INTERPRETIVE SUMMARIES, DECEMBER 2022

Invited review: **Current enteric methane mitigation options.** *By Beauchemin et al., page 9297.* Mitigation of enteric methane production from ruminants is important to rapidly curb global warming. Here, we review and analyze the current stage of implementation and barriers for adoption of various strategies to reduce enteric methane emissions. We identify and discuss opportunities, obstacles, and research needs for the adoption of different enteric methane mitigation strategies in intensive and extensive production systems. This review stems from a technical guidance document conducted under the auspices of the LEAP (Livestock Environmental Assessment and Performance Partnership) program of the Food and Agriculture Organization of the United Nations.
https://doi.org/10.3168/jds.2022-22091.

Invited review: **Shelf-stable dairy protein beverages—Scientific and technological aspects.** *By Singh et al., page 9327.* Consumer focus on health and wellness is driving the growth in the high-protein beverages category. This review discusses the scientific and technological aspects of shelf-stable high-protein dairy beverages, including the role of protein ingredients and their functionality on final product stability and quality. This review discusses and highlights the technological challenges, solutions, and unknowns during manufacturing, storage, and distribution of high- and low-acid dairy-based protein beverages.
https://doi.org/10.3168/jds.2022-22208.

X-ray computerized microtomography and confocal Raman microscopy as complementary techniques to conventional imaging tools for the microstructural characterization of Cheddar cheese. *By Lourenco et al., page 9387.* This work demonstrates the advantages of complementing conventional imaging tools with advanced microscopy techniques to characterize the microstructure of dairy products. X-Ray computerized microtomography was used to study the size distribution of microcrystals in Cheddar cheese and confocal Raman microscopy was used to chemically identify them. Because these crystals affect sensory characteristics and consumer acceptance, providing tools for their characterization is beneficial for the cheese industry.
https://doi.org/10.3168/jds.2022-22048.

Application of whey protein emulsion gel microparticles as fat replacers in low-fat yogurt: Applicability of vegetable oil as the oil phase. *By Li et al., page 9404.* Whey protein emulsion gel microparticles improved qualities of low-fat yogurt, and notably, vegetable oil could be used to replace milk fat in the emulsion gel microparticles. This would bring some reference values for the structuring of liquid vegetable oil, facilitating the further development and utilization of vegetable oil, provide a new idea for the industrialization of low-fat yogurt, improve the acceptance of low-fat yogurt by consumers, have important practical significance for the production of high-quality and healthy yogurt, and further stimulate growth of the yogurt industry.
https://doi.org/10.3168/jds.2022-22314.

Efficacy of a typical clean-in-place protocol against in vitro membrane biofilms. *By Singh and Anand, page 9417.* The present study was performed to evaluate the effectiveness of a sequential clean-in-place protocol against the constitutive microbiota of whey reverse osmosis membrane biofilms. The presence of bacterial cells after the clean-in-place indicated inadequate effectiveness of the tested protocol in removing these resilient biofilms. Within individual isolates, *Bacillus* species were found to be most resistant against the complete clean-in-place protocol, whereas mixed-species biofilms were more resistant than single species.
https://doi.org/10.3168/jds.2022-21712.

Monte Carlo simulation model predicts bactofugation can extend shelf-life of pasteurized fluid milk, even when raw milk with low spore counts is used as the incoming ingredient. *By Griep-Moyer et al., page 9439.* Monte Carlo simulation model predicts bactofugation can extend shelf-life of pasteurized fluid milk even when raw milk with low spore counts is used as the incoming ingredient. Bactofugation is used to remove bacterial cells and spores from raw milk, but limited data are available on the effectiveness of bactofugation in extending the shelf-life of pasteurized fluid milk. Total bacteria, spores, and somatic cell counts were determined in different fluid milk processing streams obtained with and without bactofugation. Bactofugation reduced all measured microbiological parameters, although the total protein loss during the process was less than 2%. Monte Carlo simulation based on the counts of cold-tolerant sporeformers in the final pasteurized skim milk predicted that bactofugation would extend the shelf-life of fluid milk by approximately 2 days.
https://doi.org/10.3168/jds.2022-22174.

