Impact of varying levels of pasture allowance on the nutritional quality and functionality of milk throughout lactation. By Timlin et al., page 6597. There is a general perception that grass-fed dairy systems produce milk that is more nutritionally beneficial for human consumption than that derived from intensive mixed ration feeding systems, primarily due to its fatty acid profile. Previous research has investigated the composition of milks derived from mixed ration and grass-only diets; however, these grass-only diets fail to integrate concentrate supplementation, which is commonly incorporated to ensure the energy demands of the animals are achieved. This research looks to give a more accurate representation of grass-fed dairy systems, such as those most commonly implemented in Ireland.

Transglutaminase, glucono-δ-lactone, and citric acid–induced whey protein isolation–milk fat emulsion gel embedding lutein and its application in processed cheese. By Li et al., page 6635. Whey protein isolate–milk fat emulsion gels showed good embedding and protective effects on lutein, and it is noteworthy that their effects were closely related to the induction method. The type of inducer had different effects on the texture and microstructure of the processed cheese as well as on the bioavailability and storage stability of lutein. These results provide valuable information for the formation of cold-set whey protein–stabilized emulsion gels, provide new ideas for embedding active substances, and further promote the development of cheese rich in nutrients and with health care functions.

Comparison of chemical composition of organic and conventional Italian cheeses from parallel production. By Manuelian et al., page 6646. This study compared the detailed composition of 4 Italian cheese types produced using organic and conventional milk. Organic and conventional cheeses of the same type were manufactured by the same company (parallel production) during 2020–2021. Results show that Asiago Protected Designation of Origin presents small but measurable differences between organic and conventional cheeses. However, within Latteria, Caciotta, and Mozzarella Traditional Specialty Guaranteed, the differences were larger and mainly related to the fatty acid amounts measured.

Comparison of taste characteristics between koji mold–ripened cheese and Camembert cheese using an electronic tongue system. By Hayashida et al., page 6701. We used an electronic tongue system to evaluate the taste characteristics of surface-ripened cheese prepared using either Aspergillus oryzae or Aspergillus sojae (koji mold). All koji cheese samples exhibited lower sourness and greater bitterness, astringency, saltiness, and umami richness than the Camembert cheese samples. The intensity of all taste characteristics varied depending on the strain of koji mold used for preparing the cheese. These findings indicate that the taste of koji cheese varies from that of conventional mold-ripened cheese.
https://doi.org/10.3168/jds.2023-23245.

Formate-producing capacity provided by reducing ability of Streptococcus thermophilus nicotinamide adenine dinucleotide oxidase determines yogurt acidification rate. By Yamuchi et al., page 6710. Despite the coexistence of various acidifying rates in Lactobacillus bulgaricus, we found that the yogurt fermentation rate was largely dependent on the acidification rate of Streptococcus thermophilus, which was determined by the formate production capacity, by using the 24 combinations of fast- and slow-acidifying S. thermophilus and L. bulgaricus. The results using the deficient mutants of pyruvate formate-lyase and nicotinamide adenine dinucleotide oxidase showed that formate production requires not only an anaerobic environment but also a low redox potential, achieved by nicotinamide adenine dinucleotide oxidase. Formate was shown to play a key role in determining the S. thermophilus acidification rate and, consequently, regulates yogurt fermentation.
https://doi.org/10.3168/jds.2023-23245.

