Invited review: Unknown-parent groups and metafounders in single-step genomic BLUP. By Masuda et al., page 923. Pedigrees are often incomplete in dairy cattle. Missing pedigrees are a source of bias and inaccuracy in genomic predictions when combining phenotypes, pedigrees, and genotypes. Pseudo individuals, so-called unknown-parent groups, are assigned to missing parents to remove bias. However, it is unclear how unknown-parent groups should work in genomic models. We discuss possible statistical models for unknown-parent groups, their effect on genomic predictions, and the relevance of an alternative metafounder model. This review helps readers choose the most appropriate model to obtain less biased genomic predictions when some parents are unknown. https://doi.org/10.3168/jds.2021-20293.

Dynamic in vitro gastric digestion behavior of goat milk: Effects of homogenization and heat treatments. By Li et al., page 965. This study investigated the effects of homogenization and 2 heat treatments on the dynamic gastric digestion behavior of goat milk. The results further our understanding of the effects of processing on the digestion of goat milk and provide new perspectives in controlling the digestive dynamics of goat milk. https://doi.org/10.3168/jds.2021-20980.

Chemical interactions among caseins during rennet coagulation of milk. By Amaro-Hernández et al., page 981. The roles played by different types of chemical bonds on the development of the proteinaceous structure during curd curing are not well understood. The aim of this research was to determine the effect of pH and temperature on the relative proportions of chemical bonds found in curd after gel setting. Although pH defined the nature of the interactions established among proteins in curd (i.e., disulfide, hydrophobic, electrostatic, hydrogen, or calcium bridges), temperature modified the rate at which such bonds were formed. https://doi.org/10.3168/jds.2021-21071.

Kinetics of pepsin-induced hydrolysis and the coagulation of milk proteins. By Yang et al., page 990. We examined the effects of enzyme concentration and pH on the kinetics of pepsin-induced hydrolysis of κ-casein and the resultant kinetics of casein micelle coagulation. This information provides a better understanding of milk casein digestion under human gastric conditions. https://doi.org/10.3168/jds.2021-21177.

Species identification of ruminant milk by genotyping of the κ-casein gene. By Vafin et al., page 1004. Authenticity of various milk products is determined by the origin of their raw material. Therefore, detecting the partial substitution of milk of the declared type in a product is important to prevent counterfeiting. The method developed for species identification of milk and dairy products from agricultural ruminant animals by the κ-casein gene includes sample preparation of samples under research, nucleic acid extraction, combined PCR-restriction fragment length polymorphism technique, detection by horizontal electrophoresis in agarose gel, and analysis, including using the designed mathematical algorithms and software. https://doi.org/10.3168/jds.2020-19931.

Identification of rare genetic variants of the αS-caseins in milk from native Norwegian dairy breeds and comparison of protein composition with milk from high-yielding Norwegian Red cows. By Roin et al., page 1014. Milk protein composition is affected by the inherent genetic variation. Milk from native breeds is of particular interest from a conservation perspective and may possess unique compositions. This study compares the protein composition in milk from 6 native Norwegian breeds with milk from high-yielding Norwegian Red cows. The study identifies common and rare genetic variants of the major milk proteins, where especially variants of αS1- and αS2-caseins have not previously been identified in these native breeds. In addition, the genetic variation in the major milk proteins is also reflected in differences in milk protein composition, which may be important for technological properties related to the production of dairy products (e.g., in cheese making). https://doi.org/10.3168/jds.2021-20455.

Evaluation of allergenicity of cow milk treated with enzymatic hydrolysis through a mouse model of allergy. By Liang et al., page 1039. Food allergy is a growing health concern worldwide, and cow milk is one of the chief food allergens, especially for children, that induces severe allergic reactions. In recent years, several studies have attempted to explore possible processing methods to reduce the potential allergenicity of food. Thus, the potential allergenicity of enzymatically hydrolyzed cow milk has been assessed in vitro and in vivo. Our work is expected to reduce or eliminate the potential allergenicity of cow milk, aid the development of cow milk products for infants and children, and provide a theoretical foundation for future research in this field. https://doi.org/10.3168/jds.2021-20686.