Rapid and simple quantitative identification of *Listeria monocytogenes* in cheese by isothermal sequence exchange amplification based on surface-enhanced Raman spectroscopy. *By Li et al., page 9450.* In this study, we have combined the isothermal sequence exchange amplification and surface-enhanced Raman spectroscopy for the first time to rapidly and sensitively detect *Listeria monocytogenes*. Raman signal amplification and integration were obtained using the nanoparticle Au@Ag as the enhancement base. The results showed that this platform provided an available method for Raman signal amplification and sensitive detection of *L. monocytogenes* in dairy products.
https://doi.org/10.3168/jds.2022-22181.

Graduate Student Literature Review: Labeling challenges of plant-based dairy-like products for consumers and dairy manufacturers. *By Zeltzer et al., page 9488*. The global market for plant-based products is increasing at a faster rate than the market for traditional dairy products. Current regulations provide standards for those traditional dairy products but lack the same regulations for similar plant-based products. Resulting from this difference in regulation is consumer confusion of the differences between the 2 types of products. The purpose of this review paper had 2 foci: how manufacturers and consumers can seek legal resolution in disputes involving labeling, and how legal precedents could influence the labeling of plant-based dairy-like products.
https://doi.org/10.3168/jds.2022-21924.

A machine learning proposal method to detect milk tainted with cheese whey. *By Lima et al., page 9496*. One of the problems found in milk is the occurrence of whey fraud, which causes economic loss and risk to the consumer's health. Appropriate analytical methods to investigate this fraud are often expensive, time consuming, and have the possibility of false-positive results and accuracy issues. This work is innovative because it uses machine learning methods, together with infrared spectroscopy, to identify milk adulteration by cheese whey addition with high accuracy and speed.
https://doi.org/10.3168/jds.2021-21380.

Changes in plasma and milk choline metabolite concentrations in response to the provision of various rumen-protected choline prototypes in lactating dairy cows. *By France et al., page 9509*. Dietary rumen-protected choline (RPC) supplementation increases milk production in cows. However, the effects of RPC feeding on plasma and milk choline and choline metabolites has revealed inconsistent outcomes. The effects of RPC feeding on plasma and milk microbial-derived trimethylamine N-oxide (TMAO) concentrations have not been investigated in cattle. We characterized the changes in plasma and milk choline and choline metabolite concentrations in response to increasing spot-doses and different types of RPC in cows. Plasma or milk choline, betaine, and TMAO concentrations increased to RPC provision in mid and late-lactation cows; albeit, the effect was dependent upon RPC type and dose.
https://doi.org/10.3168/jds.2021-21615.

Feeding up to 91% concentrate to Holstein and Jersey dairy cows: Effects on enteric methane emission, rumen fermentation and bacterial community, digestibility, production, and feeding behavior. *By Olijhoek et al., page 9523*. Increased dietary grain content could sustain dairy farms during periods of low availability of roughage during droughts, but requires investigation regarding production, methane emission, digestion, and feeding behavior. When increasing dietary concentrate level up to 91% of dry matter, responses in lowered methane emission and changed rumen fermentation were more pronounced for Holstein than for Jersey cows. Declines in rumination time and chews per unit of dry matter or fiber intake were more pronounced for Jersey than Holstein. However, while maintaining milk yield levels, higher concentrate proportion negatively affected milk fat content, rumination time, and total-tract digestibility of fiber.
https://doi.org/10.3168/jds.2021-21676.

Feeding encapsulated pepper to dairy cows during the hot season improves performance without affecting core and skin temperature. *By Vittorazzi et al., page 9542*. Peppers, rich in capsaicin, have shown thermoregulation and slimming properties. This experiment evaluated different doses of a feed additive containing capsaicin on performance and physiological parameters (respiration rate and body temperature) of dairy cows. Feeding capsaicin, regardless of the dose, increased feed intake, and fat-corrected milk and solids yield without affecting nutrient digestibility and physiological parameters. Feeding encapsulated pepper can improve performance without increasing body temperature of cows.
https://doi.org/10.3168/jds.2022-22078.