Application of tea polyphenols as additives in brown fermented milk: Potential analysis of mitigating Maillard reaction products. By Li et al., page 6731. The potential of tea polyphenols as inhibitors of Maillard reaction products in brown fermented milk was investigated. The addition of 0.08% (wt/wt) tea polyphenols resulted in 60.8%, 27.12%, 23.44%, 57.7%, and 31.28% inhibition of 5-hydroxymethyl-2-furaldehyde, glyoxal, methylglyoxal, Nε-carboxymethyl lysine, and Nε-carboxyethyl lysine, respectively, but the flavor profile of brown fermented milk was unchanged. After 21 days of storage, the levels of the 5 Maillard reaction products were 46.3%, 9.7%, 20.6%, 5.2%, and 24.7% lower than the control group, respectively. This study is important for maintaining the safety of dairy consumers.
Effects of storage conditions on milk powder properties. By Ryabova et al., page 6741. The storage and transportation of milk powder involves paelitizing with possible self-compression in the lower layers and temperature fluctuations, including in the negative temperature zone. These external influences, singly and in combination, can significantly change the products’ functional and technological properties. The work simulates conditions as close to real as possible, simulating temperature fluctuations and self-compression under the influence of gravity. The obtained results showed that the storage of milk powder at low negative temperatures does not significantly affect its properties, regardless of the storage range. When storing milk powder at $25 \pm 3^\circ$C, the temperature factor was aggravated by mechanical action, which together led to critical changes in the functional and technological properties of the product after 15 months of storage. https://doi.org/10.3168/jds.2022-23094.

Cheese yield and nutrients recovery in the curd predicted by Fourier-transform spectra from individual sheep milk samples. By Pazzola et al., page 6759. The aims of this study were to assess the feasibility of predicting ovine cheese-making traits by using milk spectra via Fourier-transform infrared spectroscopy and to quantify the effect of farms on their prediction accuracy. Cross-validation and leave-one-out validation procedures were adopted. Results from the former suggested the potential inclusion of some traits in the routine acquisition of milk spectra from individual sheep milk samples as a useful alternative to instrumental testing. Conversely, the low prediction accuracies observed for the latter procedure suggest the importance of considering the information related to the farming system. https://doi.org/10.3168/jds.2023-23349.

Parental perception of children’s school lunch milk. By Racette et al., page 6771. This study evaluated parental understanding and perception of school lunch milk. The ideal school lunch milk for parents was unflavored (white milk) or chocolate, 2% fat, ultrapasteurized, and packaged in a cardboard gabletop carton. Parents are largely unfamiliar with the specific attributes and nutritional profile of milk served in schools but believe that schools should offer milk to their children as part of breakfast and lunch. https://doi.org/10.3168/jds.2023-23326.

Comparison of rumen and abomasal infusions of an exogenous emulsifier on fatty acid digestibility of lactating dairy cows. By dos Santos Neto et al., page 6789. We evaluated the effects of infusing an exogenous emulsifier (polysorbate-C18:1) into either the rumen or abomasum on fatty acid digestibility and production responses of lactating dairy cows. Infusing 30 grams of polysorbate-C18:1 per day increased fatty acid digestibility. Compared with a ruminal infusion, abomasally infusing polysorbate-C18:1 tended to increase fatty acid digestibility. However, this may not necessarily be due to better emulsifying action because the abomasal infusion reduced fatty acid intake. In summary, abomasal and ruminal infusions both improved fatty acid absorption. https://doi.org/10.3168/jds.2022-23143.

Effect of pre- and postpartum supplementation of a pure glycerol product to dairy cows on feed intake, metabolic markers, and milk yield and components. By Van Soest et al., page 6798. A dry glycerol product was supplemented to dairy cows—either prepartum, postpartum, or both—to observe effects on feed intake, metabolic markers, and milk yield and components. Supplementing cows with glycerol prepartum resulted in greater feed intake, fewer indicators of fat mobilization in early lactation, and less body weight loss. Despite lesser feed intake following parturition, postpartum glycerol supplementation improved metabolic status by lowering the odds of hypoglycemia, reducing circulating nonesterified fatty acid concentrations, and lowering preformed fatty acid concentration and yield in milk. https://doi.org/10.3168/jds.2022-23173.

Effects of Acacia mearnsii added to silages differing in nutrient composition and condensed tannins on ruminal and manure-derived methane emissions of dairy cows. By Lazzari et al., page 6816. This study combined methane emission measurements from the rumen and from manure to evaluate the effects of Acacia mearnsii in combination with perennial ryegrass, sainfoin, or red clover silages that differed in terms of condensed tannins and nutrient composition. The tannin sources tested (acacia and sainfoin) did not affect the ruminal methane emission intensity due to some milk performance losses but did reduce manure-derived emissions. Acacia combined with low-protein silage (perennial ryegrass) drastically reduced feed intake and milk production. Both ruminal- and manure-derived methane emissions were dependent on the fiber content of the animals’ diets. https://doi.org/10.3168/jds.2022-22901.

