

## INTERPRETIVE SUMMARIES, MARCH 2021

**Identification and characterization of yak  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin.** By Wang *et al.*, page 2520. Yak milk  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin were isolated and identified. The amino acid sequences and protein structures of yak  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin differ from their bovine counterparts, thus leading to differences in physicochemical properties. These properties can be used to improve the quality of yak dairy food to facilitate yak milk use and its application in industry.  
<https://doi.org/10.3168/jds.2020-18546>.

**Effect of forage type, season, and ripening time on selected quality properties of sheep milk cheese.** By Renes *et al.*, page 2539. Sheep milk cheese has high nutritional value, and it can be affected by raw milk composition and cheese-making process. This work demonstrated that hay and silage used for sheep feeding did not affect cheese quality properties. However, season of cheese-making and ripening time highly influenced the content of amino acid compounds with reported beneficial effects on human health, such as  $\gamma$ -aminobutyric acid and ornithine. Therefore, this study could provide the dairy industry with useful information for producing cheeses with valuable nutritional quality for consumers.  
<https://doi.org/10.3168/jds.2020-19036>.

**The diversity of microbial communities in Chinese milk fan and their effects on volatile organic compound profiles.** By Chen *et al.*, page 2581. To determine the microbial composition in Chinese milk fan cheese, samples were analyzed by high-throughput sequencing. Three bacterial genera and 3 fungal genera were identified as dominant microbes in milk fan, and microbial profiles of milk fan varied among regions. Then, correlation between dominant genera and key volatile compounds were calculated. *Lactobacillus*, *Rhodotorula*, *Lodderomyces*, and *Debaryomyces* had significant correlations with a total of 13 compounds that are characteristic of the odor. These genera could be regarded as the core functional microorganisms in milk fan. This study can be used as a reference for the improvement of fermentation and aromatic quality of Chinese traditional milk fan.  
<https://doi.org/10.3168/jds.2020-19053>.

**A standard set of testing methods reliably enumerates spores across commercial milk powders.** By Murphy *et al.*, page 2615. Bacterial spores are important to dairy powder processors, as customers often set stringent specifications. Methods for enumerating spores in dairy powders vary with regard to sampling strategy, heat treatment, incubation temperature, medium, and plating method. Here we identified

a standard method set that captures the majority of variability found between different spore enumeration methods. Standardization of these methods will improve benchmarking across the dairy industry.  
<https://doi.org/10.3168/jds.2020-19313>.

**Assessing the ability of nisin A and derivatives thereof to inhibit gram-negative bacteria from the genus *Thermus*.** By Yeluri Jonnala *et al.*, page 2632. Nisin A is a lantibiotic that has “generally regarded as safe” status and can be used as a biopreservative in dairy products. Nisin A is very effective against gram-positive bacteria, but fewer studies have demonstrated its activity against gram-negative bacteria. In this study we used nisin A wild type and its bioengineered derivatives to test its activity against the gram-negative bacteria genus *Thermus*. We observed enhanced bioactivity and specific activity of nisin A variants against *Thermus* bacterial strains in vitro compared with its wild type.  
<https://doi.org/10.3168/jds.2020-19350>.

**Identification, subtyping, and tracking of dairy spoilage-associated *Pseudomonas* by sequencing the *ileS* gene.** By Reichler *et al.*, page 2668. *Pseudomonas* introduced after pasteurization during the processing and packaging of fluid milk is detrimental to product quality over refrigerated shelf life. At present, limited options are available to dairy processors to identify, diagnose, and track *Pseudomonas* in products and processing environments. We evaluated 7 potential genes to ultimately describe a single-gene polymerase chain reaction and sequencing process for rapid and low-resource preliminary subtyping and identification of dairy spoilage-associated *Pseudomonas*. Application of this process by dairy processors will allow for more effective root cause analysis of spoilage events and ongoing quality concerns, ultimately resulting in improved milk quality and shelf life.  
<https://doi.org/10.3168/jds.2020-19283>.

**Detection of methicillin-resistant coagulase-negative staphylococci and *PVL/mecA* genes in cefoxitin-susceptible *Staphylococcus aureus* (t044/ST80) from unpasteurized milk sold in stores in Djelfa, Algeria.** By Chenouf *et al.*, page 2684. The present study revealed the contamination by pathogenic and antimicrobial-resistant staphylococci species of unpasteurized milk sold in Djelfa city (Algeria) and destined for human consumption, which indicates a serious public health concern. These results require particular attention from all segments of the Algerian dairy industry, mainly food safety scientists, veterinarians, and consumers.  
<https://doi.org/10.3168/jds.2020-19270>.

**Calcium (Ca<sup>2+</sup>)-regulated exopolysaccharide biosynthesis in probiotic *Lactobacillus plantarum* K25 as analyzed by an omics approach.** By Jiang et al., page 2693. In this study, it was found that Ca<sup>2+</sup> enhanced the yield of exopolysaccharide (EPS) from *Lactobacillus plantarum* K25 in a dose-dependent manner. Data independent acquisition proteomics method was used to analyze the protein changes and the regulatory mechanism of the EPS synthesis in strain K25 in response to Ca<sup>2+</sup>. The metabolomics results indicated that Ca<sup>2+</sup> activated the HipB signaling pathway to inhibit the expression of manipulator repressors, such as ArsR, LytR/AlgR, IscR, and RaffR, and activated the expression of GntR to regulate EPS synthesis genes. This study provides a basis for understanding the metabolic pathways involved in Ca<sup>2+</sup>-induced production of EPS in *L. plantarum* K25. <https://doi.org/10.3168/jds.2020-19237>.

**Evaluation of the efficacy of commercial protective cultures to inhibit mold and yeast in cottage cheese.** By Makki et al., page 2709. Consumer demand for clean-label foods necessitates the use of novel methods for controlling spoilage in dairy products. Use of bioprotective cultures can inhibit the growth of fungal spoilage microorganisms in an effort to maintain quality and extend shelf life. In this study, 3 commercially available cultures were added to cottage cheese, and the growth of spoilage yeasts and molds was observed. Efficacy of protective cultures varied across yeast and mold strains, indicating that protective culture selection should be based on spoilage organisms of concern. <https://doi.org/10.3168/jds.2020-19136>.

**Highly sensitive detection of *Cronobacter sakazakii* based on immunochromatography coupled with surface-enhanced Raman scattering.** By Gao et al., page 2748. The contamination of foodstuffs, particularly powdered infant formula, with *Cronobacter sakazakii* may result in high lethality. The development of a new sensitive and specific test for the rapid detection of this pathogen is of great relevance for public health and may have other important implications. We describe a novel sensitive and rapid surface-enhanced Raman scattering immunochromatographic method for the specific detection of *C. sakazakii* in foodstuffs. This may have great potential application from industrial and commercial standpoints. <https://doi.org/10.3168/jds.2020-18915>.

**Lactose oxidase: Enzymatic control of *Pseudomonas* to delay age gelation in UHT milk.** By Rivera Flores et al., page 2758. Ultra-high temperature milk is consumed worldwide for its convenience and long shelf life. However, when raw milk of poor microbiological quality is used during production, “age gelation” may occur and reduce product shelf life. This

study proposed an alternative for maintaining raw milk quality and enhancing the shelf stability of the product. We used a natural, commercially available enzyme to control worst-case scenario conditions of raw milk storage and bacterial contamination. Our results showed that this approach could successfully delay “age gelation” and improve ultra-high temperature milk shelf stability, helping it last longer and thus making it more accessible. <https://doi.org/10.3168/jds.2020-19452>.