Growth performance, digestibility, and plasma metabolomic profiles of Saanen goats exposed to different doses of aflatoxin B$_1$. *By Shi et al., page 9552*. Aflatoxins are mycotoxins of a major concern to the dairy industry, and aflatoxin B$_1$ (AFB1) is the most carcinogenic natural compound known. At present, information on the metabolomic changes related to AFB$_1$ intoxication in ruminants is limited and it is difficult to make a global evaluation of the toxicity of AFB$_1$. In this study, we evaluated the impact of AFB$_1$ exposure on the performance, nutrient digestion, nitrogen metabolism, and plasma metabolomic profiles of Saanen goats. Our results could provide novel insights into the toxicity of AFB$_1$ in ruminants and benefit the development of mitigation strategies.
https://doi.org/10.3168/jds.2022-22129.

Digestive and metabolic efficiency of energy and nitrogen during lactation and the dry period in dairy cows. *By Daniel et al., page 9564*. Modern dairy cattle undergo cycles of transition from lactation to a dry period and to lactation again. Concomitantly with cessation and initiation of lactation, important changes in diet occur. Although the metabolic consequences have been well documented, less attention has been given to the effect of these transitions on digestion. Nutrient digestibility and nutrient balance were evaluated at weekly intervals from 8 wk before to 16 wk after calving, encompassing the 2 critical transitions of dry-off and calving. Short (48 h) but weekly repetition of total collection of feces and urine appears to be a suitable approach to evaluate temporal changes in nutrient digestibility, energy balance, and N balance across lactation and the dry period.
https://doi.org/10.3168/jds.2022-22142.

Production performance of Holstein cows at 4 stages of lactation fed 4 dietary crude protein concentrations. *By Letelier et al., page 9581.* Production performance was evaluated in Holstein cows at 4 stages of lactation when fed diets with 4 dietary crude protein concentrations. Increasing dietary crude protein concentration increased dry matter intake and milk production responses up to 16.7% crude protein. However, responses to crude protein were different across stages of lactation. Through regression analysis, specific ranges of dietary crude protein were identified that resulted in the greatest predicted production responses across different stages of lactation. https://doi.org/10.3168/jds.2022-22146.

Growth performance, nutrient digestibility, and ruminal fermentation of dairy calves fed starter diets with alfalfa hay versus corn silage as forage and soybean oil versus palm fatty acids as fat source. *By Panahiha et al., page 9597.* Forage inclusion in starter diets may benefit ruminal development but limit energy intake and performance, especially in restricted milk feeding and early weaning programs. To optimize forage and energy intake, a 2 × 2 factorial study was conducted in Holstein dairy calves to investigate the effects of forage source (alfalfa hay vs. corn silage) and fat source (soybean oil vs. palm fatty acids) on growth performance and ruminal fermentation. Starter intake, total ruminal short-chain fatty acids concentration, and average daily gain were highest in calves receiving corn silage with palm fatty acids, especially in the critical preweaning period. https://doi.org/10.3168/jds.2022-22165.

Effects of a combination of *Capsicum* oleoresin and clove essential oil on metabolic status, lactational performance, and enteric methane emissions in dairy cows. *By Silvestre et al., page 9610.* Botanical extracts have a potential to modify ruminal fermentation while improving performance and health of dairy cows. This study investigated the effects of a combination of *Capsicum* oleoresin and clove essential oil (botanicals) on lactational performance, nutrient utilization, enteric gas emissions, and blood parameters of dairy cows. Increasing dietary supplementation of botanicals linearly decreased daily enteric methane production (by up to 7.5%), demonstrating a potential mitigation effect on carbon footprint of milk. Additionally, botanicals decreased serum beta-hydroxybutyrate concentration, which could be related to enhanced energy metabolism; however, overall lactational performance of the cows was not affected. https://doi.org/10.3168/jds.2022-22203.

