Production, Management and the Environment: Dairy Facilities

780 Herd turnover and mortality in low profile cross-ventilated and naturally ventilated dairy barns in the Upper Midwest. K. M. Lobeck*, M. I. Endres, S. M. Godden, and J. Fetrow, *University of Minnesota, St. Paul.*

The objective of this study was to describe herd turnover and mortality rates in low profile cross-ventilated barns (CV) compared with conventional naturally ventilated (NV) freestall barns. The study was conducted in 12 commercial dairy farms in Minnesota and eastern South Dakota. All farms had deep sand freestalls and had been in operation for at least 1 year before the beginning of the study. Farm records were collected from January to December 2008. Herd size was stable except 1 CV herd expanded from 1300 to 1600 cows in the summer. One NV and 1 CV barn were excluded at the end of the study because of substandard records. Sold and died events were examined. Herd turnover rate was calculated as the number of animals that were sold or died during the year, divided by the average herd size. Mortality rate was calculated as the number of animals that died divided by average herd size. Seventeen categories were created for sold and died reasons: abortion, udder conformation, Johne's positive, mastitis, low milk production, reproduction, lame, metabolic problems, metritis, animals that were unable to rise, calving problems, injury, sick, miscellaneous, unknown, and no reason stated. Overall herd turnover rate was 26.8 ± 3.2 and mortality was 5.4 ± 0.8. Herd turnover rates (LSMeans ± SE) were 24.6 ± 4.6 and 29.0 ± 4.6, and mortality rates were 5.8 ± 1.2 and 5.0 ± 1.2 in CV and NV barns, respectively. There were no differences between the 2 systems. Top 3 reasons for cattle to die on farm were sickness (33.6 ± 0.4), metabolic disease (9.5 ± 0.03), and injuries (8.6 ± 0.02) with no differences between CV and NV barns. Top reasons to be sold from the herd were low production (10.3 ± 0.1), mastitis (9.6 ± 0.1) and reproduction (8.6 ± 0.1). Cows housed in NV barns were more likely to be sold due to low milk production (21.9 ± 0.1 vs. 12.9 ± 0.1; $P < 0.001$) than cows housed in CV barns. The CV barns reported selling more animals due to reproductive problems (16.0 ± 0.1 vs. 7.6 ± 0.1; $P < 0.001$) and mastitis (10.2 ± 0.1 vs. 6.0 ± 0.1; $P = 0.02$) than NV barns, respectively. Based on these results, CV and NV barns appeared similar for mortality and turnover rates.

Key words: dairy cattle, mortality, turnover

781 Mortality and herd turnover rates in dairy herds utilizing recycled manure solids for bedding freestalls. A. W. Husfeldt*, M. I. Endres, J. A. Salfer, and J. K. Reneau, *University of Minnesota, St. Paul.*

The objective of this study was to evaluate mortality and herd turnover rates in Midwest dairy herds utilizing recycled manure solids in deep bedded or mattress based freestalls. The study included 34 commercial dairy operations with herd sizes ranging from 100 to 3700 lactating cows. Forty 5 percent of the herds had mattresses and 55% had deep bedded stalls. Sold and died events were examined. Herd turnover rate was calculated as the number of animals that were sold or died during the year, divided by the average herd size. Mortality rate was calculated as the number of animals that died divided by average herd size. Overall mortality rate (mean ± SD) was 8.2 ± 3.1%. Deaths were categorized as mastitis, injury, lameness, euthanasia, pneumonia, and miscellaneous or unknown reasons. Main causes of death were miscellaneous or unknown reasons (63.6 ± 15.5), injuries (15 ± 8.9), and mastitis (12 ± 6.9). Overall herd turnover rate was 38.2 ± 6.9%. Reasons for turnover were categorized as injury, low production, mastitis, reproduction, udder conformation, feet and legs, sick, aborted, dairy, and miscellaneous or unknown reasons. Main reasons for turnover were mastitis (19.5 ± 10.9), reproduction (15.8 ± 10.2), and low production (14.3 ± 14.8). Turnover rate during the first 60 DIM was 9.9 ± 3.4%. There was no association between stall surface and mortality. Mortality rates (LSmeans ± SE) were 8.2 ± 0.7 and 8.6 ± 0.9 for deep bedded and mattress herds, respectively. Herd turnover rates were 37.2 ± 1.7 and 38.6 ± 1.9 for deep bedded and mattress herds, respectively. No association was found between turnover rates and stall surface. There was a trend for stall surface to be associated with voluntary (dairy) and involuntary (other) reasons for removal ($P = 0.054$). Voluntary turnover was 16.7 ± 2.5 and 8.8 ± 3.1 for deep bedded and mattress, respectively. Sixty DIM turnover rates were 10.4 ± 0.09 for deep bedded herds and 9.5 ± 1.0 for mattress herds. Stall surface was not associated with 60 DIM turnover rates. Results indicate stall surface had a relatively minor association with mortality and turnover rates in dairy herds utilizing recycled manure solids as bedding.