**Effects of goat milk enriched with oligosaccharides on microbiota structures, and correlation between microbiota and short-chain fatty acids in the large intestine of the mouse.** By Han et al., page 2773. A good balance between the host and intestinal microbiota is critical for good health. In this study, we explored the effects of combining goat milk and oligosaccharides on the large intestine environment in mice. Our findings suggest that supplementing goat milk with fructo-oligosaccharides has the potential to optimize large intestine microbiota structures. These findings could be important for developing functional foods based on goat milk enriched with oligosaccharides and for revealing their respective mechanisms of action. <https://doi.org/10.3168/jds.2020-19510>.

**Short communication: Evaluating the recovery potential of injured cells of *Listeria innocua* under product temperature-abuse conditions and passage through simulated gastrointestinal fluids.** By Singh et al., page 2787. The current study evaluated the recovery potential of heat-injured *Listeria* cells in ice cream mix samples held under temperature abuse conditions or in simulated transit through gastrointestinal fluids. The temperature abuse conditions, although resulting in a pudding-like consistency of the ice cream, did not support recovery of heat-injured cells. Similarly, injured cells did not show recovery in the simulated gastrointestinal fluids tested under in vitro conditions. <https://doi.org/10.3168/jds.2019-18071>.

**Evaluation of solar photovoltaic systems to shade cows in a pasture-based dairy herd.** By Sharpe et al., page 2794. The objective of this study was to evaluate grazing cattle under shade from a solar photovoltaic system. Cows with access to solar shade had similar behavior characteristics, fly counts, and milk production compared with cows with no access to shade. Cows with access to solar shade had lower internal body temperatures and respiration rates during the hottest parts of the day compared with cows with no access to shade. Incorporating solar photovoltaic into pasture dairy systems may reduce intensity of heat stress in cows. <https://doi.org/10.3168/jds.2020-18821>.

**Public perceptions of antibiotic use on dairy farms in the United States.** *By Wemette et al., page 2807.* This study investigated the US public's perceptions of antibiotic use on dairy farms. Data from questions submitted to the 2017 Cornell National Social Survey (n = 1,000) conducted by the Survey Research Institute of Cornell University (Ithaca, NY) were used. Most survey respondents believed that antibiotic use in cows on dairy farms posed a threat to human health and indicated they would be willing to pay more for milk produced from cows raised without antibiotics. The rationale behind such perceptions should be further explored to facilitate consumers' informed decision making and promote consumer confidence.  
<https://doi.org/10.3168/jds.2019-17673>.

**Chia (*Salvia hispanica* L.) seed mucilage as a fat replacer in yogurts: Effect on their nutritional, technological, and sensory properties.** *By Ribes et al., page 2822.* Consumer demand for healthy and nutritious foods has motivated the scientific and industrial fields to develop novel dairy products with lower fat content that are free of chemical additives. However, reducing the fat content of yogurts can cause undesirable changes in their technological and sensory features. Plant-based mucilage can be used in fermented skim milk products as a natural fat substitute that mimics the technological properties of full-fat yogurts. In the current work, we describe the use of chia seed mucilage as a fat replacer in fat-free yogurts with excellent technological properties and nutritional benefits for consumers.  
<https://doi.org/10.3168/jds.2020-19240>.

**Effects of pressurized thermal processing on native proteins of raw skim milk and its concentrate.** *By Bogahawaththa et al., page 2834.* Heating, pressurization, and shearing can modify native milk proteins. We investigated the effects of low pressure at elevated temperatures with shearing on milk proteins. Under 10 MPa at 75 or 95°C, casein micelles were destabilized and  $\alpha_{S1}$ - and  $\beta$ -casein were dissociated. Concentrated proteins were more prone to pressurization than unconcentrated proteins. The effect of 10 MPa on whey proteins was not apparent due to heat-induced conformational changes at 75 or 95°C. The effects of 10 MPa at 75 or 95°C were mostly similar to those of 100 MPa at 20°C, as reported previously. These findings will help to optimize milk processing parameters.  
<https://doi.org/10.3168/jds.2020-19542>.

**Freezing kinetics and microstructure of ice cream from high-pressure-jet processing of ice cream mix.** *By Voronin et al., page 2843.* Low-fat ice cream mix was processed using a high-pressure jet and dynamically frozen using a commercial batch freezer. During dynamic freezing, large fat-protein complexes

contributing to the enhanced rheological properties of the high-pressure-jet-treated ( $\geq 400$  MPa) ice cream mix were broken down. The resulting ice cream had increased hardness and melting rate and unique microstructural elements that show potential for future clean-label products.  
<https://doi.org/10.3168/jds.2020-19011>.

**Characterization of the relationship between olfactory perception and the release of aroma compounds before and after simulated oral processing.** *By Mu et al., page 2855.* Fermented milk is popular among consumers all over the world. Aroma is an important property of fermented milk, and it directly affects consumer acceptance. Previous studies have mainly focused on analyzing the composition of aroma compounds in fermented milk in vitro, but not all of the compounds can contribute to olfaction. Furthermore, the relationship between the release of aroma compounds and olfactory attributes is still unknown. This study clarified the relationship between olfactory perception and the release of aroma compounds under the influence of simulated oral processing, which might contribute to the development of fermented milks to meet specific consumer demands.  
<https://doi.org/10.3168/jds.2020-19026>.

**Digestibility, lactation performance, plasma metabolites, ruminal fermentation, and bacterial communities in Holstein cows fed a fermented corn gluten-wheat bran mixture as a substitute for soybean meal.** *By Jiang et al., page 2866.* In China, the demand for high-quality protein feed is gradually increasing with the continuous development of the dairy industry. However, other than soybean meal (SBM), few by-products with high-quality protein are available in China. Fermented corn gluten-wheat bran mixture might be used as a major protein ingredient in the diets of dairy cattle. We tested the effects of replacing SBM with fermented corn gluten-wheat bran mixture in Holstein cows in this study; it provided a new solution for the replacement of SBM and the improvement of lactation performance.  
<https://doi.org/10.3168/jds.2020-19072>.

**Effects of prepartum diets varying in dietary energy density and monensin on early-lactation performance in dairy cows.** *By Vasquez et al., page 2881.* Monensin administered before calving has been shown to help prevent health problems such as ketosis and to improve milk production efficiency when fed during lactation. Whether monensin acts independently of diet during the dry period has not been determined. We evaluated the effects of monensin in single-group, high-forage diets or a 2-group far-off and close-up system during the dry period. Diet had little effect on subsequent lactation performance, but pre-



partum monensin tended to increase milk yield and did increase energy-corrected and fat-corrected milk yields. In herds fed monensin during lactation, it should be fed throughout the dry period.  
<https://doi.org/10.3168/jds.2020-19414>.

**Altering the ratio of dietary palmitic and oleic acids affects production responses during the immediate postpartum and carryover periods in dairy cows.** *By de Souza et al., page 2896.* The objectives of our study were to determine the effects of altering the dietary ratio of palmitic (C16:0) and oleic (*cis*-9 C18:1) acids on production and metabolic responses of early-lactation dairy cows. We observed that feeding fatty acid supplements containing C16:0 and *cis*-9 C18:1 during the immediate postpartum period increased milk yield and energy-corrected milk compared with a control diet not supplemented with fatty acids. Additionally, the fat-supplemented diets fed during the immediate postpartum period had a positive carryover effect during early lactation, when cows were fed a common diet.  
<https://doi.org/10.3168/jds.2020-19311>.

