Optimization of lactic acid bacterial starter culture to improve the quality and flavor characteristics of traditional Hurood. By Yang et al., page 105. Hurood, a traditional fermented food in China, is prepared from milk and consumed by nomadic people. Currently, most of the Hurood available in the market is produced by small-scale enterprises, and different varieties of Hurood have not yet been developed. Consumers’ perception of Hurood is still relatively limited because its unique taste may not be palatable to most people. This is one of the reasons for the poor growth of Hurood sales. Additionally, as Hurood is mostly produced by small-scale enterprises, generally in homes and open-air environments, the constituent microorganisms and their proportions are not standardized. Therefore, the flavor and texture of Hurood are not uniform from batch to batch. In this study, we used fixed proportions of various lactic acid bacteria strains to ferment milk to prepare traditional Hurood and attempted to improve the sensory quality and flavor of Hurood, which we assessed through single-factor and orthogonal tests. This study highlighted the influence of lactic acid bacterial starter culture on traditional Hurood preparation and provides a reference for using standardized lactic acid bacteria strains to prepare traditional Hurood with enhanced flavor and sensory qualities and to develop more varieties of traditional Hurood.

Postprandial responses and gut permeability in calves fed milk replacer with different macronutrient profiles or a whole milk powder. By Wilms et al., page 184. Current formulations of milk replacers for calves differ greatly from bovine whole milk in terms of macronutrient profile. In this study, 3 milk replacer formulations (high fat, high lactose, and high protein) or a whole milk powder were fed 3 times daily and evaluated for gastric emptying, postprandial insulin-glucose kinetics, and gut permeability during the first 4 weeks of life. Results showed that balancing macronutrients in milk replacer led to postprandial dynamics and hormonal homeostasis closer to those of calves fed whole milk powder, unlike calves fed high lactose and high protein. This raises the possibility of optimizing milk replacer to better support metabolic health and positively affect calf development.

Comparison of milk protein concentrate, micellar casein, and whey protein isolate in loading astaxanthin after the treatment of ultrasound-assisted pH shifting. By Wang et al., page 141. In this study, the hydrophobic substance astaxanthin was delivered by an ultrasound-assisted pH-shifting treatment of milk protein concentrate, micellar casein, and whey protein isolate. The treated milk proteins can bind astaxanthin and improve its encapsulation rate. The encapsulation rate of whey protein isolate was significantly higher than the other 2 proteins. Furthermore, the treated nanocomposites of astaxanthin with milk protein exhibited improved bioavailability, antioxidant capacity, and storage stability. In general, the nanocomposites of milk protein and astaxanthin fabricated by using an ultrasound-assisted pH-shifting treatment have the potential to be better nano-delivery systems for astaxanthin in functional foods.

Water, mineral, and blood acid-base balance in calves with naturally occurring diarrhea receiving two alternative oral rehydration solutions or a placebo. By Wilms et al., page 202. Quantifying water and mineral losses in feces is essential to determine the optimal composition of oral rehydration solutions (ORS) to support the recovery of diarrheic animals. Thus, this study investigated the effects of 2 alternative ORS differing in tonicity and mineral composition in the presence of a negative control on water, mineral, and acid-base balance in 45 calves with naturally occurring diarrhea. Upon their arrival at the research facility, calves received ORS twice daily in between milk meals for 3 days, then monitored for 5 days. Total fecal and urine output were collected over 48 hours, and blood was sampled daily. In addition, the volume of extracellular fluid was evaluated by postprandial sampling after administration of sodium thiosulfate. Diarrheic calves likely could not absorb the high Na+ load of the hypertonic ORS, resulting in greater fecal Na+ losses. Consequently, only the hypertonic ORS sustained acid-base balance compared with the negative control, whereas the hypertonic ORS was not different from other treatments.