Can ozone be used as antimicrobial in the dairy industry? A systematic review. By Afonso et al., page 1051. Ozone is a powerful antimicrobial, and this
systematic review describes its use and effectiveness in dairy products. Milk and dairy products can contain many microorganisms, including pathogens that if consumed can cause food illnesses. This is why it is necessary to adopt certain techniques, such as ozone treatment, to improve the microbiological quality of the product to be consumed and to avoid any health harm. Studies of microbiological analysis were evaluated, leading to 9 final articles that showed promising results, but more studies in the field are needed. https://doi.org/10.3168/jds.2021-20900.

Analysis of the complete genome sequence of Lactobacillus delbrueckii ssp. bulgaricus with post-acidification capacity and its influence on yogurt in storage. By Yue et al., page 1058. Lactobacillus is recognized as a safe microorganism that can regulate intestinal microflora and promote intestinal digestion. Lactobacillus delbrueckii ssp. bulgaricus has strong acid resistance and acid production capacity, and it is the dominant bacteria in the fermentation of milk. In this study, we performed complete genome sequencing of L. bulgaricus KLDS1.0207 and KLDS1.1011. Comparative genomics analysis was performed on key genes related to acid production and specific genes of L. bulgaricus KLDS1.0207 and L. bulgaricus KLDS1.1011 during storage. The effect of weakly post-acidified L. bulgaricus on the quality of fermentation milk during storage provides a theoretical basis for the development of yogurt starter. https://doi.org/10.3168/jds.2021-20999.

Production and storage stability of concentrated micellar casein. By Hammam et al., page 1084. Concentrated micellar casein is a high-protein liquid ingredient, with >22% protein and >25% solids. Concentrated micellar casein can be produced using ceramic microfiltration membranes. In concentrated form, micellar casein can be stored for an extended period, which would eliminate the need for drying this ingredient. Thus, the shelf life of concentrated micellar casein is an important characteristic that needs to be determined. This study evaluated the chemical and microbial changes in concentrated micellar casein during storage for 60 d at 4°C. This study concluded that concentrated micellar casein can be produced using graded permeability microfiltration ceramic membranes and stored for up to 60 d at 4°C with no significant changes in its characteristics. https://doi.org/10.3168/jds.2021-21200.

Assessment of dietary protein supplementation on milk productivity of commercial organic dairy farms during the grazing season. By Ayers et al., page 1099. Maintaining milk production on organic dairies in the northeastern United States can be a challenge during the summer grazing period due to changes in the botanical and nutritive profile of the pasture. This trial explored manipulation of the dietary supplement profile, in particular the crude protein content, to determine whether crude protein may limit milk productivity during the summer grazing period. Comparing milk productivity from 3 farms that continued to use their typical supplement with that of 3 farms that fed a supplement containing higher crude protein levels revealed that manipulation of the supplement profile supported milk production throughout the 6-wk experiment. Further exploration of the effects of specific diet crude protein fractions—for example, rumen undegradable protein and soluble protein—is needed. https://doi.org/10.3168/jds.2021-20355.

Milk feeding level and starter protein content: Effects on growth performance, blood metabolites, and urinary purine derivatives of Holstein dairy calves. By Kazemi-Bonchenari et al., page 1115. We conducted a 2 × 2 factorial study using 52 female Holstein dairy calves to investigate the effects of moderate versus high milk feeding level and starter protein content (18 vs. 23%) on growth performance and urinary excretion of purine derivatives. Experimental diets were (1) moderate milk and 18% crude protein; (2) moderate milk and 23% crude protein; (3) high milk and 18% crude protein; and (4) high milk and 23% crude protein. The greatest withers and hip heights were found in calves fed high milk and 23% crude protein; however, the greatest estimated microbial growth was found in calves fed moderate milk and 23% crude protein. https://doi.org/10.3168/jds.2021-21208.

