PRODUCTION, MANAGEMENT, AND THE ENVIRONMENT: **ANIMAL HEALTH: A RETROSPECTIVE LOOK**

0553 Antibiotic use in period 2005–2012 in dairy herds in the Netherlands, with outlook to some other countries. A. Kuipers*[1] and H. Wemmenhove[2], [1]*Expertise Centre for Farm Management and Knowledge Transfer, Wageningen UR, Wageningen, Netherlands,* [2]*Livestock Research, Wageningen UR, Lelystad, Netherlands.*

Use of antibiotics in animals has become part of the societal discussion. National goal was to reduce use by 50% in 2013 compared to 2009. A herd health and treatment plan have been introduced. From 2012 on 3/4 generation drugs (3/4GE) are only allowed in exceptional cases. To gain insight, antibiotic use and attitudes of farmers were examined on 94 farms during period 2005 through 2012. Number of Daily Dosages (NDD) indicates how many days per year an average cow in the herd is under treatment of antibiotics. NDD was on average 5.86 (SD 2.14). The NDD level was increasing in period 2005 through 2007, followed by a period of growing societal interest in animal antibiotic use resulting in a reduction in use in 2011 through 2012. On average, 68% of NDD was applied to the udder, dealing with mastitis (25%) and dry-cow therapy (43%). Drugs other than applied to udder health tended to decrease the most, while farmers were reluctant to lower use of dry-cow therapy tubes. Use of 3/4GE drugs minimized from 18% of NDD in period 2005 through 2010 to 1% in 2012. More use of penicillins and wide spectrum drugs took place. The drop in NDD use varied between three groups of farmers studied. The guided study groups reduced usage since 2007, the environmental group (not guided) had a significant drop in use in 2011 and the incidental group (not guided) in 2012. Reduction in use was modeled applying the Rogers diffusion of innovation theory. A logistic function fitted nicely to the adaptation process including the early adapters and late majority groups of farmers. Also farm and herd factors affecting antibiotics use were studied, practicing a step-wise regression procedure. Variation in total use and dry cow therapy were explained, respectively, for 39 and 46% by factors such as quota size, milk amount/cow, health status, cell count, and calving interval. A correlation of -0,55 between cell count and NDD was found. The "more successful and entrepreneurial " farmers, with a good relation to the veterinarian, tended to use somewhat more antibiotics than the other colleagues. They were also able to adapt more easily to the new conditions. The situation in some other countries is compared to the analysis above. Denmark, with a quite different focus on antibiotic use, is especially of interest in this respect.

Key Words: antibiotic use, dairy herds, farm factors

0554 Retrospective analysis of body energy content profiles of dairy cows with different production and metabolic diseases during the transition period. G. L. Smith*[1], M. G. Chagunda[1], C. J. Ashworth[2], and N. C. Friggens[3], [1]*Scottish Rural University College (SRUC), Edinburgh, UK,* [2]*The Roslin Institute, University of Edinburgh, UK,* [3]*Institut National de la Recherche Agronomique (INRA), Paris, France.*