Milk beverage base with lactose removed with ultrafiltration: Effect of fat and protein concentration on sensory and physical properties. By Hernandez et al., page 169. About 96% of the lactose (and other low-molecular-weight milk components) was removed from milk by ultrafiltration. In general, lactose removal increased milk whiteness and reduced milk viscosity and flavor, whereas milk titratable acidity decreased and milk pH increased.

Effects of dietary fat, nitrate, and 3-nitrooxypropanol and their combinations on methane emission, feed intake, and milk production in dairy cows. By Maigaard et al., page 220. This study investigated the effects of dietary fat, nitrate,
and 3-nitrooxypropanol and their combinations on methane emission and production performance in dairy cows. Interactions between the dietary additives revealed that no combined supplementation of the additives resulted in methane yield (g methane/kg of dry matter intake) reductions that were greater than what was achieved by individual supplementation of the most potent additive within the combination. Additionally, individual supplementation of nitrate, 3-nitrooxypropanol, and all combinations of additives resulted in decreased dry matter intake and altered feeding behavior. Milk production responses partly reflected the responses in feed intake.

https://doi.org/10.3168/jds.2023-23420.

Lactational performance, enteric methane emission, and nutrient utilization of dairy cows supplemented with botanicals. By Martins et al., page 242. Botanicals have the potential to modify ruminal fermentation and promote host-mediated effects in dairy cows. The objective of this study was to investigate production, ruminal fermentation, nutrient utilization, milk fatty acid profile, and blood variables in lactating dairy cows supplemented with Capsicum oleoresin or a combination of Capsicum oleoresin and clove oil. Feeding the botanicals improved the efficiency of energy utilization and partitioned energy toward body weight gain but did not affect the lactational performance of the cows. The combination of Capsicum oleoresin and clove oil decreased enteric methane yield (per kg of intake) and intensity (per kg of milk yield) in primiparous cows, suggesting a potential positive environmental effect of this combination of botanicals.

https://doi.org/10.3168/jds.2023-23719.

Feeding spent hemp biomass to lactating dairy cows: Effects on performance, milk components and quality, blood parameters, and nitrogen metabolism. By Irawan et al., page 258. Spent hemp biomass (SHB) is a hemp byproduct created after the extraction of cannabinoids; though it is still illegal in the United States as a feed ingredient for livestock, it could be used in the future. In order for legalization to occur, it is essential to assess the effects of SHB on the health and performance of animals. In our study, feeding SHB to lactating dairy cows revealed a relatively low palatability of SHB but no effects on performance, activity, immune system, or methane production. However, there was an improved nitrogen use efficiency. Data suggested a possible low-grade inflammation and a decrease in liver clearance. Overall, our data suggest that SHB is a safe feedstuff for dairy cows.

https://doi.org/10.3168/jds.2023-23829.

Increasing palmitic acid and reducing stearic acid content of supplemental fatty acid blends improves production performance of mid-lactation dairy cows. By Bales et al., page 278. The objective of our study was to determine the effects of changing the ratio of palmitic and stearic acids in supplemental fatty acid blends on the milk production of mid-lactation dairy cows. Overall, fatty acid supplementation increased yields of milk, 3.5% fat-corrected milk, energy-corrected milk, milk fat, and milk lactose. Increasing the level of palmitic acid in supplemental fatty acid blends increased dry matter intake, fat-corrected milk, energy-corrected milk, and milk fat yield. Mid-lactation dairy cows producing ~40 to 50 kg/d milk benefited most, with a ratio of 80% palmitic acid and 10% stearic acid.

https://doi.org/10.3168/jds.2023-23874.