Smoothing spline assessment of the accuracy of enteric hydrogen and methane production measurements from dairy cattle using various sampling schemes. By van Lingen et al., page 6834. This study evaluated the accuracy of daily enteric hydrogen and methane production from dairy cattle using various sampling schemes for the collection of emitted gases. Gas emission data from climate
Respiration chambers were available from 2 experiments covering both restricted and ad libitum feeding. Generalized additive models were fitted to the data for predicting diurnal hydrogen and methane emission rates. Sampling based on 9 predetermined sampling schemes had a major effect on estimated daily hydrogen production, in particular with restricted feeding, whereas daily methane production was moderately affected by sampling scheme with restricted feeding and not with ad libitum feeding.


Exhaled volatile fatty acids, ruminal methane emission, and their diurnal patterns in lactating dairy cows. By Islam et al., page 6849. Ruminants are an important part of global food systems, converting human-inedible biomass into high-quality animal protein via the rumen microbial ecosystem. Understanding ruminal fermentation is key to improving the efficiency of resource utilization and sustainability of ruminant production systems. Currently, the assessment of rumen fermentation relies on invasive sampling procedures that impair animal welfare. We applied a mass spectrometry approach to identify the exhaled volatile fatty acid profile as a proxy for ruminal volatile fatty acids in dairy cows. This method shows potential for a new avenue for ruminant research without compromising animals’ well-being.

https://doi.org/10.3168/jds.2023-23301.

Effect of source and amount of rumen-protected choline on hepatic metabolism during induction of fatty liver in dairy cows. By Arshad et al., page 6860. The objectives of this study were to determine the effects of sources of rumen-protected choline (RPC) with a low (28.8%) or a high (60.0%) concentration of choline chloride to supply 0, 12.9, or 25.8 grams of choline ion per day on hepatic metabolism in cows induced to develop fatty liver. Feeding RPC reduced the concentrations of haptoglobin in serum and triacylglycerol in hepatic tissue but increased the content of glycogen in the liver. Feeding RPC altered the expression of genes involved in the metabolism of choline, lipoprotein synthesis and assembly, inflammation, autophagy, and endoplasmic reticulum stress response. Feeding RPC reduces hepatic lipidosis in dairy cows.

https://doi.org/10.3168/jds.2023-23270.

Effect of dietary seaweed (Ascophyllum nodosum) supplementation on milk mineral concentrations, transfer efficiency, and hematological parameters in lactating Holstein cows. By Newton et al., page 6880. This study assessed the concentrations of milk macronminerals and trace elements and hematological parameters from cows fed diets where seaweed (Ascophyllum nodosum) replaced equal amounts of corn meal. Feeding seaweed increased milk magnesium, phosphorus, and iodine concentrations without affecting productivity, feed efficiency, or hematological parameters, compared with the control diet containing corn meal. Seaweed supplementation in dairy cows’ diets may be recommended in locations or seasons where milk iodine concentrations are generally low, but care should be taken, as supplementation may produce milk with high iodine concentrations that could pose a nutritional risk for children.


Supplementing sodium butyrate to limit-fed heifers: Effects on growth, coccidiosis, urinary purine derivatives, and apparent total-tract nutrient digestibility. By Klobucher et al., page 6894. Sodium butyrate has been shown to improve growth and health in conventionally fed heifers. Limit feeding provides ample nutrients in a nutrient-dense diet. Heifers have not been fed sodium butyrate while limit-fed. Results were similar for growth whether sodium butyrate was fed or not. Sodium butyrate improved fiber, dry matter, and organic matter digestibility compared with those not fed sodium butyrate. Purine derivatives, a measure of microbial synthesis, were less for sodium butyrate–fed heifers. Plasma glucose was lower, and ketones were higher for heifers fed sodium butyrate compared with those that were not indicative of improved ruminal development.

https://doi.org/10.3168/jds.2023-23275.

