Invited review: Total solids concentration in milk or milk replacer for dairy calves. By Azevedo et al., page 7341. Restricting milk or milk replacer fed to dairy calves to 10% body weight and total solids concentration of 12.5% is a common feeding strategy. However, this has been linked to inferior performance and compromised calf well-being. Alternatively, the total solids concentration of the liquid feed may be increased higher than 12.5%, with positive results in the health and performance of calves. https://doi.org/10.3168/jds.2023-23372.

Glutamine and lysine as common residues from epitopes on α-lactalbumin and β-lactoglobulin from cow milk identified by phage display technology. By Wang et al., page 7382. Food allergies have increased dramatically with environmental changes and industrial development and are now paid more attention. Milk contains more than 30 proteins that contribute to the healthy growth of children, so it is vitally important to explore the mechanisms of milk allergies. In this study, we identify the epitopes of α-lactalbumin and β-lactoglobulin simultaneously, as well as the common AA from the epitopes, which could provide new ideas for the production of hypoallergenic dairy products. https://doi.org/10.3168/jds.2022-23151.

Yak milk promotes renal calcium reabsorption in mice with osteoporosis via the regulation of TRPV5. By Zhang et al., page 7396. The research reveals at the molecular stage how yak milk affects calcium reabsorption levels in the kidneys of osteoporotic mice and maintains calcium homeostasis through hormonal regulation to improve osteoporosis. This study may offer more insight into the functionality of yak milk and provide ideas for developing a new type of food to prevent osteoporosis. In addition, this research may promote the development of a specialty dairy industry in Xinjiang Province and improve the local economy. https://doi.org/10.3168/jds.2022-23218.

Near-infrared hyperspectral image analysis for monitoring the cheese-ripening process. By Alinaghi et al., page 7407. Ripening, the most crucial step in cheese manufacturing, describes the final cheese quality and its perceived sensory attributes. This study monitored the biochemical and sensory attribute changes of long-ripening hard cheeses during ripening. Near-infrared hyperspectral imaging, free amino acid, chemical composition, and sensory attributes were studied. The results prove that near-infrared hyperspectral imaging is a rapid tool for monitoring cheese maturity. The pixel-wise evaluation of images shows the homogeneity of cheese maturation at different stages of ripening. This improved understanding of undergoing biochemical processes will facilitate further adoption of monitoring approaches and process analytical technology tools in cheese manufacture. https://doi.org/10.3168/jds.2023-23377.

Dynamics of microbial communities associated with flavor formation during sour juice fermentation and the milk fan drying process. By Chen et al., page 7432. This study characterized the predominant microorganisms and changes in volatile compounds during the production of milk fan. The richness and diversity of bacterial and fungal communities during sour juice fermentation and the milk fan drying process were compared; during the drying period, the expression of the genes related to the microbial metabolism involving flavor formation was analyzed. We found that Lactobacillus, Issatchenkia, and Rhodotorula became the dominant microorganisms, successively, during the process. Some microorganisms were significantly positively correlated with aroma-active compounds. This paper provides new insights into the dynamics of microbial communities associated with the flavor of milk fan during production and provides a theoretical basis for their application in the production of milk fan. https://doi.org/10.3168/jds.2023-23244.


Bifidobacterium infantis and 2′-fucosyllactose supplementation in early life may have potential long-term benefits on gut microbiota, intestinal development, and immune function in mice. By Luo et al., page 7461. The health benefits of nutritional interventions targeting the gut microbiota in early life are transient, such as probiotics, prebiotics, and synbiotics. This study found that early life supplementation of Bifidobacterium infantis 79 or 2′-fucosyllactose alone or combined exerted long-term health benefits. This study added new evidence for
the long-term benefits of early nutrition intervention in mice. More importantly, we found that a new synbiotic composed of Bifidobacterium infantis 79 or 2′-fucosyllactose had a persistent effect on the immune function of mice. https://doi.org/10.3168/jds.2023-23367.

Crystal networks, partial coalescence, and rheological properties of milk fat fraction model systems. By Wang et al., page 7486. This study investigated the comprehensive nature of multiple milk fat fractions. Gel-like and highly organized crystal networks were found to have a relatively higher hardness. Large and rigid crystals in high-melting fractions strengthened the networks more effectively. A disordered crystal network composed of translucent platelets was detected in low-melting fractions. We conclude that partial coalescence is influenced by solid fat content and minor lipids. https://doi.org/10.3168/jds.2022-23200.