A meta-analysis of methane-mitigation potential of feed additives evaluated in vitro. By Martins et al., page 288. The objective of this meta-analysis was to characterize the methane-mitigation potential of feed additives evaluated in vitro. Chemical inhibitors were the most effective category of feed additives, decreasing methane production by 29% without affecting ruminal fermentation and digestibility of nutrients. The supplementation of Enterococcus spp. (i.e., direct-fed microbial), nitrophenol (i.e., electron sinks), and Leucaena spp. (i.e., tannins) also decreased methane production by more than 20% and had minor or no negative effects on ruminal fermentation and nutrient digestibility. Effective interventions identified in this meta-analysis should be further studied, both in vitro and in vivo, to determine their true potential to decrease enteric methane production.

https://doi.org/10.3168/jds.2023-23419.

Effects of dietary chromium supplementation on blood biochemical parameters in dairy cows: A multilevel meta-analytical approach. By Malik et al., page 301. The objective of this meta-analysis was to examine the effects of dietary chromium supplementation on various blood components, including glucose, insulin, glucagon, nonesterified fatty acid, cortisol, and serum total protein levels in dairy cows. The results indicated that the inclusion of chromium in the cows’ diet did not influence blood glucose, insulin, cortisol, and serum total protein levels. However, an increase in glucagon levels was observed. Notably, a significant decrease in nonesterified fatty acid concentration during the transition period was noted in cows receiving chromium supplementation.

https://doi.org/10.3168/jds.2023-23545.
Milk yield residuals and their link with the metabolic status of dairy cows in the transition period. By Salamone et al., page 317. In dairy cows, the transition period is defined as the 6 weeks around calving. This period is crucial for the health and productivity of dairy cows—during this time, cows are at higher risk for developing diseases. Milk residuals (i.e., the difference between the predicted milk yield as calculated by 2 lactation models) and the actual milk yield were associated with transition success. From the results presented in this study, it seems that milk residuals are closely associated with the physiological processes at play during this crucial period, opening opportunities for automatic detection of animals that are failing to transition successfully. More research is necessary to further quantify the predictive power of the milk residuals.
https://doi.org/10.3168/jds.2023-23641.

Predictive models for disease detection in group-housed preweaning dairy calves using data collected from automated milk feeders. By Perttu et al., page 331. Housing calves in groups can facilitate disease transmission, leading to increased morbidity and mortality. Furthermore, calf caretakers usually manage many calves in these group systems, leading to delayed disease diagnosis. Automated milk feeders (AMF) can be used to feed group-housed calves, and AMF collect data on visit-level calf-feeding behaviors. With data collected from AMF and calf visual health observations, we created predictive models for disease detection using machine learning. Implementing these models could reduce the need for visual calf observation on farms, minimizing labor time and improving calf health.

Fitting mathematical functions to extended lactation curves and forecasting late-lactation milk yields of dairy cows. By Innes et al., page 342. The decision to extend a lactation requires that breeding be intentionally delayed, but there is a risk that certain cows may not be suitable for an extended lactation. This decision typically occurs within the first 50 to 90 days of the lactation. Therefore, we present methods of modeling lactations using daily milk yield data from the beginning of lactation to predict milk yield at day 305. This analysis suggests that traditional models are not yet suitable for practically relevant forecasting, but assisting them with biologically meaningful constraints can improve predictions. Further work is required before these models can be used on farms.
https://doi.org/10.3168/jds.2023-23478.

Modeling ammonia emissions from manure in conventional, organic, and grazing dairy systems and practices to mitigate emissions. By Aguirre-Villegas et al., page 359. This article models conventional, organic, and grazing dairy farm systems and quantifies ammonia emissions from manure through barn, storage, and land applications. By establishing baseline ammonia estimations for manure, the effects of management practices to mitigate ammonia emissions are evaluated to guide farm and policy decision-making. In all farm types, manure storage and land application are the main sources of ammonia emissions from manure systems. Manure injection is the single most effective practice to reduce ammonia emissions from manure. This study also shows the importance of evaluating different functional units that can affect the intensity of reported emissions.
https://doi.org/10.3168/jds.2023-23782.