Estimates of daily oxygen consumption, carbon dioxide and methane emissions, and heat production for beef and dairy cattle using spot gas sampling. *By Lee et al., page 9623.* A simulation study was conducted to validate spot breath sampling to estimate daily O_2 consumption and CO_2, CH_4, and heat production and determine optimal frequency of spot sampling using data from 3 respiratory chamber experiments. Data analysis indicates that spot sampling could be used to estimate daily O_2 consumption and CO_2, CH_4, and heat production but estimates were influenced by feeding frequency and the number of observations. In this simulation, at least 8 spot samples (every 3 h in a 24-h cycle over a single day or multiple days) were required to accurately estimate gaseous exchanges and detect dietary treatment effects. https://doi.org/10.3168/jds.2022-22213.

Effects of prenatal dietary rumen-protected choline supplementation during late gestation on calf growth, metabolism, and vaccine response. *By Swartz et al., page 9639.* Prenatal choline supplementation reduced markers of oxidative stress and inflammation; however, these effects were dependent on choline dose. Prenatal choline supplementation altered the neonate's metabolism by either increasing or decreasing neonatal plasma nonesterified fatty acid concentrations, depending on the dam's prepartum nonesterified fatty acid concentrations. Finally, prenatal choline supplementation reduced the antibody response toward an intranasal vaccine in calves born from dams experiencing oxidative stress. Maternal metabolism was associated with neonatal outcomes, and these outcomes may be modified by prenatal choline supplementation. https://doi.org/10.3168/jds.2022-22239.

Increasing levels of calcium salts of palm fatty acids affect production responses during the immediate postpartum and carryover periods in dairy cows. *By dos Santos Neto et al., page 9652.* Increasing levels of calcium salts of palm fatty acids affect production responses during the immediate postpartum and carryover periods in dairy cows. Our objective was to determine the dose-response effects of feeding calcium salts of palm fatty acids on nutrient digestibility and production responses of early lactation dairy cows grazing on tropical pastures and evaluate carryover effects throughout mid and late lactation. Increasing calcium salts of palm fatty acids from 0 to 0.6 kg/d linearly decreased dry matter intake and body weight change and linearly increased the yields of milk and energy-corrected milk with a positive carryover effect across mid and late lactation. https://doi.org/10.3168/jds.2022-22337.

Predicting dry matter intake in mid-lactation Holstein cows using point-in-time data streams available on dairy farms. *By Brown et al., page 9666.* To determine how efficient a cow is at converting feed to milk, actual dry matter intake (DMI) must be determined. Determination of DMI is laborious and expensive and requires capacity for individual feeding, and, thus, is not practical for group-fed cows. This study uses a multiple linear regression approach to model DMI in mid-lactation dairy cows using cow descriptors, milk yield and composition, milk fatty acid profile, previous lactation performance, and predicted

transmitting abilities for production and efficiency as candidate predictor variables with moderate to good success, depending on variables included. https://doi.org/10.3168/jds.2021-21650.

The economics of sensor-based management of dairy cow suboptimal mobility. *By Edwardes et al., page 9682*. Early detection and prompt treatment of cows with mild suboptimal mobility can improve farm profitability. Better and more frequent visual detection of mild suboptimal mobility is time-consuming and costly. With a bioeconomic simulation model, we evaluated the economic value of automatic suboptimal mobility detection sensors. Results from this study show that incorporating these sensors in a sensor-based suboptimal mobility management strategy can add economic value to the farm operation. Results also show that the economic value is sensitive to management strategy and sensor performance. https://doi.org/10.3168/jds.2021-21726.