Partition of milk phospholipids during ice cream manufacturing. By Rathnakumar et al., page 7501. Phospholipids derived from the milk fat globule membrane have become valuable compounds due to their bioactive and technological properties. Here, the use of a byproduct stream rich in phospholipids (beta-serum) was evaluated during the manufacture of ice cream. The partition coefficient of phospholipids was also evaluated after mixing, pasteurizing, freezing, hardening, and melting ice cream. The addition of phospholipids significantly increased the viscosity of the mixes. This study provides useful guidelines for manufacturing ice cream enriched in milk phospholipids. https://doi.org/10.3168/jds.2022-23145.

Effect of cooking temperature on alkaline phosphatase in the production of raw-milk Pecorino cheese. By Licitra et al., page 7515. In some Italian Protected Designation of Origin cheeses, alkaline phosphatase has been adopted as an antifraud tool to control the use of pasteurized milk in the production of raw-milk cheeses. However, the temperatures adopted during cheesemaking may inactivate the alkaline phosphatase enzyme. In this study, high temperatures adopted during the second cooking (>80°C) reduced alkaline phosphatase content of raw-milk Pecorino cheeses to values comparable with pasteurized-milk cheeses, thus proving that care must be taken when defining alkaline phosphatase threshold values to control the use of pasteurized milk for raw-milk cheeses. https://doi.org/10.3168/jds.2023-23228.

Supplementing branched-chain volatile fatty acids in dual-flow cultures varying in dietary forage and corn oil concentrations. I: Digestibility, microbial protein, and prokaryotic community structure. By Mitchell et al., page 7530. Branched-chain volatile fatty acid incorporation into bacterial components, measured via total recovery of carbon-13 from labeled branched-chain volatile fatty acids, increased with more forage inclusion in the diet when supplemented in dual-flow continuous cultures. Supplemental corn oil did not influence recovery of dosed carbon-13. Supplementation of branched-chain volatile fatty acids increased neutral detergent fiber degradability and efficiency of microbial protein synthesis, probably increasing relative abundance of bacteria without major changes in individual taxa. Because these responses were detected without interacting with substrate source or inclusion of corn oil, we expect branched-chain volatile fatty acids to improve microbial protein supply and feed efficiency in dairy cattle under many feeding conditions. https://doi.org/10.3168/jds.2022-23165.

Supplementing branched-chain volatile fatty acids in dual-flow cultures varying in dietary forage and corn oil concentrations. II: Biohydrogenation and incorporation into bacterial lipids. By Mitchell et al., page 7548. Supplemental branched-chain volatile fatty acids were incorporated exclusively into bacterial branched-chain lipids in continuous culture; recovery of carbon-13 from branched-chain volatile fatty acids decreased when forage decreased. Supplementation of branched-chain volatile fatty acids did not affect the extent of fatty acid biohydrogenation. Supplemental corn oil decreased bacterial iso even-chain branched-chain fatty acids and iso even-chain aldehydes in the bacterial lipid profile. Recovery of carbon-13 was greatest with anteiso lipids; therefore, 2-methylbutyrate was the branched-chain volatile fatty acid most used for lipid synthesis. About half of the aldehydes formed by methylation of vinyl ethers in plasmalogens were branched, indicating that branched-chain volatile fatty acid precursors are vital for bacterial membrane structure. https://doi.org/10.3168/jds.2022-23192.

Supplementing branched-chain volatile fatty acids in dual-flow cultures varying in dietary forage and corn oil concentrations. III: Protein metabolism and incorporation into bacterial protein. By Mitchell et al., page 7566. We evaluated changing forage concentration and supplementing branched-chain volatile fatty acids (BCVFA) and corn oil in continuous cultures of ruminal microbes. A
greater inclusion of dietary forage increased BCVFA incorporation into branched-chain AA (BCAA) in bacteria. Supplementing corn oil had a limited effect on AA flow; however, supplemental BCVFA increased total AA flow, including BCAA and other AA in bacteria as well as effluent flow of nonbacterial AA, suggesting decreased breakdown of peptides. The increased supply of AA, especially bacterial BCAA, warrants further investigation for the potential to increase milk production or feed efficiency due to potential postruminal effects of BCVFA supplementation. https://doi.org/10.3168/jds.2022-23193.