Evaluating enteric methane emissions within a herd of genetically divergent grazing dairy cows. By Lahart et al., page 383. Enteric methane emissions of three genetic groups of dairy cows were evaluated across the grazing season. The results demonstrate a seasonal nature to methane emissions, with the lowest daily methane occurring in the spring, which increased as the grazing season progressed. The results also demonstrate that high economic breeding index genetics produce less methane per unit of milk solids output compared with dairy cows representative of the national average. Jersey genetics were shown to reduce methane emissions per cow when compared with high-genetic-merit animals and per unit of milk solids compared with national-average animals.

Imputation accuracy from low- to medium-density SNP chips for US crossbred dairy cattle. By Déru et al., page 398. A population of Holstein-Jersey dairy cattle was investigated to study the accuracy of imputation in US crossbred dairy cattle. Although imputation accuracy ranged from 85% to 90%, it was lower than in the purebred population. The accuracy of imputation for US crossbred dairy cattle increased significantly with the addition of related individuals of those crossbred in the reference population. These findings may provide information to assist in future studies involving genomic data in crossbred US dairy cattle. Further research should be conducted to validate the effect of imputation on the genetic values of these crossbreds and their purebred parents.
https://doi.org/10.3168/jds.2023-23250.
Farmers’ preferences for breeding goal traits and selection indexes for Slovenian dairy cattle. By Ule et al., page 412. The aim of this study was to determine the role played by farmers’ sociodemographic factors in the characteristics of their breeding goals and how they are clustered in Slovenia. A mixed-methods approach was used. The results show that the breeding goals are generally quite similar, with animals’ health and welfare and reproductive traits dominating the whole sample and environmental and meat traits being the least important. Older, more formally educated farmers and farmers with lower milk production per cow preferred milk-production traits. Three different clusters emerged: milk production–focused farmers, functionality-focused farmers, and resilience-focused farmers.


The marker effects of a single-step random regression model for 4 test-day traits in German Holsteins. By Alkhoder et al., page 423. Combined with a random regression model, the single-step model allows for the most accurate evaluation of test-day yield traits and somatic cell scores in dairy cattle. Via genomic validation, we showed a high accuracy and unbiasedness of the marker effect estimates in German Holsteins. Furthermore, the markers were shown to differ considerably in the genetic lactation curve shapes. Individual chromosomes appeared to make more variable contributions to the total genetic variance and to the genetic correlations between lactations than expected.

https://doi.org/10.3168/jds.2023-23793.

Associations between serum health biomarker concentrations and reproductive performance, accounting for milk yield, in pasture-based Holstein cows in southeastern Australia. By Luke et al., page 438. Reproductive performance is one of the most important drivers of dairy farm profitability. In this study, we assessed associations between concentrations of a suite of biomarkers measured in serum in the first 30 days of lactation and subsequent reproductive performance. Our results indicate that strategies that result in favorable changes in biomarker concentrations in pasture-based cows may improve reproductive performance, irrespective of milk yield.

https://doi.org/10.3168/jds.2022-23006.

Associations of cow- and herd-level factors during the dry period with indicators of udder health in early-lactation cows milked by automated milking systems. By Wagemann-Fluxá et al., page 459. Dairy cows are susceptible to developing intramammary infections during the dry period. Associations between early-lactation udder health and management practices during this period have been reported in previous research. However, most of this research has been conducted on farms with conventional milking systems. Our study identified associations between cow-level factors and herd-level housing and management practices in preparation for dry-off, at dry-off, during the dry period, and at the beginning of lactation with indicators of udder health in early-lactation cows from automated-milking-system herds.

https://doi.org/10.3168/jds.2023-23796.