Effects of forage and grain legume-based silages supplemented with faba bean meal or rapeseed expeller on lactational performance, nitrogen utilization, and plasma amino acids in dairy cows. By Räisänen et al., page 6903. The objective of this work was to investigate the effect of forage (red clover–grass silage vs. whole-crop faba bean–grass silage) and protein concentrate type (faba bean meal vs. rapeseed expeller) on lactational performance, nitrogen utilization, and plasma amino acids in dairy cows. Cows fed red clover–grass silage had greater milk yield compared with faba bean–grass silage, whereas rapeseed expeller, rather than faba bean meal, resulted in greater milk and milk protein yields. The greatest nitrogen efficiency was achieved when red clover–grass silage, cultivated without nitrogen fertilizer input, was combined with rapeseed expeller.


Effects of dietary inclusion of 3 Nordic brown macroalgae on enteric methane emission and productivity of dairy cows. By Thorsteinsson et al., page 6921. Currently, antimethanogenic feed additives to mitigate enteric methane emissions from cattle are intensively researched. Brown macroalgae,
Procured in the Northern Hemisphere, have shown methane-mitigating potential in several in vitro studies. However, literature on the effects when fed to dairy cows is limited. This study aimed to investigate the potential of the 3 brown macroalgae, Saccharina latissima, Sargassum muticum, and Ascophyllum nodosum, as antimethanogenic feed additives when included up to 4% on a dry matter basis in the total mixed rations of dairy cows. Our study found no effect of the inclusion of the macroalgae on enteric methane emission. Moreover, the macroalgae did not affect the dry matter intake or milk production.

https://doi.org/10.3168/jds.2022-23201.

Differential average daily gain of pregnant Holstein × Gyr dairy heifers causes placental adaptations to support fetal growth and development. By Oliveira et al., page 6938. This study evaluated the effects of diets fed to moderate or high body weight gain targets during pregnancy on the uteroplacental blood supply of Holstein × Gyr primiparous cows. Primiparous cows in the moderate treatment group had more cotyledons, continuous growth of vascularization in the placenta, and greater mRNA expression of IGFR1 and VEGFB in the cotyledons. In contrast, high body weight gain heifers produced a greater volume of lower-quality colostrum. Calf birth weight and the efficiency of passive immunity transfer were similar between treatments. Heifers fed for moderate weight gain during gestation undergo maternal adaptations in the placenta to support gestation without affecting fetal development or calving outcomes.

https://doi.org/10.3168/jds.2022-23201.

Expression of enzymes involved in the urea cycle and muscle and mammary gland development of Holstein × Gyr heifers in a rotational grazing system supplemented with increasing protein levels. By Castro et al., page 6951. Studies evaluating increasing supplemental crude protein and its effects on the urea cycle, muscle, and mammary gland are scarce for grazing cattle. We aimed to evaluate the impact of increasing supplement crude protein (Control, 12%, 24%, and 36% of crude protein) for Holstein × Gyr crossbred heifers grazing Brachiaria decumbens across seasons (rainy, dry, transition rainy-dry, and dry-rainy). The supplementation strategy did not affect mammary gland development. However, the crude protein supplementation increased the ribeye area and fat thickness, directly affecting the adenosine monophosphate-activated protein kinase expression in the muscle. Moreover, crude protein supplementation led to increased expression of urea cycle enzymes.


Taking the diet of cows into consideration in designing payments to reduce enteric methane emissions on dairy farms. By Le Gloux et al., page 6961. This study provides insights on the design of effective payments for environmental services condition toward enteric methane emission reduction. Two indicators of enteric emissions were compared, and the additional production costs for adding more grass to fodder systems as an emission-reduction lever were computed for representative French medium and large dairy farms. Results showed that an emission indicator accounting for diet effects is crucial to monitor farmers’ efforts accurately. Moreover, farms face heterogeneous additional costs for changing cows’ feed rations, and this should be taken into account in the definition of the payment amount to ensure large-scale adoption.