Benefits of barley straw as a forage for dairy calves before and after weaning. By Antúnez-Tort et al., page 7578. When calves have free access to forage, both the intake and relative forage proportion in the total diet consumed differs depending on the type of forage offered, which makes it difficult to discern the effect of forage per se and forage proportion in the final diet. We designed this study to elucidate the potential benefits of feeding barley straw or alfalfa hay at similar proportions in the diet to dairy calves. We found that barley straw is more effective than alfalfa hay in promoting feed intake, performance, and the expression of monocarboxylate transporter 1 as a proxy for rumen epithelium development. https://doi.org/10.3168/jds.2023-23401.

Abomasal infusion of oleic acid and exogenous emulsifier alter fatty acid digestibility and production responses of lactating dairy cows. By dos Santos Neto et al., page 7591. Fatty acids are key nutrients; optimizing their use is essential to improve the productivity of dairy cows. We evaluated the effects of abomasal infusion of 45 g/day oleic acid, 20 g/day of polysorbate-C18:1 (a nonionic surfactant), and both (45 g/day oleic acid + 20 g/day polysorbate-C18:1) on fatty acid digestibility of lactating dairy cows. In conclusion, abomasally infusing either 45 g of oleic acid or 20 g of polysorbate-C18:1 improved digestibility of dairy cows. In contrast, providing both had no additional benefits and moderated the positive responses observed in the individual treatments with oleic acid or polysorbate-C18:1. https://doi.org/10.3168/jds.2022-23038.

Quality and safety of hemp meal as a protein supplement for nonlactating dairy cows. By Addo et al., page 7602. Isoenergetic and isonitrogenous diets containing either 10.2% dry matter dehulled hemp meal, 13.5% dry matter canola meal, or 6.25% dry matter canola meal and 6.16% hemp meal were compared in nonpregnant, nonlactating Holstein dairy cows. Treatments did not differ in dry matter intake, rumen fermentation and total-tract dry matter and crude protein digestibilities, and in the contents of blood urea nitrogen, glucose, 3-hydroxybutyrate, and nonesterified fatty acids in blood plasma. Total-tract digestibility of neutral detergent fiber was lower in hemp meal–fed cows. No detectable transfers of cannabinoids from hemp meal to biological fluids and tissues occurred. Hemp meal appears to be a high-quality and safe feed for nonlactating dairy cows. https://doi.org/10.3168/jds.2023-23222.

Interaction of DGAT1 polymorphism, parity, and acetate supplementation on feeding behavior, milk synthesis, and plasma metabolites. By Matamoros et al., page 7613. Dietary acetate supplementation increases milk fat synthesis in dairy cows, but interactions with animal-related factors have not been described. Genetic factors, such as polymorphisms in the DGAT1 gene, have clear effects on the genetic potential for milk fat synthesis. Parity also influences energetic requirements and intake. Our objective was to determine the interaction of genetic factors, parity, and acetate supplementation on milk fat synthesis. Overall, acetate supplementation increased milk fat yield, largely regardless of parity or DGAT1 genotype. https://doi.org/10.3168/jds.2022-23209.

Rumen-protected choline reduces hepatic lipidosis by increasing hepatic triacylglycerol-rich lipoprotein secretion in dairy cows. By Arshad et al., page 7630. Our objectives were to determine the effects of feeding rumen-protected choline (0 vs. 25.8 g/d of choline ion) on hepatic composition and secretion of triacylglycerol-rich lipoprotein and serum metabolome in cows induced to develop fatty liver. Feeding rumen-protected choline increased the content of glycogen and reduced that of triacylglycerol in the liver, concurrent with an increase in hepatic secretion of triacylglycerol-rich lipoprotein. Feeding rumen-protected choline altered the expression of transcripts involved in lipidosis in the hepatic tissue and increased the serum concentrations of triacylglycerol and bile acids. Feeding rumen-protected choline reduced hepatic lipidosis by enhancing the export of triacylglycerols from the liver in cows. https://doi.org/10.3168/jds.2022-23182.

Effect of forage type on swallowed bolus mass and a method for counting swallows in dairy cattle. By Norbu et al., page 7651. The current understanding of the ingestive behaviors of dairy cows in relation to intake is limited. We investigated the swallowed bolus mass and the swallowing rate of cows offered 4 different forage feeds and evaluated 2 indirect methods for counting swallows. Swallowed bolus mass and swallowing rate were affected by forage type but not by time spent eating. Audio recording of swallows was more accurate than video recording. We conclude
that forage type affected swallow mass and swallow rate and that audio recording using a microphone attached to the cow’s forehead can provide an accurate indirect measurement of swallow rate. https://doi.org/10.3168/jds.2022-22886.