Adoption and decision factors regarding selective treatment of clinical mastitis on Canadian dairy farms. By de Jong et al., page 476. A total of 64% of 142 Canadian farms included in this study selectively treated clinical mastitis (CM), with antimicrobial treatment decisions informed by severity, udder health parameters, and cow health parameters. Farms differed in the use of CM case history, somatic cell count, and culture results to inform decision-making. Increased implementation of selective CM treatment protocols was associated with a decreasing average cow somatic cell count. Different approaches were taken if clinical signs persisted after antimicrobial treatment. Understanding on-farm CM treatment practices is crucial to tailor interventions to promote prudent antimicrobial use on dairy farms.

https://doi.org/10.3168/jds.2023-23608.

Combination of milk variables and on-farm data as an improved diagnostic tool for metabolic status evaluation in dairy cattle during the transition period. By Heirbaut et al., page 489. The transition period of high-producing dairy cows is a challenging period, and the cow is at risk of developing subclinical metabolic problems. Milk biomarkers have been widely studied as an alternative blood sampling to determine the metabolic status during early lactation. The inclusion of on-farm data could be of interest to improve the diagnostic value of milk biomarkers. Generally, milk biomarkers explained more of the variation in various metabolic blood variables, but on-farm data were of particular interest in explaining additional variations. Hence, further research evaluating the predictive value of combined data is highly recommended.

https://doi.org/10.3168/jds.2023-23693.

Exploring the sources of variation of electrical conductivity and total and differential somatic cell count in Italian Mediterranean buffaloes. By Bobbo et al., page 508. As with dairy cows, subclinical mastitis can have a detrimental effect on the production and quality of Italian Mediterranean buffaloes’ milk. Therefore, the routine measurement of indirect indicators of mastitis is fundamental to improving...
Within-herd transmission of Mycoplasma bovis infections after initial detection in dairy cows. By Biesheuvel et al., page 516. Despite the global occurrence of Mycoplasma bovis infections that affect cattle of all types, outbreak dynamics are not fully understood. This study revealed a remarkable variability in within-herd transmission parameters of M. bovis within and between cows, youngstock, and calves among 20 Dutch dairy herds. Transmission pathways originating from cows emerged as the primary route of the infection’s dissemination. Furthermore, pathways involving calf-to-calf, calf-to-youngstock, and youngstock-to-youngstock demonstrated noteworthy importance. These new insights will enhance the understanding of on-farm M. bovis outbreaks and evidence of effective on-farm intervention strategies to control the spread of M. bovis on dairy farms. https://doi.org/10.3168/jds.2023-23407.

Effects of bovine leukemia virus seropositivity and proviral load on milk, fat, and protein production of dairy cows. By Shrestha et al., page 530. The objective of this study was to evaluate the effects of bovine leukemia virus (BLV) infection, as determined by BLV seropositivity and proviral load, on estimated 305-day milk, fat, and protein yields between BLV-infected and noninfected dairy cows. Although there were no significant differences between cows positive and negative for BLV antibodies, cows with high proviral load produced less 305-day milk, fat, and protein compared with BLV-negative cows. Therefore, knowledge of BLV proviral load was more predictive of milk, fat, and protein production, and could inform culling decisions. https://doi.org/10.3168/jds.2023-23695.

Perceptions of dairy cow–handling situations: A comparison of public and industry samples. By Robbins et al., page 540. The sustainability of the dairy industry depends on aligning industry practices with social expectations about the treatment of dairy cattle. We surveyed both industry and general public samples to assess and compare how video clips of real cow-handling situations, with a range of negative to positive animal welfare effects, are perceived by both groups. We found both industry and public samples generally perceived scenarios similarly, with most differences occurring in degree, rather than kind. Establishing industry-wide cattle-handling expectations that are socially acceptable appears to be feasible. https://doi.org/10.3168/jds.2023-23629.

