0.001$) between extremes. Only one S transponder was lost in IP, probably as a consequence of an intestinal placement, and IP losses totalized 0.4%. The C and E1 ear tags had similar transport losses (1.2%). Slaughtering losses for C (11.3%) and E1 (6.1%) did not differ and 12.8% more E1 failed electronically. Unreadable ear tags were 12.3% for C and 20.5% for E1 ($P= 0.07$). Injection site affected losses and breakages in the slaughtering line (AB, 6.3%; and, IP, 0%; $P<0.05$) but transponder size did not. As a result traceability varied dramatically between ear tags (C, 86.7%; E1, 68.1%; and, E2, 0%) and injects (AB: S, 72.7%; M, 70.2%; and, L, 34.6%; and, IP: S, 99.0%; M, 100%; and, L, 100%). No intraperitoneal injects were found in the carcasses. The intraperitoneal injection with 23- to 34-mm is proposed as a method for the identification of piglets and as a traceability tool for the pig industry.

Key Words: Electronic Identification, Transponder, Swine

722 Milk industry in Hungary. Huda F Salem, Zoltan Dr Lakner, J Sandor Dr Zsarnoczai*, and Laszlo Dr Villanyi, *Szent Istvan University, Godollo, Hungary*.

Hungarian milk industry has developed rather rapidly in period socialist economic development between 1949 and 1989. Main pillars of this development were: the heavy subsidisation of milk production, the state ownership of milk processing capacities, subsidised consumer price of

the milk. Under consumption the impetus for product innovation were rather week and the efficiency of milk processing was rather low. After the privatisation the overwhelming Hungarian milk production capacities were privatised by Western European investors. There were some hopes concerning the privatisation of milk factorise to agricultural producers, but they did not have money either for buying or for financing the production. In some cases milk producers got a minority ownership, but this was not enough to get through their interests. The multinational enterprises follow three different strategy #types: cost-leadership, differentiation and focussing local producers. Rapid development was resulted by introduction of ISO 9000 norms, and HACCP systems. Important problem of Hungarian milk sector was the limited purchasing power of Hungarian consumers. It makes a limited possibility for product development. 80% of domestic purchasing of milk and milk-products are marketed through the 6 largest commercial companies. These companies utilise the tactic of predatory pricing or economic pressure in process of determination of prices. The government lays not enough weight on the handling of this problem, because this price-pressure strategy of commercial companies is a good tool in fighting against the inflation. This is a short-term possibility however, because the 1,5-2,0 real profit level does not gives technical upgrading. The EU joining means new threats and possibilities for milk processing sector. The most important threat is the introduction of milk-quota system. It is an open #end question, whether after the EU joining the multinational enterprises, producing in Hungary. The higher costs and the export-defence system of non-EU members is an important factor of decision, in second case the loss of Hungarian workplaces, processing capacities and the lower level of material and human infrastructure are the most important factors.

Key Words: Milk industry, Marketing, Multinational enterprises

Ruminant Nutrition
Ruminal Fermentation

723 Ruminal fluid effects on in vitro digestion kinetics of corn starch. F. M. Fickett* and M. S. Allen, *Michigan State University, East Lansing*.

Effects of rumen fluid on digestion kinetics of corn starch in vitro were evaluated. Four ruminally-cannulated cows were used in an experiment using a crossover design for diet with a 2 x 2 x 2 factorial arrangement of treatments. Rumen fluid was from cows offered diets formulated to 21% and 32% dietary starch, and collected at two times relative to feeding (one hour before, or two hours after feeding). Periods were 14 d in length for which 12 d were allowed for diet adaptation and 2 d for rumen fluid collection. One cow from each dietary treatment group was sampled both before and after feeding on each collection day. Substrate treatments were dry corn grain with floury or vitreous endosperm, ground in a Wiley mill with a 2 mm screen. Amounts of media, blended and filtered rumen fluid, and substrate used for incubations were 40 ml, 10 ml, and 0.25 g, respectively. Flasks were incubated under positive carbon dioxide pressure for 0, 1.5, 3, 6, 10.5, 16.5, and 24 h. Residual starch was determined following incubation. Disappearance curves were fit to a 1-pool exponential decay model with discrete lag using non-linear regression. No interactions of treatments were detected for rate of starch digestion, which was higher for floury compared to vitreous endosperm (43.6 and 28.5 %/h, $P < 0.001$) and higher after feeding compared to before feeding (41.2 and 30.9 %/h, $P<0.01$). Rate of starch digestion was not affected by dietary starch concentration. An interaction was observed between dietary starch concentration and endosperm type for digestion lag time ($P<0.01$). Lag time was greater for vitreous compared to floury endosperm for the high starch diet (2.33 vs. 1.90 h) but lower for the low starch diet (1.87 vs. 2.76 h). Lag time was greater ($P<0.01$) when rumen fluid was collected after meals compared to before meals (2.53 h and 1.90 h). Effect of time relative to feeding on rate of digestion is attributed to differences in enzyme activity of rumen fluid, which was not different for diets varying in starch concentration.