Lactational performance, rumen fermentation, nutrient use efficiency, enteric methane emissions, and manure greenhouse gas-emitting potential in dairy cows fed a blend of essential oils. By Silvestre et al., page 7661. Essential oils are natural feed additives with the potential to modify rumen fermentation in dairy cows. In this study, dietary supplementation of a blend of essential oils did not affect lactational performance of dairy cows but did increase milk fat and milk lactose concentrations compared with the control. Rumen fermentation, efficiency of nutrient utilization, and the greenhouse gas-emitting potential of manure were not affected by essential oils; however, methane intensity per kilogram of milk fat was decreased by 8.5% in cows supplemented with essential oils. https://doi.org/10.3168/jds.2022-23181.

Extrusion of lupines with or without addition of reducing sugars: Effects on the formation of Maillard reaction compounds, partition of nitrogen and Nε-carboxymethyl-lysine, and performance of dairy cows. By Manzocchi et al., page 7675. Extrusion of lupines induced protein glycation and formation of Maillard reaction compounds, decreased the degradability of proteins in the rumen, and, with the highest temperature of extrusion (150°C) without adding reducing sugars, increased N use efficiency for milk production. Nε-carboxymethyl-lysine was apparently digested and may have been retained in the body, as it was only partially excreted in urine and, to an even lesser extent, in milk. https://doi.org/10.3168/jds.2022-22902.

Effect of light intensity, spectrum, and uniformity on the ability of dairy cows to navigate through an obstacle course. By Lindkvist et al., page 7698. Using an obstacle course, we investigated the ability of dairy cows to navigate under different light conditions. Walking speed did not differ when light decreased, going from common barn indoor lighting to a darker environment similar to starlight, as long as it was uniformly distributed. However, nonuniform red light made the cows walk slower. Night lighting in barns may not be necessary for cows, and nonuniform light may be worse than very low light intensity. These findings have relevance for light design in dairy barns, especially in loose-housing systems where cows move between areas for feeding, resting, and milking. https://doi.org/10.3168/jds.2023-23469.

Outdoor access practices in the Canadian dairy industry. By Smid et al., page 7711. Dairy cows have a partial preference for outdoor access, and Canadians value outdoor access for dairy cows. However, outdoor access practices on Canadian dairy farms are largely unknown. Therefore, we assessed outdoor access practices for dairy cows in Canada using an online questionnaire. Overall, 675 of 903 (74.8%) provided some form of outdoor access. Farms with a smaller herd size or farms on the East Coast were more likely to provide pasture access. Farms using tiestall housing for dry cows or pregnant heifers more often provided pasture to these cattle classes than farms using freestall housing for these classes. https://doi.org/10.3168/jds.2023-23344.

Geographical trends for automatic milking systems research in non-pasture-based dairy farms: A scoping review. By Marques et al., page 7725. The automatic milking system (AMS) is one of the most advanced technologies implemented on dairy farms to improve labor and animal management. Although AMS have been used in Europe since the early 1990s, adoption in the United States is more recent. We reviewed 536 nonpasture–based AMS studies to identify research topics and opportunities for future research. European and other regions’ studies focused on milk and component yields, AMS efficiency, behavior, welfare, mastitis, and nutrition; in the United States, topics were similar, except for nutrition. The scarcity of studies on reproduction, economics, and water and energy consumption suggests opportunities for future research. https://doi.org/10.3168/jds.2023-23313.

Effect of altering milking interval when milking 3 times in 2 days on milk and component yields in pasture-based dairy systems. By Hall et al., page 7737. Dairy farmers are struggling to attract quality staff, partly due to the task of milking. Most pastoral dairy farmers milk twice per day, which contributes to long days and early starts. We investigated the effect on milk production when reducing the number of milkings from twice per day and changing the time of milkings. Milk production did not change when the time between milkings differed when cows were milked 3 times in 2 days, allowing farmers to shorten the working day. https://doi.org/10.3168/jds.2022-23170.