Key words: mortality, herd turnover, manure solids

782 Effectiveness of fly traps and baits at three primary fly sites on Florida dairy farms. M. E. Sowerby*[1] and J. A. Hogsette[2], [1]*University of Florida, Gainesville,* [2]*USDA-ARS-CMAVE, Gainesville.*

The house fly, *Musca domestica* L., is a ubiquitous pest on dairies. They can cause production losses from fly worry, disperse from farms to nearby towns, transmit diseases like pinkeye, and carry pathogens like *E. coli* O157:H7. The calf raising, commodity barn/feed storage, and feeding barn areas tend to attract and support large house fly aggregations on dairies. If flies could be successfully managed in these areas, farm-wide populations might be significantly reduced. Traps or toxic baits would be the best management tools because house flies are resistant to most pesticides applied as space and residual sprays. Our objective was to evaluate the relative effectiveness of a trap, a toxic scatter bait and a toxic bait strip for house fly managment in high-density fly congregation areas. Three dairies having the aforementioned fly aggregation areas were selected. Treatments were the Farnam Captivator trap (baited with Terminator Fly Attractant), the QuickStrike Bait Strip (nithiazine 1% AI) and QuikStrike Scatter Bait (dinotefuran 0.5% AI). Treatments were placed, one at each area, on all 3 dairies according to a pre-arranged random rotational schedule. After 24 h, flies were counted and devices were rotated to the next area. A complete rotation constituted one replication in a 3 × 3 Latin square design and a test was composed of 6 replications. Data were normalized with $\log_{10} + 1$, subjected to ANOVA, and means separated with the Ryan-Einot-Gabriel-Welsch Multiple Range Test ($P < 0.05$). The mean numbers of flies captured by treatment were: Captivator trap (1624)>QuikStrike Scatter Bait (138)>QuikStrike Strip (95). The mean numbers of flies captured at each area, treatment overlooked, were: commodity barn/feed storage area (1050)>the calf pens (558)>the feeding barn (249). The Captivator trap captured significantly more flies than the bait strip and the scatter bait at all areas. Thus the Captivator trap is recommended for management of flies at the three fly aggregation areas, and the most attractive area, based on our research, is the commodity barn/feed storage area.

Key words: house flies, bait strips, dairy farms

783 Chemical and bacteriological characteristics of digested, composted, and separated raw manure solids prior to use as freestall bedding. A. W. Husfeldt*, M. I. Endres, K. A. Janni, J. A. Salfer, and J. K. Reneau, *University of Minnesota, St. Paul.*