Grazing affects metabolic pattern of individual cow milk. *By Niero et al., page 9702*. Pasture is a common management strategy adopted in farming systems in mountainous areas. The present study aimed at investigating the capacity of proton nuclear magnetic resonance spectroscopy as a technique to distinguish among samples collected from different dietary regimes, and to assess the effects of grazing on milk metabolic profile. Spectra obtained from proton nuclear magnetic resonance analysis demonstrated average to high accuracy of discrimination. Also, out of the 40 identified metabolites, 29 manifested significant variation in their relative abundance in milk collected from indoor or grazing dairy cows. https://doi.org/10.3168/jds.2022-22072.

Correlations of milk and serum element concentrations with production and management traits in dairy cows. *By Denholm et al., page 9726*. Milk and milk-derived products have great potential as a route to improve micronutrient intakes and reduce micronutrient deficiencies in human populations worldwide. We estimated correlations between production-related traits on micronutrient concentrations in both dairy cow milk and blood serum. We observed a negative relationship with many important nutrients, including calcium, magnesium, iron, and zinc, suggesting that breeding strategies aimed at improving production-related traits would most likely result in lower levels of beneficial nutrients within milk for human consumption. https://doi.org/10.3168/jds.2021-20521.

Genetic parameters for dry matter intake, energy balance, residual energy intake, and liability to diseases in German Holstein and Fleckvieh dairy cows. *By Becker et al., page 9738*. Breeding for feed efficiency in dairy cows is important to meet future challenges of dairy production, such as improved sustainability. Dry matter intake and residual energy intake are possible new selection traits. Se-

lection for lower dry matter intake or residual energy intake seems to increase feed efficiency. However, genetic correlations with health have not been adequately investigated. Our study indicates negative genetic correlations between these traits and health throughout lactation. Negative correlations were pronounced in early lactation. Therefore, breeding for feed efficiency should consider lactation stage to avoid undesirable side effects on dairy cow health. https://doi.org/10.3168/jds.2022-22083.

Comparison of the genetic characteristics of directly measured and Fourier-transform mid-infrared-predicted bovine milk fatty acids and proteins. *By Tiplady et al., page 9763*. Fourier-transform mid-infrared spectroscopy is a high-throughput and inexpensive methodology commonly used to evaluate concentrations of fat and protein in dairy cattle milk samples. This methodology is also of interest for predicting fatty acids and individual milk proteins. The objective of this study was to compare the genetic characteristics for these predicted traits with those that had been measured directly using gas and liquid chromatography methods. We show that genetic correlations between directly measured and Fourier-transform mid-infrared spectroscopy-predicted fatty acids and proteins are generally high, but that the underlying genetic architecture is not always the same. https://doi.org/10.3168/jds.2022-22089.

Rapid turnover of sensor data to genetic evaluation for dairy cows in the cloud. *By Schokker et al., page 9792*. The amount of data from sensors and automation technologies is increasing each day, and this is seen in the dairy industry as well. This situation enables animal breeders to use these data to develop novel traits. We developed a flexible and scalable cloud solution that handles sensor-driven data to perform genetic evaluation and validation in 2 working days. The speed with which genetic evaluation and validation can be done using this cloud solution shows potential for animal breeding companies to adapt, test, and validate novel traits quickly, and thus have an economic effect that results in faster implementation of novel traits by farmers. https://doi.org/10.3168/jds.2022-22113.

Identifying influential sires and distinct clusters of selection candidates based on genomic relationships to reduce inbreeding in the US Holstein. *By Steyn et al., page 9810*. Strong genetic selection and extensive use of artificial insemination has increased the relatedness within US Holsteins. We used a clustering method based on genomic information to identify key sires in the population. When using more clusters, important sons were identified. Clustering was applied to 20,099 animals that could be considered as selection candidates. Hypothetical mating within and across cluster were performed. Mating within clusters resulted in higher inbreeding than expected with random mating while across cluster mating generally resulted in similar or lower inbreeding. Our methods can

aid the mating of animals that would lead to lower expected inbreeding.
https://doi.org/10.3168/jds.2022-22143.