Genomic evaluation of feed efficiency in US Holstein heifers. By Khanal et al., page 6986. We investigated the variability of residual feed intake in dairy heifers. We estimated the genetic parameters of residual feed intake and its component traits. There was sufficient variability and moderate heritability of residual feed intake. We also conducted a genomic evaluation of residual feed intake of dairy heifers. This genomic prediction provides new tools to select for feed efficiency of heifers that are not yet available to commercial US dairy producers nationally. Future research should be directed toward the correlation of residual feed intake for heifers and cows in order to select individuals based on lifetime feed conversion efficiency.


Genetic evaluation of heat tolerance in Holsteins using test-day production records and NASA POWER weather data. By Rockett et al., page 6995. The NASA POWER database provides meteorological data over regions where surface measurements are sparse or nonexistent. Therefore, the overall aim of this study was to evaluate the genetic parameters for heat tolerance in Canadian Holsteins using NASA POWER meteorological—rather than weather station—data. The results showed that heat tolerance had a low to moderate heritability, indicating there is genetic variability for thermotolerance. Therefore, genetic selection for heat tolerance is possible, but the genetic gain may be slow. There was also a moderate antagonistic correlation between the level of production and less sensitivity to heat stress, indicating that continued selection for production without consideration for heat tolerance will likely decrease the ability of dairy cattle to cope with heat stress. Finally, the
Effects of weaning strategies on health, hematology, and productivity in Holstein dairy calves. By Wolfe et al., page 7008. Abrupt weaning in calves is shown to increase stress and decrease growth, but whether calves at different ages are equally affected is unclear. This study examined 4 different weaning strategies (early-abrupt, early-gradual, late-abrupt, and late-gradual) and their effects on calf health measures, intakes, rumen pH, and hematology associated with immune function. Gradually weaning calves increased lymphocyte counts, neutrophil counts, and average daily gain regardless of weaning age. This may relate to the gradual-weaned calves also having an increase in their grain intake during weaning. Abruptly-weaned calves demonstrate increased procainamide and blood hematocrit. Weaning strategy and immunocompetence should be further investigated. https://doi.org/10.3168/jds.2022-22738.

Three years of situated social learning and development of diverse cow-calf contact systems in Danish organic dairy farms. By Vaarst and Christiansen, page 7020. This study summarizes the learning process of Danish organic dairy farmers who participated in farmer peer-to-peer group meetings held over 3 years to learn more about cow-calf contact systems. The results from the 21 meetings involving 32 farmers provided evidence that social learning took place across a wide variety of areas, including animal care, housing, equipment, and grazing practices needed for cow-calf contact systems. Many participants viewed foster cow systems as a more feasible option, and some viewed them as a stepping stone to their long-term goal of implementing a dam-rearing system.

Predicting lameness in dairy cattle using untargeted liquid chromatography–mass spectrometry-based metabolomics and machine learning. By Randall et al., page 7033. Lameness (impaired mobility) is a condition that affects the health and welfare of dairy cows and the sustainability of the dairy industry. Current detection methods rely on visual assessment of gait changes resulting from pain. The study findings demonstrated that metabolomics alongside machine learning could predict lameness from the metabolome of dairy cows. Prediction accuracies of up to 82% were achieved at the time of lameness detection, and lameness could be predicted prior to observable changes in gait. These findings provide the building blocks for developing tools to predict lameness, thus aiding in prevention and management. https://doi.org/10.3168/jds.2022-23118.

Association between transfer of passive immunity, health, and performance of female dairy calves from birth to weaning. By Sutter et al., page 7043. The objective of this observational study was to compare calf health, average daily weight gain, and calf mortality, considering 4 passive immunity categories. A further aim was to examine the effects of calving-related factors (e.g., dystocia, winter season) on passive immunity. We hypothesized that calves with excellent passive immunity have greater average daily weight gains and lower risks for infectious diseases and mortality. Calves with poor passive immunity had greater hazards for diarrhea, pneumonia, or mortality. The greater the passive immunity measured by refractometry (% Brix), the lower the probability of developing pneumonia or dying. Calves with excellent, good, and fair passive immunity had greater average daily weight gains.