Effect of stage of lactation and dietary starch content on endocrine-metabolic status, blood amino acid concentrations, milk yield, and composition in Holstein dairy cows. By Piccioli-Cappelli et al., page 1131. Rate of carbohydrate fermentability at different stages of lactation may affect the concentration of amino acids in blood of dairy cows. The present study revealed that such changes have no effect on milk yield and milk protein output, partly due to adaptations in hormonal (insulin, somatotropin) and metabolite profiles and the ability of the mammary gland to extract amino acids from blood. Our results underscore the potential for tailored diet formulation to increase the efficiency of nitrogen use and reduce nitrogen excretion in intensive dairy production systems. https://doi.org/10.3168/jds.2021-20539.

Effects of milk replacer feeding rate and frequency of preweaning dairy calves in the southeastern United States: Performance, abomasal emptying, and nutrient digestibility. By Orellana Rivas et al., page 1150. We examined effects of milk replacer feeding rate and frequency on performance
and abomasal emptying of dairy calves during summer and winter. Increasing milk replacer allowance from 0.65 to 0.76 kg of dry matter per day improved growth in both seasons but delayed abomasal emptying only in the summer. Increasing milk replacer feeding frequency from 2 to 3 times per day accelerated abomasal emptying in both seasons but improved growth only in winter. These data suggest that heat stress results in delayed abomasal emptying. Feeding milk replacer more often accelerated abomasal emptying but did not affect growth in summer.

https://doi.org/10.3168/jds.2021-20287.

Effect of milk replacer feeding rate and frequency of preweaning dairy calves in the southeastern United States: Glucose metabolism. By Orellana Rivas et al., page 1170. Effects of milk replacer (MR) feeding rate and frequency on glucose metabolism of dairy calves during summer and winter were examined. Increasing MR feeding rate from 0.65 to 0.76 kg of dry matter/day had no effect on glucose or insulin metabolism in both seasons. However, increasing MR feeding frequency from 2 to 3 times a day reduced insulin secretion and improved peripheral tissue insulin response before weaning in both summer and winter. These data suggest that MR feeding frequency significantly affects glucose metabolism in the calf, which, however, did not seem to affect body growth.

https://doi.org/10.3168/jds.2021-20288.

Early step-down weaning of dairy calves from a high milk volume with glutamine supplementation. By Wickramasinghe et al., page 1186. A step-down weaning scheme was tested with or without a glutamine supplement (Gln) for calves fed 9.0 kg/d of milk. The Gln improved calf starter intake and helped maintain gut barrier function during weaning when it was initiated at 35 d of age. The calves with Gln were weaned completely at 51 d, 9 d earlier than calves beginning weaning at 49 d without Gln. Both groups achieved similar body weight at 10 and 20 wk. Incorporating Gln to weaning schemes could help achieve a smooth weaning from high milk volumes without compromising postweaning growth.

https://doi.org/10.3168/jds.2021-21009.

Metabolic and blood acid-base responses to prepartum dietary cation-anion difference and calcium content in transition dairy cows. By Zhang et al., page 1199. Homeostasis of Ca in dairy cows plays a vital role in periparturient metabolic adaptation. This research determined acid-base status, blood gases, and blood metabolites of cows fed diets with different dietary cation-anion difference (DCAD) and Ca contents. A negative DCAD diet with low or high dietary Ca changed acid-base balance and induced compensated metabolic acidosis. On the basis of improved protein and lipid metabolism, high Ca supply in a negative DCAD diet was more favorable to the metabolic adaptation to lactation in dairy cows than low Ca in a negative DCAD diet.

https://doi.org/10.3168/jds.2021-21191.

Evaluating the effects of high-oil rapeseed cake or natural additives on methane emissions and performance of dairy cows. By Bayat et al., page 1211. Methane emissions from agriculture originate mostly from enteric fermentation and manure management. Several nutritional strategies have been shown to mitigate enteric methane production from dairy cows. Potential effects of high-oil rapeseed cake and 2 natural additives on performance and methane emissions of dairy cows were evaluated. Combinations of yeast hydrolysate and a resin acid-based compound or garlic-citrus extract and essential oil supplementation did not influence ruminal fermentation, nutrient utilization, and milk production, whereas yeast hydrolysate and the resin acid-based compound improved nitrogen balance. Rapseed cake, but not natural additives, decreased enteric methane emissions and improved performance and milk fatty acid composition among dairy cows.

https://doi.org/10.3168/jds.2021-20537.