Local breed proportions and local breed heterozygosity in genomic predictions for crossbred dairy cows. *By Eiriksson et al., page 9822.* Prediction of the genetic potential of dairy cows using genomic markers is an important breeding and management tool for many dairy herds. The genome of crossbred cows is a mosaic of segments originating in the pure breeds, which complicates the predictions. We investigated novel models for predicting the performance of crossbred cows and breeding values using genotypes and phenotypes, combined with solutions from already established genomic evaluations for the pure breeds. Results showed that the best models improved prediction accuracy slightly compared to previous models. Implementing the best models could help dairy farmers to make good management and breeding decisions.
https://doi.org/10.3168/jds.2022-22225.

Blood transcriptome analysis and identification of genes associated with supernumerary teats in Chinese Holstein cows. *By Chen et al., page 9837.* The supernumerary teats (SNT) of cows have the potential to interfere with milking and increase the risk of mastitis, resulting in economic losses. Although studies have showed that SNT cows have worse milk performance than non-SNT cows, farmers still ignore the effects of SNT on cows. The heritability of SNT in cattle was medium, thus, the occurrence of SNT should be reduced by genomic selection. This study aims at elucidating the effects of SNT on dairy cows from the blood transcriptome level and identifying genes associated with SNT.
https://doi.org/10.3168/jds.2022-22346.

Characterizing the diagnostic sensitivity and specificity of pain biomarkers in cattle using receiver operating characteristic curves. *By Martin et al., page 9853.* Biomarkers are commonly used to assess pain and analgesic drug efficacy in livestock. However, the diagnostic sensitivity and specificity of these biomarkers for different pain conditions over time have not been described. Results comparing analgesic effects to uncontrolled pain consistently yielded acceptable diagnostic accuracy for plasma cortisol (time points: 1.5, 2, 3, 4, 6, and 8 hours), hair cortisol (time point: 62 days), and infrared thermography (time point: 72 hours). Receiver operating characteristic curve analysis can be a useful indicator of the predictive value of pain biomarkers, and certain time points seem to yield acceptable diagnostic accuracy, whereas many do not.
https://doi.org/10.3168/jds.2021-21393.

Determination of milk concentrations and pharmacokinetics of salicylic acid following acetylsalicylic acid (aspirin) administration in postpartum dairy cows. *By Fritz et al., page 9869.* Salicylic acid concentrations were determined in the plasma and milk of postpartum dairy cattle administered aspirin at 200 mg/kg body weight for 2 treatments, 24 h apart. The current milk withdrawal interval recommendation for cows treated with aspirin is 24 h. Based on the milk depletion profile of salicylic acid, a 120 h (5 d) withdrawal interval may be necessary to meet residue tolerance limits if using this treatment regimen. Our findings suggest that aspirin may mitigate postpartum inflammation by inhibiting prostaglandin production. Veterinarians and producers can use this information to optimize strategies to manage pain and inflammation in postpartum cows.
https://doi.org/10.3168/jds.2021-21507.

Deep convolutional neural networks for the detection of diarrhea and respiratory disease in preweaned dairy calves using data from automated milk feeders. *By Ghaffari et al., page 9882.* In this study, automated milk feeder (AMF) data were used to develop predictive models based on a convolutional neural network (CNN) for the detection of respiratory disease and diarrhea in preweaned dairy calves. German Holstein calves were fed either ad libitum (n = 32) or restrictively (n = 32) through AMF. The AMF measured milk replacer (MR) intake, number of rewarded visits, number of unrewarded visits, and drinking rate. Drinking speed and MR intake were the 2 important factors predicting sickness in ad libitum-fed calves, and the number of unrewarded visits and MR intake were the 2 important factors predicting sickness in restrictively fed calves. In summary, despite the very good test performance of the CNN model, the relatively low daily prevalence of calf sickness resulted in a high proportion of false-positive alarms.
https://doi.org/10.3168/jds.2021-21547.