Key Words: Starch digestion kinetics, Rumen fluid, Corn endosperm type

724 Comparison of fermentation parameters in ruminal fluid collected from lactating dairy cows at different production levels. S. A. Martin*[1], T. G. Nagaraja[2], T. C. Jenkins[3], S. E. Ives[2], H. J. Strobel[4], J. Sullivan[5], K. Murphy[5], D. Luchini[5], S. Koenig[5], and J. L. Klingener[1], [1]*University of Georgia, Athens,* [2]*Kansas State University, Manhattan, KS,* [3]*Clemson University, Clemson, SC,* [4]*University of Kentucky, Lexington,* [5]*Bioproducts, Inc., Fairlawn, OH*.

The objective of this study was to compare ruminal fermentation parameters and ciliated protozoal populations in lactating cows at three different production levels. Ruminal contents were collected via stomach tube from Holstein cows at a commercial dairy in California. The ruminal contents were obtained approximately 1.5 h after feeding from five cows within each of three different production levels (low = 13,736 kg, medium = 16,479 kg, high = 19,716 kg). Immediately after collection of each ruminal fluid sample pH was measured and aliquots of samples were fixed in formol-saline for protozoal enumeration. Volatile fatty acids, malate, lactate, ammonia, and protein were also determined. When ruminal fluid samples from each production level (n = 5) were analyzed, pH was lower ($P < 0.05$) for the low producing cows compared to the medium and high groups. Concentrations of acetate, propionate, butyrate, isovalerate, and valerate were lower ($P < 0.05$) in ruminal fluid from the medium and high producing cows. Ammonia concentrations were lower ($P < 0.05$) in the high producing cows. When compared to the ruminal fluid from the low production cows, lactate and protein concentrations were numerically lower and the acetate:propionate ratio was numerically higher in the medium and high production samples. There were no significant differences in protozoal populations between the three production levels with the exception of *Entodinium* numbers being lower ($P < 0.05$) in the medium production group compared to the low production group. While it is unclear what specific factors are responsible for these differences between production groups, our results suggest that cows at the medium and high production levels had higher ruminal pH and lower concentrations of most fermentation end products compared to the low producing cows. These differences may be associated with greater ruminal turnover and(or) absorptive capacity in the medium and high production animals.

Key Words: Rumen, Fermentation, Dairy cattle

725 Dose-response effects of propionate infusion on feeding behavior and plasma metabolites in lactating dairy cows. M. Oba* and M. S. Allen, *Michigan State University, East Lansing, MI*.

Three experiments were conducted to evaluate dose-response effects of intra-ruminal infusion of propionate on DMI. Infusion treatments were mixtures of sodium propionate and sodium acetate, at ratios of 0:5, 1:4, 2:3, 3:2, 4:1 and 5:0, infused into the rumen continuously for 18 h starting 6 h before feeding. Dose-response effects of propionate on DMI and plasma metabolites, and their relationship were summarized. In experiment 1, DMI decreased and plasma glucose concentration (PG) increased linearly as propionate infusion increased. In experiment 2, DMI did not decrease at lower rates of propionate infusion which were associated with greater increases in PG, but DMI decreased at higher rates of propionate infusion associated with a much lower marginal response in PG. Marginal response in DMI (kg/12h) per mmol/min of propionate infusion was negatively related to PG across treatment means for these experiments ($r^2 = 0.26$; $P< 0.01$; marginal DMI response = 13.6 - 0.23 x PG). We speculated that hypophagic effects of propionate are lower when propionate is extensively utilized for gluconeogenesis and greater when the marginal effect of infused propionate on PG decreases, increasing oxidation in the liver. One inconsistency is that cows in early stage of lactation in experiment 3 decreased DMI linearly at lower rates of propionate infusion despite a greater marginal increase in PG. However, plasma concentration of β-hydroxybutyrate was greatly reduced at lower rates of propionate infusion for cows in early stage of lactation in that experiment. At lower rates of propionate infusion, propionate might have stimulated complete oxidation of acetyl CoA in the liver while partially utilized for gluconeogenesis. These observations were consistent with our hypothesis that propionate decreases feed intake in lactating dairy cows by stimulating oxidative metabolism in the liver.

Key Words: Propionate, Oxidative metabolism, Plasma glucose