**Altering the ratio of dietary palmitic and oleic acids affects nutrient digestibility, metabolism, and energy balance during the immediate postpartum in dairy cows.** *By de Souza et al., page 2910.* We determined the effects of altering the dietary ratio of palmitic (C16:0) and oleic (*cis*-9 C18:1) acids on nutrient digestibility, energy balance, and metabolism of early-lactation dairy cows. Our results indicate that feeding fatty acid supplements containing C16:0 and *cis*-9 C18:1 increased nutrient digestibility, energy intake, and milk energy output compared with a non-fat-supplemented diet. Increasing dietary *cis*-9 C18:1 increased energy intake, reduced markers of body fat mobilization, and improved energy balance during the immediate postpartum period. We concluded that feeding supplements containing C16:0 and *cis*-9 C18:1 during the immediate postpartum period can increase energy intake and milk energy output.  
<https://doi.org/10.3168/jds.2020-19312>.

**Effects of propylene glycol on in vitro ruminal fermentation, methanogenesis, and microbial community structure.** *By Wang et al., page 2924.* Propylene glycol serves as an energy additive in early lactation of dairy cows to treat ketosis. In the present study, the fermentation of propylene glycol produced more propanol and less propionate, which means that more of the intermediate product propanal could be used as an electron acceptor to competitively inhibit methanogenesis. In addition, the change of fermentation pattern resulting from propylene glycol metabolism affected the other 2 propionate production pathways, and the enhanced succinate pathway could provide alterna-

tive electron sinks to competitively inhibit methanogenesis. Changes in the bacterial and archaeal community structure may be responsible for these results.  
<https://doi.org/10.3168/jds.2020-18974>.

**Variation in urea kinetics associated with ruminant species, dietary characteristics, and ruminal fermentation: A meta-analysis.** *By Souza and White, page 2935.* This meta-analysis presents a quantitative summary of the relationships among nitrogen cycling fluxes in the gastrointestinal tract and ruminant species, dietary characteristics, and ruminal fermentation. The results provide guidance on how these factors influence nitrogen cycling fluxes and may be of interest to scientists and professional nutritionists.  
<https://doi.org/10.3168/jds.2020-19447>.

**Progressive inclusion of pearl millet herbage as a supplement for dairy cows fed mixed rations: Effects on methane emissions, dry matter intake, and milk production.** *By Civiero et al., page 2956.* Including grazing in dairy systems can improve animal welfare and reduce health problems, animal care labor, manure management, and feeding costs. We quantified the effects of the progressive inclusion of pearl millet pasture in dairy cow diets on dry matter intake, milk production, and enteric methane emissions. Providing access to a pearl millet pasture between the morning and afternoon milkings and reducing up to 50% of the total mixed ration decreased milk production by less than 10% and did not change the enteric methane intensity (g/kg of milk).  
<https://doi.org/10.3168/jds.2020-18894>.

**Effects of unprotected choline chloride on microbial fermentation in a dual-flow continuous culture depend on dietary neutral detergent fiber concentration.** *By Arce-Cordero et al., page 2966.* Choline is supplemented to cows as protected choline chloride to prevent extensive degradation by ruminal microorganisms. However, effects of unprotected choline on ruminal fermentation are unclear, and limited research suggests that choline may influence ruminal fermentation and that such effects depend on dietary concentration of fiber. We evaluated in vitro the supplementation of unprotected choline chloride at 2 neutral detergent fiber concentrations: 30 and 40%. Our results indicate that choline chloride increased propionate molar proportion in diets with 30% neutral detergent fiber in which a greater starch content was available, allowing for a greater proportion of propionate.  
<https://doi.org/10.3168/jds.2020-19089>.

**Nutrient digestibility and endogenous protein losses in the foregut and small intestine of weaned dairy calves fed calf starters with conventional or enzyme-treated soybean meal.** *By*

*Ansia et al., page 2979.* Bioavailability of amino acids and other nutrients of solid feed is of vital importance to achieve a successful transition of young calves from liquid to solid feeding. In this study, we compared the effect of conventional and enzyme-treated soybean meal on digestion at the duodenum and ileum. We found that a diet based on an enzyme-treated soybean meal improved efficiency of microbial protein synthesis, flow of undigested dietary protein into the duodenum, and digestion of protein and amino acids in the small intestine.  
<https://doi.org/10.3168/jds.2020-18776>.

**Methionine precursor effects on lactation performance of dairy cows fed raw or heated soybeans.** *By Pereira et al., page 2996.* The isopropyl ester of 2-hydroxy-4-(methylthio)-butanoic acid (HMBi) is a methionine precursor to the rumen microbes and systemic to dairy cows. In experiment 1, HMBi decreased rumen microbial yield and did not affect lactation performance, and in experiment 2, it increased rumen microbial yield and the secretion of milk protein. Heating soybeans increased the efficiency of N utilization and the yields of milk protein, fat, and lactose relative to raw soybeans, but whole soybean type did not interact with HMBi supplementation.  
<https://doi.org/10.3168/jds.2020-18696>.

**Addition of straw to the early-lactation diet: Effects on feed intake, milk yield, and subclinical ketosis in Holstein cows.** *By Seifi et al., page 3008.* Dairy cows are typically transitioned to a higher-energy ration immediately after calving to accommodate the increased energy demands of lactation. To explore whether this change in diet has positive consequences for the energy metabolism and performance of dairy cows, we compared this conventional approach with a feeding protocol that supplemented the diet with chopped straw, diluting the energy density and increasing the physically effective fiber. Adding straw to the diet of lactating cows reduced feed intake and milk yield and increased the incidence of subclinical ketosis during early lactation.  
<https://doi.org/10.3168/jds.2020-18549>.

**Effect of uncouplers of oxidative phosphorylation on metabolism of propionate in liver explants from dairy cows.** *By Kennedy et al., page 3018.* Energy from metabolism of fuels is captured in the form of high-energy phosphate bonds produced primarily through oxidative phosphorylation. Propionate, produced in the rumen, stimulates oxidation in the liver, and hepatic oxidation of fuels has been linked to the control of feeding behavior in various species. Our aim was to examine the effect of uncouplers of oxidative phosphorylation on the metabolism of propionate in the liver of dairy cows. Understanding metabolism

during the postpartum period when control of feed intake is likely dominated by metabolic mechanisms is important to optimizing milk production and nutrient utilization, thus improving the sustainability of the dairy industry.  
<https://doi.org/10.3168/jds.2020-19536>.

**Assessing amino acid uptake and metabolism in mammary glands of lactating dairy cows intravenously infused with methionine, lysine, and histidine or with leucine and isoleucine.** *By Huang et al., page 3032.* Methionine, lysine, and histidine as a group and isoleucine and leucine as a group interact to affect amino acid transport and metabolism in mammary glands and additively increase milk protein yield in dairy cows. This interaction among absorbed amino acids likely changes the efficiency of utilization of individual amino acids at the mammary gland level and, consequently, the whole-body level. Thus, it is inaccurate to use a fixed, constant efficiency within and across amino acids in current postabsorptive models used for dairy ration formulation.  
<https://doi.org/10.3168/jds.2020-18169>.