Associations between days in the close-up group and milk production, transition cow diseases, reproductive performance, culling, and behavior around calving of Holstein dairy cows. By Venjakob et al., page 7056. The objective of this study was to evaluate the association between days in the close-up group and milk production, early lactation diseases, reproductive performance, and culling. In addition, behavioral changes associated with days in the close-up group were evaluated. A short (<10 days) and a long (>30 days) stay in the close-up group were associated with detrimental effects on milk production and risk of disease. In nulliparous and parous cows with a short (<10 days) and a long (>30 days) stay, the culling risk was increased compared with cows with stays in the close-up group between 21 and 28 days. Compared with cows with 14, 21, and 28 days in the close-up group, cows with 7 and 35 days also had impaired behavior before calving, as time spent eating and ruminating was reduced, and cows were more inactive.

Dairy workers’ attitudes toward dairy cattle euthanasia. By Merenda et al., page 7076. The study aimed to investigate dairy workers’ attitudes toward dairy cattle euthanasia and whether their attitudes were related to their demographic characteristics. White workers were more comfortable with euthanasia than Latin Americans. Additionally, individuals who had euthanized before were more comfortable with euthanasia than individuals who had not. Participants
who felt unconfident lacked knowledge, were detached from cattle, primarily worked on farms with 501 to 1,000 cows, had minimum experience with livestock, and had no training. Future training activities should focus on Latin Americans without euthanasia experience, as they were the most uncomfortable with dairy cattle euthanasia.

https://doi.org/10.3168/jds.2023-23223.

Health indicators in surplus calves at the time of arrival at auction markets: Associations with distance from farms of origin in Québec, Canada. By Ramos et al., page 7089. The presence of ocular discharge, abnormal hide cleanliness, a swollen navel, and dehydration were the main physical signs observed in surplus calves from different farms at 2 large auction markets during the summer and winter. Dehydration and ocular discharge were more commonly observed in calves from farms located at greater distances from the auction markets, and during the summer. Conversely, these calves were less likely to present abnormal hide cleanliness. Our results report the main health problems in surplus calves at auction markets in Québec, highlighting the importance of transport length and season on calf health.

https://doi.org/10.3168/jds.2022-22827.

Antimicrobial and teat sealant use and selection criteria at dry-off on Canadian dairy farms. By McCubbin et al., page 7104. Selective dry cow therapy, preferably combined with teat sealant application, can reduce preventive antimicrobial use. Various dry cow therapy and teat sealant decision-making protocols are used on Canadian dairy farms. Larger farms more often used teat sealants, and automatic-milking-system farms used teat sealants selectively, rather than on all cows. Regardless, herd-level somatic cell count, milk production, farm size, province, and milking system were not substantially different between farms using selective versus blanket dry cow therapy.


Calcium dynamics and associated temporal patterns of milk constituents in early-lactation multiparous Holsteins. By Seminara et al., page 7117. As dairy cows transition into early lactation, calcium homeostasis is challenged such that many cows experience subclinical hypocalcemia. Among cows, differing dynamics of calcium metabolism in the early postpartum period have been found to be differentially associated with risk of disease. Therefore, we aimed to investigate the potential of Fourier-transform infrared spectroscopic methods to identify cows with favorable or unfavorable calcium dynamics by characterizing milk constituent profiles for cows with these dynamics. Although these samples were collected from a single farm, our results indicate that these methods show promise as a diagnostic tool.


Store-operated Ca\(^{2+}\) entry-sensitive glycolysis regulates neutrophil adhesion and phagocytosis in dairy cows with subclinical hypocalcemia. By Zhang et al., page 7131. Subclinical hypocalcemia hampers immune function in dairy cows and leads to a variety of secondary diseases such as ketosis, endometritis, and mastitis. Neutrophils are the first line of innate immunity. Improving the bactericidal ability of neutrophils is essential to enhance immune function in dairy cows. In the present study, we observed that increasing the intracellular Ca\(^{2+}\) concentration and the glycolytic ability of circulating neutrophils greatly improved their bactericidal capacity. Thus, a similar response in vivo might enhance the immune responsiveness in the cow.