The objective of this study was to investigate the chemical and bacteriological characteristics of digested, composted, and separated raw manure solids. The study included samples of recycled manure solids from 38 Midwest dairy herds collected before use as freestall bedding. Twenty-five composite samples of digested solids, 9 samples of separated raw solids, and 4 samples of composted solids were collected once and analyzed for chemical and bacteriological characteristics. Chemical analyses included moisture, pH, fiber, fat, non-fiber carbohydrates (NFC), ash, nitrogen, phosphorous, potassium, carbon, and C:N ratio. Bacterial counts (colony forming units per mL) of bacillus, coliforms, environmental streptococci, staph species, and yeasts were performed. Moisture content (LSmeans ± SE) was different (P < 0.001) between composted (60.3 ± 1.6)and both digested (72.9 ± 0.7) and raw (72.6 ± 1.1) solids. The pH, nitrogen, phosphorous, NFC, and total ash content were different (P < 0.001) between digested and separated raw solids. The pH was 9.3 ± 1.0 for digested solids and 8.9 ± 1.0 for raw manure solids. Nitrogen (%) was 1.50 ± 0.03 and 1.17 ± 0.05% for digested and raw solids, respectively. Phosphorus (ppm) was 5,451 ± 240 for digested and 2,321 ± 415 for raw solids. The NFC (%) was 3.8 ± 0.26 for digested and 6.2 ± 0.45 for raw solids. Ash (%) was 10.2 ± 0.32 and 8.1 ± 0.56 for digested and raw solids, respectively. Differences in coliform (P < 0.001) and environmental streptococci (P = 0.002) populations were also found between digested and raw manure solids. Log-transformed coliform bacterial counts in digested and raw solids were 4.0 ± 0.4 and 9.4 ± 0.7, respectively. Coliforms were not found in composted solids. Environmental streptococci counts were 9.4 ± 0.7 in digested solids and 14.8 ± 1.2 in raw solids. Other minor differences between digested and composted manure solids as well as composted and separated raw manure solids were also observed. These results indicate that anaerobic digestion of manure may affect the characteristics of recycled solids before use as bedding for freestalls.

Key words: recycled manure solids, freestall bedding, bacterial counts

784 Chemical and bacteriological characteristics of digested, composted, and separated raw manure solids used as freestall bedding. A. W. Husfeldt*, M. I. Endres, K. A. Janni, J. A. Salfer, and J. K. Reneau, *University of Minnesota, St. Paul.*

The objective of this study was to investigate the chemical and bacteriological characteristics of digested, composted, and separated raw manure solids used as freestall bedding. The study was conducted on 38 dairy farms in the Midwest. Composite bedding samples from each lactating pen and one dry pen collected at one visit were analyzed for bacterial counts of bacillus, coliforms, environmental streptococci, staphyloccocus species and yeasts. Total number of samples for bacterial analysis included 199 digested, 38 composted, and 71 separated raw solids. Subsamples from high and low production groups as well as first parity and dry cow groups were analyzed for moisture, pH, NDF, non-fiber carbohydrates (NFC), ash, N, C, and C:N ratio. Total number of samples for chemical analysis included 85 digested, 14 composted, and 29 separated raw solids. Bedding moisture adjusted for bedding frequency (LSmeans, % ± SE) of composted solids was 40.0 ± 1.1. Composted solids moisture was different (P < 0.001) than digested (54.3 ± 1.0) and raw (56.5 ± 1.1) solids. The NDF (%) in digested solids (70.6 ± 0.55) was different than composted (75.0 ± 1.1, P < 0.001) and raw solids (73.1 ± 0.9, P = 0.012). The NDF content was not different between composted and raw solids. Ash (%) in composted solids was 7.7 ± 1.1 and was different than digested (12.3 ± 1.0, P < 0.001) and raw solids (9.7 ± 1.1, P = 0.024). In addition, ash content was different between digested and raw solids (P < 0.001). Nitrogen (%) was different between raw and digested solids (1.7 ± 1.1 and 2.0 ± 1.0, respectively; P = 0.001). There were no differences among the bedding types for coliform counts. Environmental streptococci counts were different (P < 0.001) between digested and raw, and digested and composted solids; however, this was a minor biological difference. Environmental streptococci counts (log-transformed colony forming units per mL) were 14.1 ± 0.11, 15.2 ± 0.18, and 15.4 ± 0.24 for digested, raw, and composted solids, respectively. In conclusion, we found only minor differences among digested, composted, and separated raw manure solids when used as bedding in freestalls.