**Lactational performance, enteric gas emissions, and plasma amino acid profile of dairy cows fed diets with soybean or canola meals included on an equal protein basis.** *By Lage et al., page 3052.* This study investigated the effects of feeding diets with soybean or canola meals included on an equal protein basis on lactational performance, enteric gas emissions, and plasma amino acid profile of dairy cows. Overall, compared with the soybean meals, canola meal enhanced dry matter intake, but energy-corrected milk and component yields and feed efficiency were similar among protein sources.  
<https://doi.org/10.3168/jds.2020-18851>.

**Menthol stimulates calcium absorption in the rumen but not in the jejunum of sheep.** *By Geiger et al., page 3067.* Dairy cows direct large amounts of Ca<sup>2+</sup> into milk at the onset of lactation. This often leads to hypocalcemia and milk fever with far-reaching health and economic consequences. Certain plant bioactive lipid compounds (PBLC), especially menthol, have been shown to stimulate ruminal Ca<sup>2+</sup> absorption and to increase blood Ca<sup>2+</sup> levels in cows and sheep. In the present study, we demonstrated a long-term sensitization of ruminal Ca<sup>2+</sup> absorption to acute stimulation by menthol after pre-feeding menthol-rich PBLC. This stimulation was most likely attributable to transient receptor potential channels vanilloid 3 (TRPV3) and may serve as a tool to prevent postparturient hypocalcemia.  
<https://doi.org/10.3168/jds.2020-19372>.

**Influence of starter crude protein content on growth and body composition of dairy calves in**

**an enhanced early nutrition program.** *By Stamey Lanier et al., page 3082.* Increased rates of milk replacer in feeding result in greater lean growth before weaning but often decreased growth around and after weaning. The effect of starter crude protein content on calf body composition has not been investigated. Here, we demonstrated that feeding a starter with higher crude protein increased growth of the reticulorumen and liver without affecting empty body weight gain. Feeding the larger amount of milk replacer with the lower protein starter increased fat content of empty body weight gain after weaning, but the higher crude protein starter resulted in less fat in gain.  
<https://doi.org/10.3168/jds.2020-19580>.

**Effects of starter protein content and alkali processing of wheat straw on growth, ruminal fermentation, and behavior in Holstein calves.** *By Mirzakhani et al., page 3098.* Early-life nutrition is an important factor that can influence the survival and future productivity of replacement heifers. Starter protein content and forage provision can affect the growth performance of calves. This study was conducted to evaluate the effects of alkali processing of wheat straw and different protein contents in ground starter feed on the intake and performance of calves. The current results showed that feeding high-protein ground starter feed increased the average daily gain and feed efficiency, and supplementing alkali-processed wheat straw increased fiber digestibility.  
<https://doi.org/10.3168/jds.2020-19247>.

**Replacing soybean meal with okara meal: Effects on production, milk fatty acid and plasma amino acid profile, and nutrient utilization in dairy cows.** *By Zang et al., page 3109.* The US dairy industry relies heavily on soybean meal due to its high protein content and relatively balanced amino acid profile. However, the use of alternative protein sources may be attractive to dairy producers. Okara is a by-product from the production of soymilk and tofu and contains high protein and fiber levels. Results showed that okara meal can replace soybean meal without reducing intake and production of milk and milk components. Okara meal also reduced milk and plasma urea nitrogen concentrations, suggesting improved nitrogen utilization.  
<https://doi.org/10.3168/jds.2020-19182>.

**Economic losses due to Johne's disease (paratuberculosis) in dairy cattle.** *By Rasmussen et al., page 3123.* Johne's disease, or paratuberculosis, is an infectious disorder of the intestines primarily associated with cattle and sheep, resulting in significant economic losses for dairy producers. This study estimated those losses for a comprehensive selection of dairy-producing regions within a Monte Carlo Markov chain framework using region-specific economic variables. On average,

it was estimated that approximately 1% of gross milk revenue, equivalent to \$33 per cow, is lost annually in infected dairy herds, with greater losses in regions with above-average farm-gate prices and production per cow.  
<https://doi.org/10.3168/jds.2020-19381>.

**Derivation of economic values for German dairy breeds by means of a bio-economic model—with special emphasis on functional traits.** *By Schmidt-mann et al., page 3144.* Economic values reflect the marginal economic importance of breeding traits and form the basis for setting appropriate breeding goals in dairy cattle. In this study, we provide reliable estimates for economic values of various production and functional breeding traits in 3 German dairy breeds. Differences in the derived economic values across breeds are analyzed. These results are highly applicable to breeding organizations in Germany as they represent a first step toward economically optimal breeding goals for the breeds under study.  
<https://doi.org/10.3168/jds.2019-17635>.

**The economic cost of metritis in dairy herds.** *By Pérez-Báez et al., page 3158.* Metritis affects up to 40% of the dairy cows in the United States and is associated with decreased milk production, impaired reproductive performance, and increased culling. Metritis cost was calculated by subtracting the profit of cows with metritis from the profit of cows without metritis. Milk sales, feed costs, and profit were all less in cows with metritis, and the average cost of a case of metritis was ~\$512.  
<https://doi.org/10.3168/jds.2020-19125>.

**Financial benchmarking on dairy farms: Exploring the relationship between frequency of use and farm performance.** *By Ramsbottom et al., page 3169.* Although benchmarking is positively associated with technical and financial efficiency, its uptake on farms is low. A database containing financial and physical information was categorized by frequency of annual financial benchmarking over a 9-yr period. The relationship between frequency of benchmarking and farm physical characteristics and financial performance was quantified. The results show that specialized and larger scale dairy farms benchmark more frequently, were more intensive and technically efficient, and were more profitable. We conclude that the development of simplified financial benchmarking systems is required to increase benchmarking on farms in support of a more sustainable and resource-efficient dairy industry.  
<https://doi.org/10.3168/jds.2020-18843>.

**Effects of herd fertility on the economics of sexed semen in a high-producing, pasture-based dairy production system.** *By Walsh et al., page 3181.* A stochastic, whole-farm, bioeconomic model was used to evaluate the economic return from using sexed



semen under 3 fertility states in a high-producing, spring-calving, pasture-based dairy system. The model included a monthly specification of the management and biological processes within the farm. Herd dynamics were modeled as a Markov process and included genetic gain resulting from changes in selection intensity. Sexed semen was shown to be more profitable than unsorted semen for herds with good baseline fertility status. The study highlights the importance of herd fertility status as a key factor influencing the economic return from adoption of sexed semen.  
<https://doi.org/10.3168/jds.2020-18676>.

**Describing motivation for health and treatment decisions and communication choices of calf-care workers on western United States dairies.** *By Moore et al., page 3197.* With animal treatments in the hands of dairy employees on large farms, understanding employee motivation for treatment decisions could be helpful in designing training programs for judicious drug use. This study found that many calf-care employees made sick calf identification decisions based on their beliefs, personal standards, values, and job fulfillment. Within-farm communication varied between goal setting and tasks, with owners and veterinarians being less involved in communication regarding tasks relative to goal setting for animal health. Investigation and incorporation of employee beliefs and values in training programs could help align treatment protocols with actual treatment.  
<https://doi.org/10.3168/jds.2020-18669>.