Evaluation of immunogenicity of enterobactin conjugate vaccine for the control of Escherichia coli mastitis in dairy cows. By Zeng et al., page 7147. Mastitis is the most common disease in dairy cows and is responsible for huge economic losses in the industry. When fully applied, current mastitis-control programs reduce contagious mastitis pathogens but are less effective against environmental mastitis pathogens such as Escherichia coli. Consequently, environmental mastitis pathogens became a major problem for dairy farms with a reduced incidence of contagious mastitis pathogens. The current commercially available E. coli J5 mastitis vaccine is ineffective in controlling E. coli mastitis. A nutritional immunity approach that restricts bacterial iron uptake by targeting enterobactin molecules secreted by the bacteria can be a promising approach for controlling E. coli mastitis in dairy cows. The immunogenicity and safety of this enterobactin-targeting vaccine in dairy cows have not been evaluated. The objective of this study was to determine the immunogenicity and safety of the enterobactin conjugate vaccine in dairy cows. We enrolled 12 Holstein dairy cows in 2 groups of 6 enterobactin-vaccinated and 6 phosphate-buffered saline (pH 7.4)–injected control cows. Results from this study showed that the enterobactin conjugate vaccine induced significantly higher enterobactin-specific antibodies in milk and serum. It appears to be safe for dairy cows, as shown by the absence of local and systemic adverse reactions, no detrimental effects on milk production, and no difference in the fecal microbiota structure and diversity between vaccinated and unvaccinated control groups. Therefore, our study demonstrated that the enterobactin conjugate vaccine is immunogenic in dairy cows and is a promising vaccine for controlling E. coli mastitis in dairy cows.
Effects of dairy cows’ personality traits on their adaptation to an automated milking system following parturition. By Brasier et al., page 7191. This study investigated the effects of dairy cows’ personalities on their adaptation to an automated milking system and whether personality traits are consistent across the transition from gestation to lactation. Cows that scored high for boldness, high for activity, and low for exploration tended to adapt better to the automated milking system immediately after introduction. The results not only demonstrate that cow personality traits influenced the ease of adaptation to an automated milking system, but also that personality traits were consistent across the transition period, specifically for the trait of activeness. https://doi.org/10.3168/jds.2022-23176.

A meta-analysis of the effects of colostrum heat treatment on colostral viscosity, immunoglobulin G concentration, and the transfer of passive immunity in newborn dairy calves. By Rabaza et al., page 7203. Colostrum ingestion is essential for newborn dairy calves to acquire passive immunity effectively. As colostrum can be a source of infectious agents, heat treatment is performed to decrease pathogen load. The effects of heat treatment on its viscosity and immunoglobulin G concentration were systematically reviewed and meta-analyzed. Despite the adverse effects of heat treating colostrum (i.e., increased viscosity and reduced immunoglobulin G concentration), feeding newborn calves with heat-treated colostrum, particularly <2 hours of age, remains beneficial as reflected by increased serum immunoglobulin G concentration at 24 to 48 hours of age. https://doi.org/10.3168/jds.2022-22555.

Dairy farmer and farm staff attitudes and perceptions regarding daily milk allowance to calves. By Svensson et al., page 7220. We interviewed Swedish dairy farmers and farm staff to understand factors influencing decisions about milk allowances. Care of calves was at the center of participants’ discussions, and they strove to maximize allowances. However, social factors, farm facilities and equipment, and profitability and production restricted their perceived freedom to increase allowances. The results suggest that advisers should take a holistic perspective when guiding farmers about milk allowances and account for social factors on farms feeding calves manually. Initiating on-farm discussions about biological normal allowances, technical investments, and sharing experiences from farms using higher allowances may support the adoption of recommended milk allowance levels. https://doi.org/10.3168/jds.2023-23499.
intake as a percentage of body weight, but it was not associated with milk yield. Additionally, an increase in the vaginal discharge score (evaluated using the Metricheck device) was associated with a decreased milk yield of up to 2.26 kilograms per day. https://doi.org/10.3168/jds.2022-23070.