Influence of environmental factors and parity on milk yield dynamics in barn-housed dairy cattle. By Maruno et al., page 1225. Extreme weather events such as high ambient temperatures in summers are expected as a result of climate change in European countries. We investigated the effects of weather on milk production and particularly the dynamics of the lactation curve in Scottish lactating dairy cows. This study demonstrates that increases in a 2-day-lagged minimum temperature (both indoor and outdoor) negatively affected the average milk yield depending on the parity group (primiparous vs multiparous cows). Primiparous cows were more affected than multiparous cows, but the effect size was small. However, the findings of this study revealed that prolonged high temperatures over a few days were more important than short-term (temporary) high temperatures over 1 or 2 days.

https://doi.org/10.3168/jds.2021-20698.

Survey on the disposal of waste milk containing antimicrobial residues on Swiss dairy farms. By Bernier Gosselin et al., page 1242. We investigated practices surrounding the disposal of waste milk containing antimicrobial residues on Swiss dairy farms. Waste milk is most commonly discarded in the manure pit or is fed to calves. Herd factors associated with the practice of feeding waste milk to calves include nonorganic production, region, herd average somatic cell count, and average cow milk yield. Furthermore, criteria affecting...
this practice include time elapsed after treatment, type of drug received by the cow, administration route, and calves’ age.

https://doi.org/10.3168/jds.2021-20948.

**Birth conditions affect the longevity of Holstein offspring.** By Dallago et al., page 1255. Studies of dairy cow longevity usually focus on the animal’s life after first calving, overlooking the early life stage and its effect on longevity. To overcome this limitation, prerecorded data that were routinely collected from commercial herds were used to evaluate the effect of birth conditions on offspring longevity by using a machine-learning algorithm. Our results indicated the existence of a long-term effect of birth conditions on the ability of the offspring to remain in the herd and provided insights to support farmers in the optimization of replacement and culling strategies.

https://doi.org/10.3168/jds.2021-20214.

**Preferences of European dairy stakeholders in breeding for resilient and efficient cattle: A best-worst scaling approach.** By Burns et al., page 1265. Deviations in dairy cow performance relative to weather variables are well known. As the climate continues to change, it may become increasingly important to mitigate deviations at the animal level by promoting resilience. Resilience can be introduced at the animal level through genetic selection with breeding objectives. However, the resilience value of traits is difficult to measure with conventional approaches; it is long-term and dependent on uncertain climate projections. Here, we used a novel application of a discrete choice experiment that asked stakeholders of European dairy systems how the value of trait improvements changes if the production objective is either efficiency or resilience.

https://doi.org/10.3168/jds.2021-20316.

**Mating allocations in Nordic Red Dairy Cattle using genomic information.** By Bengtsson et al., page 1281. We optimized matings within herds, considering genetic level, semen cost, the economic impact of recessive genetic defects, and genetic relationships. We found that it was possible to reduce relationships between parents with minimal effect on genetic level. Including the cost of known recessive genetic defects eliminated the expression of genetic defects. It was possible to reduce genomic relationships between parents with pedigree measures, but it was best done with genomic measures.

https://doi.org/10.3168/jds.2021-20849.

**Genome-wide association study using haplotype libraries and a repeated-measures model to identify candidate genomic regions for stillbirth in Holstein cattle.** By Fonseca et al., page 1314. In this study, we performed a genome-wide association study using haplotype libraries to identify genomic regions associated with stillbirth events in Holstein cows. A statistical model accounting for repeated birth records was applied to better address the different outcomes observed across pregnancies. Functional candidate genes associated with fertility, pre-embryonic development, and early life losses were identified within or close to (in a 200-kb interval) the haplotypes significantly associated with stillbirth events. The results obtained here help to better understand the genetic basis of stillbirth in dairy cattle and may be useful for prediction of stillbirth, helping to reduce the related economic losses in the dairy industry caused by this phenotype.

https://doi.org/10.3168/jds.2021-20936.