Characteristics of body energy profiles for dairy cows with production and metabolic diseases during the transition period were studied. We used 542 cow-lactations from Holstein Friesians. Cows were from one of the four divergent production systems that were based on two feeding regimes (high forage and low forage) and two genetic lines (control and select). Control cows were of average UK genetic merit and select cows were of high genetic merit based on selection for fat and protein yield. Cows were milked three times daily, and stockmanship was similar across all systems. Live-weight of individual cows was recorded three times daily in lactation and weekly in the dry period. Body condition score (BCS) was recorded weekly using a 5-point scale. Health records were maintained throughout the study period. First, prevalence of disease within the first 4 wk after calving was determined as a proportion of cow lactations with disease relative to the total number of cow lactations per production system. Second, cow-lactations were categorized into disease-groups: retained placenta, metritis, metabolic, and healthy. The metabolic group comprised left displaced abomasum, ketosis, hypomagnesaemia, and hypocalcaemia. Body energy content in mega joules was calculated using the equation: EC = [(9.4 × body lipid weight) + (5.7 × body protein weight)] x 4.1868. Body lipid and protein weights were calculated using standard equations, which included live weight, BCS, and days pregnant. EC profiles covered the period between 6 wk pre-calving and 4 wk post-calving. Effects were determined using the GLM procedure of SAS. High genetic merit cows on a forage rich diet and average genetic merit cows fed a low forage diet had the highest prevalence of disease (30 and 25%, respectively). In the pre-calving period, healthy cows had an EC of 5878 ± 24 MJ which was significantly lower ($P < 0.01$) than those that had retained placenta (6384 ± 156 MJ) or metritis (6156 ± 46 MJ). Cows that developed metabolic diseases had significantly lower EC (5466 ± 216 MJ) than cows with retained placenta or metritis ($P < 0.01$). In the post- calving period, the metabolic disease group had significantly lower EC ($P < 0.001$) than all other disease groups. The study demonstrated that EC is an important lead indicator of production diseases in the transition period. Real-time tracking of EC could be used to rank individual cow risk of developing metabolic diseases.

Key Words: transition period, energy content, production disease

0555 Update on animal health concerns of recombinant bovine somatotropin (rbST): Meta-analysis of use in dairy cows. N. St. Pierre[1], G. A. Millikin[2], D. E. Bauman[3], R. J. Collier[*4], J. S. Hogan[5], J. K. Shearer[6], K. L. Smith[5], and W. W. Thatcher[7], [1]*The Ohio State University, Columbus,* [2]*Kansas State University, Manhattan,* [3]*Cornell University, Ithaca, NY,* [4]*The University of Arizona, Tucson,* [5]*The Ohio State University, Wooster,* [6]*Iowa State University, Ames,* [7]*Dep. of Animal Sciences, University of Florida, Gainesville.*

The commercial form of recombinant bovine somatotropin, sometribove zinc formulation (rbST-Zn), was approved by FDA as safe and has been successfully used by the U.S. dairy industry since 1994. However, a meta-analysis by an expert panel assembled at the request of Health Canada concluded that the commercial use of rbST would cause serious health and welfare problems. The present investigation utilized a series of meta-analyses to re-evaluate the efficiency and safety of rbST-Zn when used according to label. A total of 26 studies met the criteria: 1) published in peer-reviewed journals or reviewed by regulatory agencies, 2) used the rbST-Zn formulation (Posilac) available to U.S. producers, and 3) used according to label for dose (biweekly), treatment initiation (57–70 d postpartum), and administration method (subcutaneous injection). Meta-analysis results indicated that milk, fat, protein, and 3.5% fat-corrected milk yields were all increased ($P < 0.001$) by rbST-Zn (average of 4.00, 0.144, 0.137, and 4.04 kg/d, respectively), whereas milk concentrations of fat, protein, and lactose were unaltered ($P < 0.09$, 0.07, and 0.26, respectively). A 5.4% improvement in pregnancy proportion from rbST-Zn was detected for the first two breeding cycles after the voluntary wait period ($P < 0.01$). However, a 5.5% decrease ($P < 0.05$) in pregnancy proportion during the length of the trials was likely due to reduced estrous behavior. There was no effect of rbST-Zn on fetal loss, days open, services per conception, twinning, or cystic ovaries ($P < 0.65$, 0.96, 0.12, 0.68, and 0.43, respectively); on the odds of clinical mastitis or milk somatic cell count ($P < 0.12$ and 0.54, respectively); nor on rates of clinical lameness, lameness lesions, or traumatic lesions of the integumentary system (all $P < 0.99$). The rbST-Zn reduced body condition scores by 0.06 point (1 to 5 scale), a difference in body weight of about 3 kg ($P < 0.03$). No change to culling rate was associated with rbST-Zn ($P < 0.63$). Overall, the present meta-analysis demonstrates that rbST-Zn is effective and presents no unmanageable effects on health or welfare.