Effects of grazing platform stocking rate on productivity and profitability of pasture-based dairying in a fragmented farm scenario. By Fenger et al., page 7750. This study quantified the effects of farm fragmentation on the productivity and profitability of pasture-based dairy production in Ireland. The analysis was conducted across a range of
systems with different stocking rates of dairy cows on the grazing platform (the area adjacent to the milking parlor that is accessible for grazing by lactating dairy cows) and investigated the optimum grazing platform stocking rate depending on variable criteria. Milk and herbage production were similar within the range of grazing platform stocking rates tested. A greater level of farm fragmentation lowered profitability, largely due to increased feed and transport costs. It was most profitable to increase grazing platform stocking rate up to 4 cows/ha when milk price was high, land rental price was low, and distance between grazing platform and non-grazing platform areas was short. https://doi.org/10.3168/jds.2023-23362.

**Shaping cow-calf contact systems: Farmers’ motivations and considerations behind a range of different cow-calf contact systems.** By Bertelsen and Vaarst, page 7769. Alternative calf-rearing methods in the dairy industry, such as cow-calf contact, may hold the potential to improve animal welfare while better conforming with the expectations of organic farming. Danish organic dairy farmers with experience in cow-calf contact systems were interviewed to explore their perspectives on the rearing method. Farmers were motivated by practicality, ethical responsibility, and image to different degrees, depending on the structure of the farm. Economic considerations largely shaped how the system was managed, leading to either part-time contact between cow and calf or foster cow systems, depending on both ethical considerations and farm structure. https://doi.org/10.3168/jds.2023-23148.

**Identification of candidate novel production variants on the Bos taurus chromosome X.** By Trebes et al., page 7799. The inclusion of chromosome X in dairy genetic studies has the potential to affect cattle breeding goals. In Jersey and crossbred cattle, we found a strong relationship between chromosome X loci and the milk production traits volume, milk protein, and milk fat. Two candidate variants are identified in the MOSPD1 and CCDC160 genes associated with decreased volume and protein production and increased fat production. Identification of genetic variants that are associated with production efficiency can contribute to breeding strategies designed to maximize genetic improvement. https://doi.org/10.3168/jds.2022-23095.

**Single-step genome-wide association analyses for selected infrared-predicted cheese-making traits in Walloon Holstein cows.** By Atashi et al., page 7816. Cheese production and consumption are increasing in many countries worldwide. As a result, interest has increased in strategies for genetic selection of individuals for technological traits of milk related to cheese yield in dairy cattle breeding. However, little is known about the genetic background of the cheese-making traits in dairy cows. In this study, the genetic parameters and genomic backgrounds of selected cheese-making traits were estimated in Walloon Holstein cows. The results confirmed most previously identified genes and identified several novel candidate genes that may have functional associations with the analyzed traits. The findings of this study can be used for the future implementation of genomic evaluation to improve cheese yield in Walloon Holstein cows. https://doi.org/10.3168/jds.2022-23206.

**Genome-wide association study identifies functional genomic variants associated with young stock survival in Nordic Red Dairy Cattle.** By Cai et al., page 7832. Calf survival is crucial in the cattle industry and has economic and welfare implications. We conducted genome-wide association studies (GWAS) in a large cohort of Nordic Red Dairy Cattle bulls to understand the genetic basis of young stock survival. We analyzed a young stock survival index and its component traits, stratified by sex and age, as well as stillbirth traits. Our GWAS and post–GWAS analyses revealed several putative causal genes. These findings provide valuable insights into the genetic architecture of calf survival and highlight potential candidate genes that could be utilized to reduce calf mortality and enhance cattle welfare. This research advances our understanding of young stock survival and stillbirth traits, with practical implications for the cattle industry. https://doi.org/10.3168/jds.2023-23252.

**Single-step genomic predictions for heat tolerance of production yields in US Holsteins and Jerseys.** By McWhorter et al., page 7861. Heat stress affects US dairy cattle health and production, affecting the overall economic return for dairy producers. A national evaluation for heat tolerance of test-day yields in US Holsteins and Jerseys was explored. This study identified the threshold at which heat and humidity became a burden on milk, fat, and protein yields in Holstein and Jersey breeds. Additionally, single-step genomic predictions were developed to identify heat-tolerant US Holsteins and Jerseys. Genomic estimated breeding values for general genetic merit and heat tolerance genetic merit of production could be valuable tools for selecting animals for production yields in environments that experience high temperatures and humidity. https://doi.org/10.3168/jds.2022-23144.