**Signatures of selection reveal candidate genes involved in production traits in Chinese crossbred buffaloes.** By Deng et al., page 1327. Identification of selection signature is important for a better understanding of genetic mechanisms that affect milk production traits in buffaloes. Here, 31 candidate selection regions were identified in the Chinese crossbred population using 3 complementary statistical methods (integrated haplotype score, cross population extended haplotype homozygosity, and composite likelihood ratio). Within these candidate regions, 25 genes were under putative selection. Several candidate genes were found to be associated with production traits. In addition, we identified 13 selection regions that overlapped with bovine quantitative trait loci that were mainly involved in milk production and composition traits. These results can provide useful insights regarding the selection response for production traits of Chinese crossbred buffaloes, as identified candidate genes influence production performance.

https://doi.org/10.3168/jds.2021-21102.

**Inheritance of a mutation causing neuropathy with splayed forelimbs in Jersey cattle.** By Al-Khudhair et al., page 1338. A new recessive genetic condition, neuropathy with splayed forelimbs (JNS), has been identified in Jerseys. Calves with JNS are alert at birth but unable to stand, exhibiting neurologic symptoms that include head and neck spasticity and convulsive behavior as well as dislocated shoulders, congenital craniofacial anomalies, and degenerative myelopathy. Pedigree analysis of 16 affected calves identified a common ancestor born in 1995. A haplotype associated with JNS was found on chromosome 6; a missense variant in *UCHL1* is believed to be causal. About 6% of genotyped Jerseys in the United States are carriers. Properly applied mating programs to prevent breeding carrier animals could prevent the birth of potentially ~2,200 affected calves annually.

https://doi.org/10.3168/jds.2021-20600.
Are subjectively scored linear type traits suitable predictors of the genetic merit for feed intake in grazing Holstein-Friesian dairy cows? By Williams et al., page 1346. Measuring feed intake in grazing dairy cows using currently available techniques is invasive, time consuming, and expensive. An alternative to directly measuring feed intake for use in genetic evaluations is to use correlated animal features. In the present study, we show that, although several linear type traits were genetically correlated with feed intake, upon validation with genetic evaluations, linear type traits were not good predictors of feed intake.

https://doi.org/10.3168/jds.2021-20922.

Genome-wide association study for methane emission traits in Danish Holstein cattle. By Manzanilla-Pech et al., page 1357. There are many methane phenotypes at present, but consensus is lacking on which trait definition is the most useful for breeding purposes. Before selecting for lower methane emitting cows, an understanding of the genetic background of these traits is needed. We assembled a large reference population of 2,000 cows and found genomic regions and quantitative trait loci associated with different methane phenotypes. Importantly, there were few shared regions between different phenotypes. This study forms a basis for comparison for future studies and demonstrates the importance of methane trait definitions.

https://doi.org/10.3168/jds.2021-20410.

The influence of personality and weaning method on early feeding behavior and growth of Norwegian Red calves. By Whalin et al., page 1369. This study aimed to determine how personality traits, particularly sociability, and gradual weaning methods (by age or concentrate intake) are associated with feeding behavior and growth in Norwegian Red calves. Calves that were more “playful/exploratory” during 4 personality tests consumed more milk and concentrates, whereas sociability traits (“vocal/active” and “interactive in group test”) were associated with lower feed intakes. These associations of personality traits with feeding behavior did not depend on weaning method. However, weaning by concentrate intake may be a strategy to manage differences in feeding behavior and ensure calves are consuming recommended amounts of concentrate before weaning.

https://doi.org/10.3168/jds.2021-20871.