Key Words: bovine somatotropin, animal health, meta-analysis

0556 Trends in U.S. milk quality based on bulk-tank somatic cell counts. J. E. Lombard*, C. A. Kopral, and K. E. Bjork, *USDA:APHIS:VS: Center for Epidemiology and Animal Health, National Animal Health Monitoring System, Fort Collins, CO.*

The objective of this study was to evaluate changes in bulk-tank somatic cell counts (BTSCC) from 2000 to 2012. BTSCC data from four Federal Milk Marketing Orders (FMOs), representing about half of the milk marketed in the United States, were used to evaluate changes in BTSCCs. The four FMOs were: Mideast, Upper Midwest, Central and Southwest. Data were collected monthly and included herd identification, FMO, pounds of milk shipped, and official BTSCC. These data represent all milk shipped through the four FMOs, and conclusions apply only to this population of shipments. Because this study was a census, no estimates of sampling variability were calculated. A milk-weighted, 3-mo geometric mean BTSCC was calculated and summed for all herds in each FMO and for all herds. SAS software was used for all calculations. The Upper Midwest FMO accounted for approximately 45% of milk monitored on an annual basis. In 2012, 43.1 billion kg of milk from 309,343 shipments representing 28,274 producers were monitored. The milk-weighted mean BTSCC decreased from 296,000 cells/mL in 2000 to 194,000 cells/mL in 2012, while the producer-weighted mean BTSCC decreased from 320,000 to 230,000 cells/mL during the same period. The Mideast FMO had the lowest BTSCC for 11 of the 13 yr evaluated. Seasonal variations in BTSCC were consistent from 2000 to 2012, with the highest counts occurring in July through September. The U.S. BTSCC limit is 750,000 cells/mL; however, some countries that import dairy products from the United States have a limit of 400,000 cells/mL. From 2000 to 2012, the percentage of milk shipped from the four FMOs with BTSCCs of less than 400,000 cells/mL increased from 74.8 to 95.6%, while the percentage of shipments with counts less than 400,000 cells/mL increased from 65.0 to 87.4%. The percentage of producers from which all shipments counts were less than 400,000 cells/mL increased from 42.2 to 64.5%. BTSCCs in the United States have decreased approximately 35% since 2000. Many factors are likely responsible for these improvements in milk quality, e.g., producer motivation in the form of bonuses for providing quality milk, milk-quality regulations of countries that import U.S. dairy products, and an emphasis on improving milking procedures.

Key Words: BTSCC milk quality

0557 Somatic cell counts, mastitis infection prevalence, and mastitis pathogen distribution in compost bedded pack and sand freestall farms.

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The objective of this research was to describe the relationships among somatic cell counts (SCC), mastitis infection prevalence (MIP, percent of cows with SCS > 3.9), and mastitis pathogen distribution (MPD) in eight compost bedded pack (CB) and seven sand freestall (SF) farms in Kentucky from May 2013 to January 2014. The same observer evaluated cow hygiene scores (HYS, Cook and Reinemann, 2007) bi-weekly for 50 cows per herd. Throughout the study, producers collected aseptic milk samples from all quarters displaying clinical mastitis signs for bacteriological culturing. Test-day SCC and MIP were obtained from DHIA. The PROC MIXED of SAS (SAS Institute, Inc., Cary, NC) was used to assess fixed effects of barn type (BT), maximum ambient temperature (MT), and HYS on SCC and MIP. Stepwise backward elimination removed nonsignificant interactions ($P \geq 0.05$) with main effects remaining in the model regardless of significance. A χ^2 analysis was conducted using the FREQ procedure of SAS to determine MPD between BT. Maximum ambient temperature, BT, and MT × BT were significant predictors of MIP ($P < 0.05$). As MT increased, MIP increased more rapidly in CB than in SF ($P < 0.05$). Calculated MIP LSMeans(± SE) for CB and SF herds were 30.67 ± 3.02% and 25.33 ± 3.12%, respectively ($P < 0.05$). Hygiene score and BT × MT were significant predictors of SCC ($P < 0.05$). With increasing MT, herd SCC increased more rapidly in CB than in SF ($P < 0.05$). Somatic cell count LSMeans(± SE) for CB and SF were 255,700 ± 24,269 cells/mL and 223,520 ± 25,163 cells/mL, respectively ($P \geq 0.05$). Table 0557 summarizes MPD frequency by BT. Results of this study demonstrate potential challenges for managing mastitis in CBP.