**Genetic parameters and evaluation of mortality and slaughter rate in Holstein and Jersey cows.** By Haile-Mariam et al., page 7880. Dairy cow mortality rates have increased in recent years without
any significant decrease in the longevity of cows. Cow mortality rates in Australian cattle have increased from below 1% in 1990 to about 4% in 2016. Our analysis shows that a small part of the increase in cow mortality is related to intense selection for milk yield traits. However, recently—likely due to the inclusion of fertility, survival, and other health traits in the breeding objectives—the genetic trend has improved, and the phenotypic trend in cow mortality and slaughter rate has stabilized in Australian Holstein and Jersey breeds. https://doi.org/10.3168/jds.2023-23471.

Intramammary infections and risk factors in freshly calved heifers in Swedish dairy herds. By Persson Waller et al., page 7893. Cleanliness and hock and udder skin lesions in freshly calved heifers did not differ between herds with a large proportion of heifers with high somatic cell count (SCC) and herds with a large proportion of heifers with low SCC at the first 2 test milkings after calving. Udder-thigh dermatitis was less common, whereas calving in a group box and use of restraint during milking were more common in low-SCC herds. In 14% of the quarter milk samples taken twice from 722 heifers within 4 days after calving, bacterial growth, mainly Staphylococcus chromogenes, was found. Finding the same bacterial species in both samplings was more common in high-SCC herds, which was in line with the higher SCC in these herds. The predominance of Staph. chromogenes needs further research. https://doi.org/10.3168/jds.2022-22995.

Butyrate supplementation in the liquid diet of dairy calves leads to a rapid recovery from diarrhea and reduces its occurrence and relapses in the preweaning period. By Nicola et al., page 7908. Sodium butyrate supplementation was studied as an alternative to improve gastrointestinal development and reduce the occurrence of diarrhea in dairy calves. Diarrhea is a recurrent disease during the calf-rearing phase, resulting in damages related to growth, cost of antibiotics, and death of animals. Our study shows that sodium butyrate supplementation in whole milk fed to calves reduced the occurrence of diarrhea and accelerated gastrointestinal development, resulting in better animal health and well-being, reduced antibiotic use, and greater profitability. https://doi.org/10.3168/jds.2022-22670.

Effects of udder edema on parlor behavior in first- and second-lactation Holstein dairy cows. By Okkema et al., page 7924. Udder edema is a noninfectious swelling of the udder that occurs during the transition period in dairy cows. The prevalence of this disorder within milking herds in the United States is currently unknown, along with its etiology. In this study, more than 90% of cows presented with udder edema. The disorder may cause pain, resulting in reduced welfare. First-lactation cows with udder edema were generally more reactive by stepping and kicking throughout udder preparation, along with kicking off the milking unit during milking, compared with first-lactation cows without udder edema and second-lactation cows with or without udder edema. https://doi.org/10.3168/jds.2022-22761.

Estimating the nonlinear interaction between somatic cell score and differential somatic cell count on milk production by parity using generalized additive models. By Huang et al., page 7942. We investigated the nonlinear interaction between somatic cell score (SCS) and differential somatic cell count (DSCC) on milk production in cows by parity using generalized additive models. The SCS had a negative effect on milk yield, while DSCC had a positive effect, and their interaction was pronounced. When DSCC was high, the negative effect of SCS on milk yield was minimal; however, if DSCC was low, high SCS caused significant milk loss, especially in high-parity cows, with losses of up to 20 kg/d (59.9%). These findings emphasize the detrimental effect of high SCS and low DSCC, an indication of chronic mastitis, on milk production. https://doi.org/10.3168/jds.2022-22958.

Free-choice pasture access for dry cows: Effects on health, behavior, and milk production. By Leso et al., page 7954. Allowing dairy cattle to access pastures is known to be beneficial for cows’ welfare and is considered important by the general public. However, pasture access may be difficult to implement on dairy farms, especially for lactating animals. The objective of this study was to investigate the effects on the health, behavior, and milk production of high-yielding dairy cows by providing free-choice pasture access during the dry period. We found that pasture access can positively affect the performance of dairy cattle and represents a desirable practice in confinement-based dairy production systems. https://doi.org/10.3168/jds.2022-23107.