Key words: bacterial counts, freestall bedding, manure solids

785 Temperature and humidity in cross-ventilated and naturally ventilated dairy barns in the upper Midwest. K. M. Lobeck*, M. I. Endres, S. M. Godden, and J. Fetrow, *University of Minnesota, St. Paul.*

The objective of this study was to describe barn temperature, humidity, and some measurements of cow comfort in low profile cross-ventilated barns (CV) compared with conventional naturally ventilated freestall barns (NV). The study was conducted on 12 commercial dairy farms in Minnesota and eastern South Dakota from January to December 2008. Herd sizes ranged from 400 to 1600 lactating cows. All herds had stalls bedded with sand. All NV barns used fans and soakers and all CV barns used evaporative cooling pads for heat abatement. Cow respiration rates were measured on 75 cows from the high production pen on each farm twice during the summer visit. Morning observation was the baseline respiration rate with the second observation taken a minimum of 3 h later in the afternoon. Temperature and humidity were collected hourly inside the facility with data loggers and from the nearest weather station for the entire year. Cow comfort index (CCI) was calculated as the number of animals lying down in the stalls divided by total number of animals touching a stall (lying, 2 feet in a stall, or standing with all 4 feet in the stall) and it was measured 3 times during each visit. The CV barns were warmer in the winter than the NV barns (3.9 vs. −1.7°C; P < 0.001). There were no differences in temperature between CV and NV barns in spring, summer, or winter. However, summer temperature-humidity index (THI) was lower in CV than NV barns (65.9 vs. 68.5; P < 0.001). Respiration rates were not different between CV and NV barns (55.6 vs. 56.6 breaths/min, respectively). Outside THI was similar for CV and NV barns during respiration rate measurement (73.8 vs. 73.6). Each 1 unit increase in outside THI increased respiration rates by 0.26 ± 0.09. Overall CCI were 84.2, 85.2, 79.7, and 84.6 for winter, spring, summer, and fall, respectively. The CV barns had higher CCI than NV barns (84.2 vs. 75.3; P = 0.047) during the summer, with no differences in the other seasons. In conclusion, CV barns had greater CCI and lower THI during the summer than NV barns (possible indicators of improved cow comfort) although respiration rates did not differ.

Key words: temperature, cross-ventilated barn, humidity

786 A one-year comparison of house fly and stable fly populations at three different types of dairy facilities in the Texas Panhandle. S. L. Swiger*[1], K. J. Lager[2], T. R. Bilby[1], B. R. Henderson[2], R. G. S. Bruno[2], and E. R. Jordan[3], [1]*Texas AgriLife Extension and*

Research, Stephenville, [2]Texas AgriLife Extension, Canyon, [3]Texas AgriLife Extension and Research, Dallas.

Throughout the years work has been done to construct the most efficient and economical dairy facility that increases production, eliminates health issues and disease risks. Three main types of dairy facilities are currently utilized in the United States; open dry-lot, free-stall and cross ventilation. Each style of facility has a unique impact on the fly populations on and around a dairy. The objective of this study was to determine the effect of 3 different dairy facility types on number of house flies and stable flies present during summer. House flies were collected with 4 dinotefran baited scatter bait traps and stable flies were collected with 4 Olson sticky traps within each of the 3 dairy facility types. The fly traps were placed throughout each facility and flies were collected weekly for 12 wks from May until August 2010. The 3 facilities were found to contain both house flies and stable flies. The open dry-lot barn had more ($P < 0.05$) stable flies (n = 18,067) than either the free-stall (n = 5,423) or cross ventilation barns (n = 1,130) and the free-stall barn had more ($P < 0.01$) stable flies than the cross ventilation barn. There were more ($P < 0.05$) house flies in the free-stall barn (n = 5,270) than the open dry-lot (n = 418) or cross ventilation barn (n = 2,438) and the cross ventilated barn had more ($P < 0.01$) than the open dry-lot. In conclusion, results show that using a cross ventilated barn reduced stable but not house fly populations compared with a free-stall or open dry-lot facility. Further studies are needed to assess the ability of different facility types to reduce the negative effects of different fly populations on dairy cattle.

Key words: dairy, house fly, stable fly