Key Words: mastitis, sand freestall barn, compost bedded pack barn

Table 0557. Frequencies of pathogens isolated from clinical mastitis cases in compost bedded pack (CB) barns and sand freestall (SF) barns[1,2]

Pathogen isolated[1]	CB[2] (Total number of cases = 219) (Mean number of cows = 1208)	SF[2] (Total number of cases = 109) (Mean number of cows = 629)
Coagulase negative staphylococci	16 (7%)	4 (4%)
Environmental streptococci	32 (15%)	21 (19%)
Escherichia coli	63(29%)	19 (17%)
Gram-positive Bacillus species	4(2%)	1 (1%)
Staphylococcus aureus	7 (3%)	6 (6%)
Yeast species	5 (2%)	2 (2%)
Klebsiella species	4 (2%)	4 (4%)
Other gram-negative species	28 (13%)	14 (13%)
Other gram-positive species	6 (3%)	8 (7%)
No growth	32 (15%)	20 (18%)
Contaminated samples	20 (9%)	8 (7%)
Missing samples	2 (1%)	2 (2%)

[1] Number of pathogens isolated per species (percent of total samples per barn type).
[2] $\chi 2$ analysis indicated no significant differences for mastitis pathogen distribution between barn types ($P \geq 0.05$).

0558 Corn silage management practices on California dairies.

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The aim of this study was to describe current corn silage management practices on California¢s Central Valley dairies. In spring 2013, a forage management survey was mailed to dairy producers in California's San Joaquin Valley (n = 1100). Producers received an envelope containing an invitation letter, a double-sided two-page survey, and a pre-paid return envelope. Response rate was 14.5%. Median herd size was 1200 cows. Harvest date was decided solely by the dairy producer (53.3%) or by the producer with the assistance of the forage grower, the chopper, and/or the nutritionist (23.4%). When the dairy producer was not involved in setting a harvest date, the chopper (12.0%), the grower (7.3%), the nutritionist (0.7%), or the chopper and the grower (3.3%) were responsible for setting the harvest date. Most dairies (75.0%) estimated crop DM before harvest, mostly by visual analysis of the milk line. Only one dairy determined DM by shredding and drying plants before harvest. The number of choppers operating simultaneously was either one (35.9%), two (50.3%), three (11.1%), or four to five (2.7%). The most common chopper size was eight-row (67.3%), followed by six-row (17.7%), and 10-row (15.0%). One (68.8%), two (29.7%) or three (1.4%) tractors were used for packing the forage on the silage structure. Dairies (62%) weighed every load of fresh chopped corn delivered at the silage pit with a farm scale (58.9%), the custom harvester's mobile scale (23.2%), other certified scale (16.6%), or other methods (1.3%). Most dairies completed filling their largest silage structure in less than 3 d (48.5%) or in 4 to 7 d (30.9%). Thirty-two percent reported filling silage structures with more than five different fields of harvested forage, comprised of one (36.8%) or two (40.6%) varieties. Dairies (68.8%) reported covering silage within 24 h, with all dairies covering silage structures within 72 h of completion. Daily covering of silage structures was reported from 19.6% of dairies. Dairies (51.0%) used a temporary cover during filling, with duration of filling ranging from 1 to 60 d on their largest corn silage structure. Dairies that did not use a temporary cover reported pile completion duration up to 15 d on their largest structure. Results from this survey study help us to identify critical control points for education and outreach activities to improve silage management practices at harvest, packing, and covering on California's Central Valley dairies.

Key Words: silage management, dairies, survey