**Purebreeding with sexed semen and crossbreeding with semen from double-muscle sires to improve beef production from dairy herds: Live and slaughter performances of crossbred calves.** *By Bittante et al., page 3210.* A survey of 1,530 crossbred beef calves from dairy farms showed that, in veal production, INRA 95 crossbreds were lighter in weight at slaughter but had a greater dressing percentage compared with Belgian Blue crossbreds. Limousin crossbreds had a smaller average daily gain and lighter slaughter and carcass weights, and Simmental had a similar growth rate but less favorable carcass traits. The effects of sire breed on beef production by specialized fattening farms and of dam breed on veal and beef production were less marked, but Piemontese crossbreds exhibited a greater dressing percent when fattened in the dairy farm of origin.  
<https://doi.org/10.3168/jds.2020-18436>.

**Genomic and pedigree estimation of inbreeding depression for semen traits in the Basco-Béarnaise dairy sheep breed.** *By Antonios et al., page 3221.* The most important observed consequence of inbreeding is the decrease in performance and fitness of the animals, a phenomenon known as inbreeding depres-

sion. Here, we evaluated different methods to estimate the level of inbreeding and inbreeding depression for semen traits. In sheep, inbreeding from pedigree tends to be underestimated because of missing pedigrees, and inbreeding from genomic information does not involve all animals because many of them are not genotyped. Using methods able to handle missing pedigree and ungenotyped animals, some inbreeding depression was found for sperm motility in the Basco-Béarnaise breed.  
<https://doi.org/10.3168/jds.2020-18761>.

**Genetic parameters for reproductive losses estimated from in-line milk progesterone profiles in Swedish dairy cattle.** *By Ask-Gullstrand et al., page 3231.* Impaired fertility is a major concern in the dairy industry. Diagnosing reproductive loss in early gestation could reduce losses in production, decrease the risk of premature culling, and increase herd profitability. However, few estimates of genetic parameters for reproductive loss have been identified. This study provides valuable information for determining genetic variation in reproductive loss and its potential usefulness as a trait to be considered in genetic or genomic evaluations to improve dairy cattle fertility and reduce reproductive losses in production.  
<https://doi.org/10.3168/jds.2020-19385>.

**Determination of immunoglobulin concentrations and genetic parameters for colostrum and calf serum in Charolais animals.** *By Martin et al., page 3240.* The acquisition of immunoglobulins through the intake of maternal colostrum is crucial for the immunity of newborn calves. Here, we evaluated the situation in beef cattle from 366 colostrum and calf serum samples. The levels of the different types of immunoglobulins were determined, and an effect of calving difficulty on the calf immunoglobulin levels was identified. Heritability estimates were low to moderate, with the highest reaching 0.28 in colostrum and 0.36 in serum. Despite generally higher concentrations in beef than in dairy cattle, calves with low immunoglobulin levels existed, and negative effects on survival and subsequent performance were observed.  
<https://doi.org/10.3168/jds.2020-19423>.

**Estimation of genetic parameters for cheese-making traits in Spanish Churra sheep.** *By Pelayo et al., page 3250.* In this study, low to moderate heritability estimates are reported for cheese-making traits in Churra sheep. The results suggest that an improvement in these traits may be achieved by genetic selection in this breed. In addition, some of the traits, such as milk coagulation properties and traits related to curd firmness over time, were analyzed for the first time in Churra sheep.  
<https://doi.org/10.3168/jds.2020-19387>.

**Herd life, lifetime production, and profitability of Viking Red-sired and Montbéliarde-sired crossbred cows compared with their Holstein herdmates.** *By Hazel et al., page 3261.* The first 2 generations of crossbred cows from a 3-breed rotation of Viking Red, Montbéliarde, and Holstein (HO) were compared with their HO herdmates from a designed, phenotypic study in high-performance herds. Both the 2-breed and 3-breed crossbreds had longer herd life compared with their respective HO herdmates. The 2-breed crossbreds had more daily fat plus protein production (kg) and a lower percentage of cows that died during the 45 mo after first calving compared with their HO herdmates. Both the 2-breed and 3-breed crossbreds had greater lifetime profit and daily profit compared with their respective HO herdmates.  
<https://doi.org/10.3168/jds.2020-19137>.

**Genetic and environmental analysis of female calf survival in the Israel Holstein cattle population.** *By Weller et al., page 3278.* Mean survival rate of Israeli Holsteins to first calving was 0.85. Birth month, gestation length, dystocia, and twin birth affected survival rate. Heritability was 0.009. Correlations of sire transmitting abilities for calf survival with the traits included in the Israeli breeding index were all <0.3. Genetic control of survival to first calving and after first calving were not similar. Mean economic value of calf survival was \$526. Inclusion of calf survival in the Israeli breeding index resulted in a 0.5% increase in calf survival over 10 yr but reduced progress for the other traits by 8%.  
<https://doi.org/10.3168/jds.2020-19434>.

**Short communication: Iodine content in bovine milk is lowly heritable and shows limited genetic variation.** *By Costa et al., page 3292.* Iodine deficiency has become a severe issue affecting 2 billion people around the globe. Milk and dairy products have an important role in the human diet, as they provide iodine and contribute to the requirements. Thus, there is interest in understanding sources of variation and strategies to increase this mineral in cow milk. The present study investigated the genetics of iodine content predicted from milk spectra in cattle on a large scale. Results showed that the predicted iodine content is lowly heritable and difficult to increase in milk through breeding strategies.  
<https://doi.org/10.3168/jds.2020-19486>.

**Technical note: Genetic groups in single-step single nucleotide polymorphism best linear unbiased predictor.** *By Vandenplas et al., page 3298.* Genetic groups are often used in dairy cattle genetic evaluations to replace unknown parents and to account for selection that cannot be accounted for by known genetic relationships. In this study, we derived

a system of equations for single-step single nucleotide polymorphism best linear unbiased prediction that included genetic groups in the pedigree. Compared with a system with genetic groups fitted as covariates, the derived system required less memory and time when applied to a dairy cattle data set with more than 6 million animals in the pedigree, 123,000 genotypes, and 441 genetic groups.  
<https://doi.org/10.3168/jds.2020-19460>.

**Making tiestalls more comfortable: I. Adjusting tie-rail height and forward position to improve dairy cows' ability to rise and lie down.** *By St John et al., page 3304.* Tie- and neck-rails are an important component of stall design in stall-based housing systems, and if their configuration is poor they can have a negative effect on cow behavior and welfare. We tested 4 tie-rail positions, including 2 novel tie-rail placements, and found that injury prevalence changed based on the location of the tie-rail. Future research should investigate housing options that provide fewer obstacles for the cow through the elimination of some stall hardware.  
<https://doi.org/10.3168/jds.2019-17665>.

**Making tiestalls more comfortable: II. Increasing chain length to improve the ease of movement of dairy cows.** *By Boyer et al., page 3316.* Our study compared the effect of a tie chain longer than the current recommendation on the ease of movement of dairy cows housed in tiestalls. Increasing chain length leads cows to modify the way they use the available space and improves their ease of movement upon lying down. Therefore, increasing chain length could be implemented as a low-cost modification on tiestall dairy farms as part of a series of measures aiming to improve comfort of dairy cow at their stalls.  
<https://doi.org/10.3168/jds.2019-17666>.

**Making tiestalls more comfortable: III. Providing additional lateral space to improve the resting capacity and comfort of dairy cows.** *By Boyer et al., page 3327.* This study compared the effect of housing lactating dairy cows in tiestalls of double width compared with the current recommendation. Increasing stall width improves the cows' comfort and resting capacity by providing them with increased opportunities to express and switch between natural lying postures. Increasing stall width also reduced the prevalence of contacts with the stall elements during lying-down movements, highlighting the need of dairy cows for a greater margin of error to perform lying-down movements in cubicle-based systems.  
<https://doi.org/10.3168/jds.2019-17667>.