Effects of maternal choline supplementation on performance and immunity of progeny from birth to weaning. *By Zenobi et al., page 9896.* Objectives were to investigate effects of maternal choline supplementation on growth and immunity of calves. Multiparous Holstein cows (n = 105) were assigned a prepartum diet with or without rumen-protected choline, and calves (n = 111) born to those cows were blocked by sex and assigned randomly to colostrum from control cows or colostrum from cows fed rumen-protected choline. Feeding colostrum from cows fed rumen-protected choline increased apparent efficiency of absorption of IgG by 17.4% compared with control colostrum. Female calves of rumen-protected choline-supplemented cows had fewer cases of fever and greater DMI in the first 21 d of age compared with females of control dams. Male calves (n = 38) born to rumen-protected choline-supplemented cows received intravenous lipopolysaccharide challenge at 21 d of age. On the basis of rectal temperatures, plasma indicators of inflammatory response, and DMI, maternal rumen-protected choline supplementation attenuated the inflammatory response of calves to lipopolysaccharide challenge. In summary, evidence suggest

that maternal rumen-protected choline supplementation benefits calf immunity via increased transfer of passive immunity and attenuation of inflammatory responses. https://doi.org/10.3168/jds.2021-21689.

Development and validation of a clinical respiratory disease scoring system for guiding treatment decisions in veal calves using a Bayesian framework. *By Berman et al., page 9917.* We developed and validated a clinical score to detect active infectious bovine respiratory disease in veal calves housed individually, to guide treatment decisions. We found that calves with 2 of the following findings—cough, unilateral or bilateral ear droop or head tilt, or rectal temperature ≥39.7°C—were considered positive and had a 31% chance of having active bovine respiratory disease. Without these 2 findings, a calf had a 100% chance of not having active bovine respiratory disease. At the batch level (≥100 calves), we found that a batch with ≥3 positive calves among 10 calves sampled 2 wk after arrival at the fattening unit had a 94% chance of having an active bovine respiratory disease prevalence ≥10%. A batch with <3 positive calves had a 95% chance of not having an active bovine respiratory disease prevalence ≥10%. https://doi.org/10.3168/jds.2021-21695.

Apparent prevalence and risk factors for udder skin diseases and udder edema in Bavarian dairy herds. *By Groh et al., page 9934.* This cross-sectional study was conducted to assess the apparent prevalence of teat warts, udder edema, udder thigh dermatitis, and udder cleft dermatitis on dairy farms in southern Germany and their potential risk factors. Most diseases were only sporadically observed—teat warts affected only 432 of the assessed 6,208 animals. Herd- and cow-level risk factors were identified for teat warts and udder edema, only herd-level risk factors were identified for udder cleft dermatitis, and one cow-level risk factor was found for udder thigh dermatitis. https://doi.org/10.3168/jds.2022-21867.

Neutrophil function and antibody production during the transition period: Effect of form of supplementary trace minerals and associations with postpartum clinical disease and blood metabolites. *By Ogilvie et al., page 9944.* Replacing inorganic salts of supplementary trace minerals with organic sources in both pre- and postpartum diets resulted in a modest improvement of neutrophil function measured in vitro, but did not affect IgG responses to an in vivo challenge with ovalbumin. Compared with cows without postpartum clinical disease, cows diagnosed with a disease had a reduction in phagocytic intensity and an increase in percentage of phagocytosis of neutrophils through the transition period. Immunoglobulin G responses did not differ between cows that had or did not have postpartum disease, but it was positively associated with the energy status of transition cows. https://doi.org/10.3168/jds.2022-21909.

Association of a green tea extract with serum immunoglobulin G status and neonatal vitality in newborn dairy calves. *By Reis et al., page 9961.* We ran a randomized control trial to evaluate if a green tea extract (15 mL) provided to calves (n = 24) at 3 h postnatal affected the apparent efficiency of absorption of immunoglobulin G from the colostrum replacer and if green tea extract was associated with an improved vigor score. Vigor scores and blood samples were collected at 2.5 h postnatal and daily to 72 h of age. Green tea extract had no association with apparent efficiency of absorption or improved vigor score in the calves. We suggest that green tea extract offered to calves prior to colostrum feeding had a minimal effect under normal birth conditions. https://doi.org/10.3168/jds.2022-22099.