Dynamic fecal microenvironment properties enable predictions and understanding of peripartum blood oxidative status and nonesterified fatty acids in dairy cows. By Zhu et al., page 573. The peripartum period is a critical and vulnerable stage in dairy farming, and peripartum oxidative status and negative energy balance are common. In this study, we explored intestinal sources of host oxidative status and nonesterified fatty acids based on peripartum sequential stages, microenvironment sequencing data, and blood parameters from 21 days before until 21 days after calving. Using a total of 120 blood and feces samples from 30 dairy cows, we demonstrated the decline of microbial alpha diversity and bacterial interactions from 7 days before calving to after calving. Metabolic pathway enrichment analysis revealed elevated carbohydrate, lipid, and energy metabolism (glycerophospholipid metabolism, tricarboxylic acid cycle) at 7 days after calving; core metabolites were significantly correlated with oxidative status biomarkers and nonesterified fatty acids. The Bayesian network further demonstrated the driver microbial and metabolic modules for oxidative status and negative energy balance. The support vector machine radial model was applied to oxidative status and negative energy balance level predictions, and it showed 100% accuracy as well as >80% accuracy in the test and external validation datasets. https://doi.org/10.3168/jds.2022-23066.

Novel insights into the associations between immune cell population distribution in mammary glands and milk minerals in Holstein cows. By Giannuzzi et al., page 593. In this study, we exploited the pattern of associations between different milk immune cell populations (i.e., lymphocytes, polymorphonuclear leucocytes, and macrophages) in the mammary gland somatic cells and milk minerals in Holstein cows. We observed that different immune cell populations were associated with varying minerals in milk. Specifically, macrophages were associated with an increase in Na and S, and a decrease in K milk contents, mirroring the worsening of inflammation processes. Also, milk Fe content showed positive associations with the lymphocytes and polymorphonuclear leucocytes population, highlighting its crucial role in immune regulation. https://doi.org/10.3168/jds.2023-23729.
Effects of monensin supplementation on rumen fermentation, methane emissions, nitrogen balance, and metabolic responses of dairy cows: A systematic review and dose-response meta-analysis. By Rezaei Ahvanooei et al., page 607. The aim of this study was to evaluate the dose-response relationship between monensin supplementation and metabolic responses in dairy cows using a meta-analysis in a comprehensive review. The data and information used in this review were primarily from peer-reviewed literature published between 2001 and 2022. Based on the analysis of all variables evaluated, the optimal dose of monensin was estimated to be 19 to 24 mg/kg. https://doi.org/10.3168/jds.2023-23441.

Nuciferine protects bovine hepatocytes against free fatty acid–induced oxidative damage by activating the transcription factor EB/peroxisome proliferator-activated receptor γ coactivator 1 alpha pathway. By Fang et al., page 625. In nonruminants, transcription factor EB (TFEB) is a key suppressor of oxidative stress. Nuciferine, an alkaloid found in lotus, alleviates liver injury in rodents. Using primary bovine hepatocytes, this study revealed that nuciferine enhanced TFEB transcriptional activity and protected hepatocytes from free fatty acid–induced oxidative damage. Importantly, these protective effects of nuciferine were curtailed by knockdown of TFEB or peroxisome proliferator–activated receptor γ coactivator 1 alpha (PPARGC1A). Thus, nuciferine may be a valuable protective compound, and the TFEB/PGC-1α pathway a useful therapeutic target for preventing hepatic oxidative injury induced by high concentrations of fatty acids. https://doi.org/10.3168/jds.2022-22801.

The impact of automated, constant incomplete milking on energy balance, udder health, and subsequent performance in early lactation of dairy cows. By Meyer et al., page 641. Reducing the amount of milk withdrawn at each milking is one of the options to mitigate the negative energy balance. To facilitate the implementation of incomplete milking (IM), an automated system, first developed as a tool for dry-off, was used. When clamping the milk withdrawn to the amount obtained at 8 days in milk for 2 weeks, udder health was maintained, milk yield and composition until week 15 were unaltered, and cows tended to have less feed intake than normally milked cows during the 2 weeks of IM, leaving energy balance largely unaffected during the 2 weeks of IM and thereafter. https://doi.org/10.3168/jds.2023-23777.