**Making tiestalls more comfortable: IV. Increasing stall bed length and decreasing manger wall**



**height to heal injuries and increase lying time in dairy cows housed in deep-bedded tiestalls.** *By McPherson and Vasseur, page 3339.* In stall-based housing systems, stall dimensions and the type of lying surface can impede cow comfort and welfare if too restrictive or abrasive. Here we tested the effect of stall length and manger wall height on dairy cows housed in deep-bedded tiestalls. Increasing stall length increased lying time and allowed for healing of pre-existing injuries. Manger wall height may play a role in how the cow positions herself in the stall.  
<https://doi.org/10.3168/jds.2019-17668>.

**Sensitivity and specificity of a tail-activity measuring device for calving prediction in dairy cattle.** *By Voß et al., page 3353.* The objective of the study was to assess a calving sensor mounted to the tail (Moocall Ltd., Dublin, Ireland). The sensor could not reliably predict calving. We also observed frequent slipping or losses of the sensor. The mounting device caused pressure marks and necrosis.  
<https://doi.org/10.3168/jds.2020-19277>.

**Negatively controlled, randomized clinical trial comparing different antimicrobial interventions for treatment of clinical mastitis caused by gram-positive pathogens.** *By Tomazi et al., page 3364.* Use of effective antimicrobial interventions can increase the cure rates of clinical mastitis, reduce disease recurrence, and indirectly decrease antimicrobial use in dairy herds. The aim of this negatively controlled clinical trial was to perform an in-depth evaluation of the efficacy of different interventions for treatment of gram-positive clinical mastitis using narrow- and broad-spectrum antimicrobials. According to results of milk microbiome analysis, SCC, composition, and bacterial counts, the use of antibiotics remains an indispensable tool for treatment of clinical mastitis caused by gram-positive bacteria. No differences between antibiotic interventions were observed in terms of clinical and bacteriological cure, although treatment effects on other outcomes at the cow and mammary quarter levels were detected.  
<https://doi.org/10.3168/jds.2020-18830>.

**The nasopharyngeal microbiota of preweaned dairy calves with and without ultrasonographic lung lesions.** *By Raabis et al., page 3386.* This cross-sectional study compares the microbial composition of the nasopharynx between calves diagnosed with and without bovine respiratory disease (BRD) using ultrasonography and clinical scoring. Severity of pneumonia was associated with an increased relative abundance of *Pasteurella* spp. in the nasopharynx. Increased microbial diversity of the nasopharynx may be associated with reduced prevalence of clinical BRD. Further un-

derstanding of the respiratory microbiota will require longitudinal studies with larger sample sizes to determine shifts in the microbiota that may affect the risk of BRD.  
<https://doi.org/10.3168/jds.2020-19096>.

**Application of a dot blot hybridization assay for genotyping *Streptococcus uberis* from Brazilian dairy herds.** *By Alves et al., page 3418.* We evaluated the diversity of *Streptococcus uberis* isolates from clinical and subclinical mastitis by dot blot hybridization. Taxonomic and virulence factor markers were evaluated by dot blot apparatus in a nylon membrane, followed by data analysis. After overnight hybridization, we observed a high diversity of *S. uberis* isolates, suggesting that the environment harbors a high diversity of *S. uberis* genotypes that cause mastitis in dairy herds. The presence of the same dot blot pattern in different mammary quarters from the same animal also suggested contagious transmission. We identified the genes *sua*, *pauA*, and *gapC* more frequently among isolates, confirming that adhesion and internalization of *S. uberis* were optimized in the mammary gland.  
<https://doi.org/10.3168/jds.2020-18782>.

**Effects of adding an automated monitoring device to the health screening of postpartum Holstein cows on survival and productive and reproductive performances.** *By Silva et al., page 3439.* Automated devices that monitor behavior have become more accessible to dairy farmers. Despite evidence that such systems allow for the early diagnosis of diseases and therapeutic interventions to reduce the impact of diseases, it is unclear whether health screening with such devices improves survival, milk production, and reproductive success. In the current experiment, automated devices did not improve the survival, milk production, and reproductive success of Holstein cows that were already subjected to an intensive health-screening program. Responses measured by automated devices, however, may prove useful to assist in treatment decisions for cows diagnosed with clinical diseases.  
<https://doi.org/10.3168/jds.2020-18562>.

**Progression of different udder inflammation indicators and their episode length after onset of inflammation using automatic milking system sensor data.** *By Bonestroo et al., page 3458.* Sensors measuring indicators of intramammary inflammation in milk are common in automatic milking systems and can be used to monitor udder health. This study examines duration and variation in udder inflammation indicators after detection of an initial inflammation using daily data from sensors. On average, for cows that did recover, the inflammation indicators recovered within 3 to 4 wk after the initial udder inflammation.

Sensor data could be used to detect udder inflammation recovery.  
<https://doi.org/10.3168/jds.2019-18054>.

**Bacteriophage has beneficial effects in a murine model of *Klebsiella pneumoniae* mastitis.** *By Zhao et al., page 3474.* *Klebsiella pneumoniae*, a very common cause of bovine mastitis, is usually treated with antibiotics, but drug resistance commonly develops. Our objective was to evaluate the efficacy of bacteriophage therapy in a murine model of *K. pneumoniae* mastitis. A lytic *K. pneumoniae* bacteriophage (CM8-1) was isolated from dairy farm wastewater; it had an incubation period and burst time of 30 and 20 min, respectively, with no significant change in viability, adsorption, or infectivity at 30 to 50°C or pH 6 to 10. This bacteriophage caused significant (1) reductions in number of *K. pneumoniae* in the murine mammary gland, (2) improvements in mammary gland tissue morphology, and (3) reductions in mRNA and protein expression of proinflammatory factors TNF- $\alpha$ , IL-1 $\beta$ , IL-6, and IL-8.  
<https://doi.org/10.3168/jds.2020-19094>.

**Familiarity influences social networks in dairy cows after regrouping.** *By Foris et al., page 3485.* We investigated how regrouping affects the social relationships among familiar cows and unfamiliar cows. Regrouping increased the number of displacements, but it had little effect on the displacement or grooming relationship structure within subgroups of familiar cows. After regrouping, cows preferred familiar individuals over unfamiliar ones as grooming partners and feeding neighbors. Displacements were more common between familiar cows at the feed bunk, possibly because they were preferred neighbors. Our results suggested that a small familiar group may mitigate some of the social stress associated with regrouping.  
<https://doi.org/10.3168/jds.2020-18896>.

**The effect of individual versus pair housing of dairy heifer calves during the preweaning period on measures of health, performance, and behavior up to 16 weeks of age.** *By Knauer et al., page 3495.* This randomized clinical trial was conducted at the University of Minnesota St. Paul Campus Dairy Cattle Teaching and Research Center from November 2018 to April 2019 to explore the effect of pair housing during the preweaning period on measures of calf health, behavior, and performance up to 16 wk of age. Compared with individually housed calves, paired calves had improved preweaning growth and increased lying time during weaning.  
<https://doi.org/10.3168/jds.2020-18928>.