Smallholder milk-quality awareness in Indonesian dairy farms. By Fadillah et al., page 7965. Based on survey data from 600 smallholder dairy farmers, this study determined smallholder farmers’ awareness of 5 milk quality parameters. Indonesian dairy farmers’ awareness of important milk quality parameters was low. Dairy cooperatives and other relevant stakeholders should consider developing participatory extension programs to increase farmers’ awareness and knowledge of these parameters in order
to improve milk quality and animal health on Indonesian dairy farms.
https://doi.org/10.3168/jds.2023-23267.

Comparison of non-aureus staphylococcal and mammaliancoccal species found in both composite milk and bulk-tank milk samples of dairy cows collected in tandem. By Reydams et al., page 7974. We estimated the distribution of non-aureus staphylococci and the closely related mammaliancocci, the most frequently isolated microorganisms from bovine milk samples, isolated from cow and bulk-tank milk samples collected on 5 commercial dairy herds in tandem. The distribution of non-aureus staphylococci and the closely related mammaliancocci species was herd-specific, and the most prevalent species were isolated from both sample types in each herd with a strain-type overlap in varying degrees. Studying the distribution of non-aureus staphylococci and the closely related mammaliancocci at the strain level should complement species-level studies.

Genotypic characterization of Staphylococcus chromogenes and Staphylococcus simulans from Swedish cases of bovine subclinical mastitis. By Persson Waller et al., page 7991. Subclinical mastitis in dairy cows can be caused by udder infection with staphylococcal bacteria such as Staphylococcus chromogenes and Staphylococcus simulans. However, little is known about how much the genetics within each of these staphylococci vary. In this study, the whole genome of more than 100 Swedish milk isolates of each species was sequenced. We found a substantial variation within each staphylococcus in genetic relatedness, presence of virulence factors, and antimicrobial resistance. The information improves the understanding of how these bacteria can spread between and within herds and how such infections can be treated and prevented.
https://doi.org/10.3168/jds.2023-23523.

β-hydroxybutyrate impairs the directionality of migrating neutrophils through inhibiting the autophagy-dependent degradation of Cdc42 and Rac1 in ketotic cows. By Yang et al., page 8005. The mechanism underlying the migration directionality impairment of neutrophils in ketotic cows is unclear. In vivo and in vitro experiments allowed us to determine that pathological concentration of β-hydroxybutyrate inhibits the autophagy-dependent degradation of Cdc42 and Rac1, contributes to their accumulation, and impairs the migration directionality of bovine neutrophils. These findings help to explain the immunosuppression state in ketotic cows and provide information for the pathogenesis of infectious diseases secondary to ketosis.
https://doi.org/10.3168/jds.2023-23293.

Effects of heat stress abatement on systemic and mammary inflammation in lactating dairy cows. By Chen et al., page 8017. This study examined the effects of heat stress abatement on systemic and mammary inflammation prior to and following an intramammary lipopolysaccharide infusion. Heat stress did not affect systemic and mammary inflammation in healthy lactating dairy cows. Following the intramammary lipopolysaccharide infusion, heat stress suppresses systemic inflammation but leads to an upregulated mammary inflammatory response, resulting in greater immune cell infiltration into the mammary gland.
https://doi.org/10.3168/jds.2023-23390.

Influence of dietary fiber content and horn status on thermoregulatory responses of Brown Swiss dairy cows under thermoneutral and short-term heat stress conditions. By Reiche et al., page 8033. Mitigation strategies are important for reducing the detrimental effects of heat stress on both animal welfare and the farm economy. Decreasing dietary fiber content and the presence of horns are considered to ease thermoregulation under heat stress conditions. In an experiment with 20 Brown Swiss dairy cows, short-term heat stress conditions induced physiological thermoregulatory responses but did not affect milk production. The responses to the heat stress conditions were mainly unaffected by fiber content and horn status, suggesting that they did not mitigate mild or beginning heat stress.

Effect of ultrasonographic lung consolidation on health and growth in dairy calves: A longitudinal study. By Sáadatnia et al., page 8047. Calf ultrasonography during the preweaning period can identify areas of lung consolidation that are not clinically visible while having a deleterious effect on calves’ growth and, later, production. However, little is known about the effect of ultrasonographic lung lesions occurring in areas other than North American and European countries. Using weekly thoracic ultrasonography from birth to weaning on dairy calves, we found that ultrasonographic lung consolidation was associated with lower average daily gain when controlled for antimicrobial treatment, and that persistent consolidations had a greater negative effect on average daily gain than single episodes of consolidation that were seen only once.
https://doi.org/10.3168/jds.2023-23296.