Sirtuin 3 mitigates oxidative-stress-induced apoptosis in bovine mammary epithelial cells. By Liu et al., page 7266. Ketosis often results in a reduction of milk production in dairy cows. Ketotic cows undergo unbalanced oxidation-reduction reactions in the mammary glands, which lead to cell damage and even cell death. Here, Sirtuin 3 is shown to alleviate cell death in bovine mammary epithelial cells challenged with an oxidant, but activation of Sirtuin 3 is restricted in the mammary glands of cows with ketosis. This study suggests a feasible role of Sirtuin 3 as a target for helping to relieve the cell damage in the mammary glands of cows with ketosis. https://doi.org/10.3168/jds.2023-23366.

Effects of temperature-humidity index on blood metabolites of German dairy cows and their female calves. By Halli et al., page 7281. This study aimed to analyze the effect of temperature-humidity index on the blood metabolite concentrations of German dairy cows during late gestation and their female calves during their first week of life. Our analyses identified thermally sensitive metabolites in cows and calves with the potential to serve as individual biomarkers for heat stress, instead of general environmental climate descriptors. These metabolites can also be used to improve heat tolerance in dairy cows. Our findings initiate ongoing research to infer the effects of heat stress on metabolic pathways and contribute to a deeper understanding of the thermal stress mechanisms of cows and their calves. https://doi.org/10.3168/jds.2023-23340.

Graduate Student Literature Review: Mitochondrial response to heat stress and its implications on dairy cattle bioenergetics, metabolism, and production. By Marquez-Acevedo et al., page 7295. Heat stress is becoming an increasingly relevant topic within the global dairy industry as air temperatures continue to rise, causing significant economic losses to dairy enterprises. Heat stress impairs reproduction, reduces milk production, and contributes to disease, all of which decrease farm profits. Understanding the physiology behind the body’s response to hyperthermia and its links to impaired performance is important to generate novel mitigation solutions. This literature review summarizes and connects the available research regarding the mitochondrial response to heat stress and the implications this response has on dairy cattle bioenergetics, metabolism, and production. https://doi.org/10.3168/jds.2022-22671.

Effect of sodium concentration and mucosal pH on apical uptake of acetate and butyrate, and barrier function of the isolated bovine ruminal epithelium. By Bertens et al., page 7310. It has been postulated that cattle experiencing ruminal acidosis may suffer from a ruminal sodium deficiency, thus contributing to the observed negative effects on nutrient absorption and gut health. Therefore, this experiment used isolated ruminal tissue to investigate the role of increasing sodium supply and reduced mucosal pH on the uptake of short-chain fatty acids and barrier function. It was observed that the ruminal epithelium can prevent the translocation of permeability markers via processes that do not appear to be dependent on sodium availability to support short-chain fatty acid absorption. However, increasing sodium concentrations may help to stabilize tissue integrity. https://doi.org/10.3168/jds.2022-23052.

A randomized field trial assessing the timing of postpartum calcium bolus administration on milk yield of multiparous Holstein cows. By Mahjoubi et al., page 7320. Hypocalcemia is a prevalent postpartum metabolic disorder, and oral calcium administration has been recommended as a supplementation strategy to reduce its incidence. Cows with hypocalcemia at 4 days in milk, regardless of their blood calcium concentration before that time, experience reductions in milk yield. With the goal of supporting these dyscalcemic cows, we compared herd-level oral calcium supplementation strategies in which boluses were administered in a traditional time frame at calving and 24 hours later or a delayed time frame at 24 hours and 48 hours postpartum with a nonsupplemented group. The timing of calcium supplementation did not affect subsequent milk production. https://doi.org/10.3168/jds.2022-22671.