Can we detect patterns in behavioral time series of cows using cluster analysis? *By Stachowicz et al., page 9971.* Behavioral patterns of greater complexity such as the directional, sequential, and temporal structure of behavior might provide deeper insights into an animal's state. The present study investigated whether consistent daily, individual patterns in activity and area use exist in dairy cows using time series clustering. Although no overt patterns were found, they might be still present, just more variable. Because the method used does not account for natural fluctuations, it does not seem suitable for animals that naturally exhibit greater plasticity in their temporal structure of activity. https://doi.org/10.3168/jds.2022-22140.

Evaluating the effectiveness of colostrum as a therapy for diarrhea in preweaned calves. *By Carter et al., page 9982.* The objective of this study was to evaluate the effectiveness of providing colostrum to young dairy calves with diarrhea as a means to improve resolution of diarrhea and growth through the pre-weaning period. Fecal consistency score, severity of diarrhea, weight throughout the study, serum immunoglobulin G concentration, and the original source of the calf were recorded. It was determined that feeding colostrum at the onset of diarrhea can reduce the days to resolution of diarrhea and improve growth during the preweaning period. https://doi.org/10.3168/jds.2022-22187.

Genetic diversity and iron metabolism of *Staphylococcus hominis* isolates originating from bovine quarter milk, rectal feces, and teat apices. *By Reydams et al., page 9995.* We assessed the genetic diversity and iron uptake capabilities from iron-binding proteins (i.e., lactoferrin and ferritin) of *Staphylococcus hominis* isolated from bovine quarter milk, rectal feces, and teat apices. Two well-studied *Staphylococcus chromogenes* strains and *Staphylococcus aureus* ATCC 25923 were included for comparison. Eighteen distinct *S. hominis* random amplified polymorphic DNA (RAPD) fingerprint types were distinguished but we did not identify the same RAPD type in all 3 habitats.

Staphylococcus hominis strains from all 3 habitats were unable to significantly utilize lactoferrin as an iron source, suggesting their role in intramammary infection is less relevant than that of other non-aureus staphylococcal species. https://doi.org/10.3168/jds.2022-22216.

Effects of hydrogen peroxide and L-tryptophan on antioxidative potential, apoptosis, and mammalian target of rapamycin signaling in bovine intestinal epithelial cells. *By Wei et al., page 10007*. Valid amino acids are primarily absorbed by enterocytes of the small intestine, which is a target organ in animals subjected to oxidative stress, causing intestinal disfunction. L-Tryptophan is an essential aromatic α-amino acid for protein synthesis and the precursor of crucial molecules. However, the effect of L-tryptophan on oxidative stress and the underlying mechanism by which L-tryptophan protected from oxidative injure have not been elucidated. This study showed that L-tryptophan protected bovine intestinal epithelial cells from oxidative injury via promoting antioxidative capacity and depressing apoptosis, and the changes in antioxidative capacity and transporters of amino acid by L-tryptophan were associated with the mammalian target of rapamycin signal. The results provide insights into the effect and potential mechanism of L-tryptophan on oxidative stress in bovine enterocytes. https://doi.org/10.3168/jds.2022-21869.

Identification of sperm proteins as biomarkers of field fertility in Holstein-Friesian bulls used for artificial insemination. *By Rabaglino et al., page 10033*. Sperm used for artificial insemination in cattle are subjected to rigorous quality control tests. Nevertheless, fertility in the field still varies from bull to bull. Here, we used a combination of bioinformatic approaches in sperm proteomic data from Irish Holstein-Friesian bulls to identify biomarker proteins determining fertility. Using their abundance levels in the sperm of an independent Danish Holstein-bull population, we could predict fertility with 94.4% accuracy. Biomarker proteins more abundant in high-fertility bulls were involved in sperm motility. Therefore, this study identified functionally relevant sperm proteins predictive of the fertility of Holstein bulls used in artificial insemination. https://doi.org/10.3168/jds.2022-22273.