Multivariate analysis of milk metabolite measures shows potential for deriving new resilience phenotypes. By Ithurbide et al., page 8072. In response to the growing interest in breeding more resilient animals, a noninvasive resilience indicator would be very valuable. The aim of this study was to
explore the potential of milk metabolites known to reflect various energy metabolism pathways as indicators of resilience. We described the milk metabolite curves throughout an underfeeding challenge of early lactating primiparous dairy goats divergently selected for extreme functional longevity. An unsupervised clustering defined 3 overall metabolic responses to underfeeding associated with different survival outcomes. This confirmed that multivariate analysis of noninvasive milk measures shows potential for deriving new resilience phenotypes.

https://doi.org/10.3168/jds.2023-23332.

Postpartum longissimus dorsi muscle loss, but not back fat, is associated with resumption of postpartum ovarian activity in dairy cattle. By Ryder et al., page 8087. Our findings indicate that extensive longissimus dorsi muscle loss in postpartum dairy cattle was associated with delayed first estrus and a delayed start to luteal activity, even when accounting for body condition change, clinical disease, and subclinical ketosis. Marginal muscle loss was, however, favorable to both fertility outcomes. A greater understanding of the determinants of muscle loss and prevention over-and-above negative energy balance may improve dairy cattle fertility in early lactation.

https://doi.org/10.3168/jds.2023-23253.

Blood metabolomics and impacted cellular mechanisms during transition into lactation in dairy cows that develop metritis. By Casaro et al., page 8098. The objective of this study was to identify metabolites associated with metritis and use them to identify cellular mechanisms affected during transition into lactation. Cows that developed metritis had affected cellular processes associated with lower amino acid metabolism in the prepartum period, greater lipolysis, cell death, and oxidative stress at calving and metritis diagnosis, and greater leukocyte activation at calving, but lower immune cell activation at metritis diagnosis. Cows that developed metritis had plasma metabolomic changes associated with greater lipolysis, oxidative stress, and a dysregulated immune response, which may predispose cows to metritis development.

https://doi.org/10.3168/jds.2023-23433.

Effect of use and dosage of p-follicle-stimulating hormone for ovarian superstimulation before ovum pick-up and in vitro embryo production in pregnant Holstein heifers. By Hayden et al., page 8110. This study was designed to evaluate the effect of use and dose of follicle-stimulating hormone for ovarian superstimulation before ovum pick-up on ovarian response and in vitro embryo production in pregnant heifers. Total number of follicles, cumulus-oocyte complex yield, and cleavage and blastocyst percentage increased in response to follicle-stimulating hormone administration in a dose-dependent manner. As a result, the number of transferable embryos produced per heifer increased with increasing follicle-stimulating hormone dose in a linear fashion. Optimizing follicle-stimulating hormone dose in pregnant cattle, therefore, can lead to greater efficacy of in vitro embryo production.

https://doi.org/10.3168/jds.2023-23576.

Inflammatory tone in liver and adipose tissue in dairy cows experiencing a healthy transition from late pregnancy to early lactation. By McGuckin et al., page 8122. The near-universal rise in circulating biomarkers of inflammation after parturition suggests a role for the immune system in the metabolic adaptations of early lactation. Less attention has been devoted to the possibility of parallel increases in the inflammatory tone of liver and adipose tissue. Expression of a panel of pro- and anti-inflammatory genes remained mostly invariant between late pregnancy and early lactation in the liver and adipose tissue of cows experiencing a healthy transition period. These data do not support a role for the local immune system in the metabolic adaptations of these tissues at the onset of lactation.

https://doi.org/10.3168/jds.2023-23373.

Associations between the postpartum uterine and vaginal microbiota and the subsequent development of purulent vaginal discharge vary by dairy cow breed and parity. By Moore et al., page 8133. Purulent vaginal discharge is associated with uterine and vaginal bacterial infection. Up to 30% of cows are affected by the disease, which reduces their fertility. This study reports that the vaginal and uterine microbiota during the first week after calving was different between cows that were or were not subsequently diagnosed as having purulent vaginal discharge 2 weeks later, and that the microbiota differences were dependent on the breed of cow and parity. The findings suggest that therapeutic interventions used to treat purulent vaginal discharge may need to differ depending on the parity and breed of dairy cow affected.