**Provision of shelter during the prepartum period: Effects on behavior, blood analytes, and health status in dairy cows in winter.** *By Cartes*

*et al., page 3508.* This study aimed to examine whether shelter provision under winter conditions influenced behavior, body fat mobilization, and health in outdoor-housed prepartum dairy cows. Cows were assigned to a paddock without shelter or to one with access to an artificial shelter 3 wk before their expected calving date. Sheltered cows were cleaner, spent more time lying down, and showed fewer signs of fat mobilization than cows without access to shelter during the prepartum period. The provision of shelter mitigates the effects of winter weather, promoting the welfare of prepartum dairy cows.  
<https://doi.org/10.3168/jds.2020-19439>.

**Molecular diversity of *Staphylococcus aureus* and the role of milking equipment adherences or biofilm as a source for bulk tank milk contamination.** *By Pacha et al., page 3522.* Strain diversity of *Staphylococcus aureus* in intramammary infections has been widely assessed, but diversity has not been evaluated for strains from bulk tank milk and adherences on milking equipment surfaces (AMES). This study describes the *Staph. aureus* dynamics between consecutive bulk tank milk samples and AMES pulsotypes. The discovery of common pulsotypes among AMES samples from different farms consistently sharing *Staph. aureus* with bulk tank milk samples shows the role of AMES as a source of *Staph. aureus* in on-farm bulk tank milk contamination. Understanding the epidemiology of *Staph. aureus* on farms is crucial to identify sources of bulk tank milk contamination to improve milk quality.  
<https://doi.org/10.3168/jds.2020-19121>.

**Recovery from udder cleft dermatitis in dairy cows.** *By Ekman et al., page 3532.* Udder cleft dermatitis (UCD) involves lesions that affect the udder skin of dairy cows and may impair animal welfare. Udder cleft dermatitis lesions vary in appearance from mild skin changes to severe, craterlike ulcers. In this study we followed cows in 7 Swedish dairy herds for 1 yr and investigated factors that affected spontaneous recovery from UCD, and we performed a small treatment trial. Further studies on UCD are important for improved prevention of treatment of the lesions in the future.  
<https://doi.org/10.3168/jds.2020-19046>.

**Short communication: Associations of serum biomarkers of stress and inflammation measured at arrival with health, mortality, and growth of calves transported within the first 4 days of life.** *By Celestino et al., page 3547.* This study assessed the association of serum concentrations of biomarkers of stress and inflammation such as haptoglobin, cortisol, and L-lactate measured at arrival with health and performance of calves transported for a long period within their first 4 d of life. We observed that calves that had circulating haptoglobin concentration >0.63

μmol/L at arrival were less likely to be diagnosed with bovine respiratory disease and tended to grow more during the preweaning period than calves with  $\leq 0.63$  μmol/L. However, L-lactate and cortisol concentrations measured at arrival were not associated with health and performance outcomes.  
<https://doi.org/10.3168/jds.2020-19106>.

**Short communication: Algicide activity of antimicrobial peptides compounds against *Prototheca bovis*.** By Sperotto et al., page 3554. This work aims to initiate new studies for the control of *Prototheca achlorophyllic* algae, which is responsible for diseases in animals and humans. *Prototheca* is naturally multidrug resistant, and the treatment options against algae are very restricted. In our in vitro study, antimicrobial peptides, a new class of antibiotics, were suggested to be a great alternative for controlling *Prototheca bovis* algae.  
<https://doi.org/10.3168/jds.2020-18171>.

**Short communication: Efficacy of a second intrauterine cephalosporin infusion for the treatment of purulent vaginal discharge and endometritis in postpartum dairy cows.** By Dubuc et al., page 3559. The objective of this study was to quantify the efficacy of a second cephalosporin treatment administered 14 d after the initial treatment on the subsequent reproductive performance of postpartum dairy cows affected by purulent vaginal discharge (PVD) or endometritis (ENDO). In total, 4,140 postpartum Holstein cows were enrolled in this randomized clinical trial. Cows diagnosed with PVD or ENDO were assigned to receive a single intrauterine cephalosporin treatment or 2 treatments. Study results showed that postpartum cows affected by PVD or ENDO did benefit from a second cephalosporin treatment by having a greater pregnancy risk at first insemination than cows treated only once.  
<https://doi.org/10.3168/jds.2020-19537>.

**Short communication: Association between the accessory gene regulator (*agr*) group and the severity of bovine mastitis caused by *Staphylococcus aureus*.** By Rossi et al., page 3564. *Staphylococcus aureus* causes different symptoms in bovine mastitis. We compared the prevalence of different capsular and accessory gene regulator (*agr*) types among isolates from mild and moderate clinical and subclinical mastitis cases. Isolates presenting the *agrI* gene and lacking the *agr* locus (*agr*–) were more prevalent among subclinical cases, whereas isolates containing the *agrII* and *agrIII* genes were more frequent among clinical cases. The capsular types were not associated with a specific type of mastitis. This strong association between *agr* type and type of mastitis demonstrates that the knowledge of *Staphylococcus aureus* genetic profiles can be used as a tool to control this disease.  
<https://doi.org/10.3168/jds.2020-19275>.

**Technical note: Development of a closed-tube isothermal multiple self-matching-initiated amplification assay for visual detection of *Staphylococcus aureus* in milk samples.** By Chen et al., page 3569. *Staphylococcus aureus* is a pathogen that causes severe disease in animals. It is associated with bovine mastitis and causes important losses for the dairy industry because it leads to a decline in milk quality and milk yield. Rapid and sensitive identification of *Staph. aureus* is an urgent need. In the present study, we developed and evaluated a novel closed isothermal amplification method for confirming the presence of *Staph. aureus* in milk samples using a reliable, sensitive visual tool.  
<https://doi.org/10.3168/jds.2020-19023>.

**Milk supplemented with dried seaweed affects the systemic innate immune response in preweaning dairy calves.** By Samarasinghe et al., page 3575. Preweaned calves have an immature immune system at birth that makes them vulnerable to infectious diseases, especially after the first week of life as colostrum-derived immune components in blood decrease rapidly. Enhancing calf immune status can have beneficial effects on performance, health, and welfare. This study investigated the effect of feeding milk supplemented with seaweeds (i.e., *Ulva lactuca*, *Ascophyllum nodosum*, and *Saccharina latissima*) on blood immune variables in preweaned calves. Milk supplemented with seaweeds increased the blood concentration of innate immune variables (i.e., fibrinogen, serum amyloid A, and haptoglobin) in preweaned calves.  
<https://doi.org/10.3168/jds.2020-19528>.

**Timing of artificial insemination using fresh or frozen semen after automated activity monitoring of estrus in lactating dairy cows.** By Tippenhauer et al., page 3585. This observational experiment was conducted to determine the association between the interval from different characteristics of an estrus event (i.e., onset, peak, and end) detected by an automated activity monitor and timing of artificial insemination (AI) on pregnancy per AI. Lactating Holstein cows were fitted with a neck-mounted automated activity monitor, and optimum timing of AI was assessed for either fresh or frozen semen. Cows inseminated from 7 to 24 h after onset of estrus or from 1 to 18 h after peak of estrus showed greatest pregnancy per AI irrespective of type of semen.  
<https://doi.org/10.3168/jds.2020-19278>.

**Relationships between metabolic profiles and gene expression in liver and leukocytes of dairy cows in early lactation.** By Wathes et al., page 3596. Many dairy cows suffer metabolic imbalance in early lactation, which predisposes them to infectious disease. Analysis of hepatic gene expression confirms



that mobilization of body fat to meet the energy deficit at this time causes liver dysregulation in imbalanced cows. This is accompanied by gene expression patterns in circulating leukocytes indicative of an endoplasmic reticulum stress response and reduced cell division, contributing to immune dysfunction. This helps to explain underlying mechanisms that make some recently calved cows more susceptible to infection.

<https://doi.org/10.3168/jds.2020-19165>.

**Metabolic and hormonal control of energy utilization and partitioning from early to mid lactation in Sarda ewes and Saanen goats.** *By Lunesu et al., page 3617.* The metabolic and hormonal mechanisms that might differentiate nutrient partitioning during the lactation of dairy sheep and goats were studied. A simultaneous comparison between the 2 species showed that, throughout the lactation period studied, the Saanen goats had a hormonal status (high growth hormone and low insulin concentration) that favored milk production, whereas the Sarda ewes had a hormonal status more prone to favor body reserve accumulation. This was particularly clear in mid lactation, when high-starch and low-starch diets were compared in both species.

<https://doi.org/10.3168/jds.2020-19462>.

**Prewaning to postweaning rumen papillae structural growth, ruminal fermentation characteristics, and acute-phase proteins in calves.** *By van Niekerk et al., page 3632.* This study investigated ruminal structural development, ruminal pH, short-chain fatty acids, and serum acute-phase protein concentrations preweaning to postweaning in calves fed up to 1.4 kg/d of milk replacer, using 6 ruminally cannulated bull calves. Before weaning, calves experienced ruminal acidosis even though calf starter intake was low during this time. During the postweaning period, calves also experienced ruminal acidosis, which might have been due to a delay in rumen development. Based on papillae structure and lack of inflammatory response, prolonged pH depression likely did not affect rumen epithelial barrier integrity.

<https://doi.org/10.3168/jds.2020-19003>.

**Glucose metabolism and the somatotropic axis in dairy cows after abomasal infusion of essential fatty acids together with conjugated linoleic acid during late gestation and early lactation.** *By Vogel et al., page 3646.* The study tested the effects of conjugated linoleic acid (CLA) and essential fatty acid (EFA) infusion on glucose metabolism and the somatotropic axis in dairy cows around calving. Supplementation with CLA and the combination of CLA with EFA resulted in elevated plasma glucose but decreased glucose production and stimulation of the somatotropic axis after calving. Treatment with EFA

enhances glucose production but inhibits hepatic messenger RNA abundance related to gluconeogenesis.  
<https://doi.org/10.3168/jds.2020-19321>.

**Association between days open and milk spectral data in dairy cows.** *By Toledo-Alvarado et al., page 3665.* We inferred the association of absorbances of wavenumbers within the mid-infrared spectrum, both individually and jointly, and of milk components with days open in dairy cows. Various wavenumbers within spectral regions ranging from 3,048 to 1,701  $\text{cm}^{-1}$  and from 1,582 to 925  $\text{cm}^{-1}$  were found to be important predictors of days open. Data from milk samples taken during the period between 31 and 90 d in milk were the most significant in relation to days open as the high variability in milk composition during this period is likely associated with fertility.

<https://doi.org/10.3168/jds.2020-19031>.

**Dynamics of lipid droplets in the endometrium and fatty acids and oxylipins in the uterine lumen, blood, and milk of lactating cows during diestrus.** *By King et al., page 3676.* Abundance of endometrial lipid droplets and abundance and composition of fatty acids and oxylipins in uterine fluid, blood plasma, and milk were evaluated on d 5 (early diestrus), 10 (mid diestrus), and 15 (late diestrus) of the estrous cycle. The abundance of lipid droplets increased gradually from d 5 to 10 to 15. Concentrations of fatty acids and oxylipins in uterine flushing were greater at late diestrus. These differences were not observed in blood and milk, suggesting an independent mechanism of lipid accumulation in the uterus. Moreover, temporal changes in the profile of individual fatty acids and oxylipins in uterine fluid were characterized.

<https://doi.org/10.3168/jds.2020-19196>.

**Effects of a dietary supplement enriched in palmitoleic acid on fatty acid composition of follicular fluid, granulosa cell metabolism, and oocyte developmental capacity in early lactation dairy cows.** *By Plante-Dubé et al., page 3693.* This study examined the incorporation of dietary palmitoleic acid in plasma and follicular fluid lipid classes as well as the influence of follicular fluid fatty acid composition on reproductive indicators in early-lactation dairy cows. A lipid supplement enriched in palmitoleic acid, compared with palmitic acid, increased palmitoleic acid concentration in plasma esterified lipid classes and in follicular fluid phospholipids and cholesterol esters. Results from the current study suggest that the limited modifications in the fatty acid composition of the oocyte microenvironment via dietary lipid supplements enriched in specific fatty acids do not have a major effect on granulosa cell metabolism and oocyte developmental capacity in early-lactation cows.

<https://doi.org/10.3168/jds.2020-19191>.

**Heifers with positive genetic merit for fertility traits reach puberty earlier and have a greater pregnancy rate than heifers with negative genetic merit for fertility traits.** *By Meier et al., page 3707.* The inclusion of fertility traits in dairy cow breeding objectives has increased both genetic merit for fertility and phenotypic reproductive performance. However, these traits seldom include measurement before first calving. We compared the onset of puberty and reproductive performance in heifers with positive or negative genetic merit for fertility traits. There were small effects on heifer body weight gain; heifers with negative genetic merit for fertility traits were heavier. However, the heifers with a positive genetic merit for fertility traits reached puberty earlier and at a lighter body weight. They also had superior pregnancy outcomes. Our results indicate that heifer puberty and pregnancy rates are affected by genetic merit for fertility traits, and these may be useful phenotypes for genetic selection.  
<https://doi.org/10.3168/jds.2020-19155>.

**An improved method for specific-target preamplification PCR analysis of single blastocysts useful for embryo sexing and high-throughput gene expression analysis.** *By Xiao et al., page 3722.* A method is described for measurement of expression of specific genes from individual blastocysts based on specific preamplification of cDNA before polymerase chain reaction (PCR). The procedure can be used for embryo sexing and can be incorporated into a high-throughput, quantitative real-time PCR method using the  $96 \times 96$  integrated fluidic circuit in the Biomark microfluidic platform (Fluidigm, South San Francisco, CA). This

method for single-blastocyst gene expression analysis provides an improved and useful option for assessing gene expression of hundreds of genes of interest.  
<https://doi.org/10.3168/jds.2020-19497>.

**Evaluation of the RumiWatch system as a benchmark to monitor feeding and locomotion behaviors of grazing dairy cows.** *By Pereira et al., page 3736.* Animal behavior technologies may monitor animal feeding, health, and estrus behaviors, and some technologies have been validated by visual observation for use by dairy farmers. Visual observation can be time consuming, and variability exists between observers. The RumiWatch system (Itin and Hoch GmbH, Liestal, Switzerland), an animal behavior technology that comprises a noseband sensor and pedometer to monitor feeding and locomotion behaviors of cows, had high accuracy for rumination, grazing, standing, and lying compared with visual observations. The results of this study suggest that the RumiWatch system may be used as a benchmark instead of visual observation for feeding and locomotion behaviors.  
<https://doi.org/10.3168/jds.2020-18952>.

**Graduate Student Literature Review: The effect of chain length and stall width on common outcome measures of dairy cow welfare in stall-based housing systems.** *By Boyer and Vasseur, page 3751.* Stall-based systems are common housing systems, and they have a considerable effect on the space granted to the cows for resting and moving. We reviewed the literature to determine how chain length and stall width affect common indicators of cow welfare.  
<https://doi.org/10.3168/jds.2020-19279>.