Selective dry cow therapy effect on milk yield and somatic cell count: A retrospective cohort study. By Niemi et al., page 1387. Control of antibiotic resistance means optimizing all antibiotic use, including antibiotic dry cow therapy (aDCT) at the end of lactation. Our epidemiologic study compared milk yield and the udder health indicator somatic cell count between selectively aDCT-treated and untreated cows. Findings indicated that, for a cow likely to have intramammary infection, a missed aDCT treatment undesirably affects subsequent lactation milk yield and somatic cell count. This highlights the significance of accurate selection of cows to be treated.

https://doi.org/10.3168/jds.2021-20918.

Reducing milking frequency from twice to once daily as an adjunct treatment for ketosis in lactating dairy cows—A randomized controlled trial. By Williamson et al., page 1402. Virtually all treatments for ketosis in dairy cows focus on providing ketotic cows with supplemental energy but, at best, resolve ketosis in only half of the affected animals. Current research has shown that milking cows once a day can improve energy balance in healthy cows in early lactation, but reducing energy output had not been examined as a possible treatment for ketosis. We found that reducing milking frequency in cows with ketosis from twice to once a day for 2 wk improved resolution of ketosis but reduced milk yield over 4 months.

https://doi.org/10.3168/jds.2021-20551.

Cow- and herd-level risk factors for lameness in partly housed pasture-based dairy cows. By Browne et al., page 1418. This large-scale study identified potential risk factors for lameness by analyzing data gathered during both the grazing and housing periods, on cow-level variables, infrastructure characteristics, and management practices, on 99 spring-calving, pasture-based dairy farms. Cow age, predicted transmitting ability for lameness, farmers’ perception of hoof health on the farm, and a variety of infrastructure measurements and management practices were associated with risk of lameness. These results identified associations between potential risk factors and lameness, providing a focal point for future intervention studies.

https://doi.org/10.3168/jds.2021-20767.

Calf and dam characteristics and calf transport age affect immunoglobulin titers and hematological parameters of veal calves. By Marcato et al., page 1432. In the Netherlands, calves purchased for veal production are usually transported at a minimum age of 14 days to a veal farm. This age coincides with a decreasing passive immunity and the absence of a mature adaptive immune system of the calf. As a consequence, health of calves may be compromised at the veal farm. This study investigated effects of different transport ages (14 vs. 28 d) on immunoglobulin titers and hematological parameters of veal calves. Results suggested that calves transported at 28 d had a more advanced adaptive immunity than calves transported at 14 d of age.

https://doi.org/10.3168/jds.2021-20636.
Effects of transport age and calf and maternal characteristics on health and performance of veal calves. By Marcato et al., page 1452. Age at first transport from the dairy farm of origin to a veal farm may be an important determinant of the biological state of a calf at arrival, and may affect subsequent health and performance of calves at the veal farm. The current study investigated effects of transport age (14 vs. 28 d) on health and performance of veal calves. Calves transported at 28 d of age had a lower probability of individual treatments with medicines other than antibiotics (e.g., anti-inflammatories, multivitamins, and anti-coccidial drugs), a lower mortality risk, and a higher carcass weight than calves transported at 14 d of age.

https://doi.org/10.3168/jds.2021-20637.

Effects of feeding Saccharomyces cerevisiae fermentation products on the health of Holstein dairy calves following a lipopolysaccharide challenge. By Klopp et al., page 1469. Feeding Saccharomyces cerevisiae fermentation products (SCFP) to dairy calves in milk replacer and calf starter altered their immune system response following a lipopolysaccharide (LPS) challenge. Circulating concentrations of tumor necrosis factor (TNF-α) were increased for 1.5 h after dosing with LPS in calves fed SCFP compared with control, and glucose concentrations were increased at 0.5 h after dosing in calves fed SCFP compared with control. Calves supplemented with SCFP also showed an increase in respiration rate just after dosing and reduced feed intake the day of the challenge. The increases in TNF-α, glucose, and respiration rate after dosing with LPS suggest that calves supplemented with SCFP exhibit an increased acute immune response.

https://doi.org/10.3168/jds.2021-20341.

Views of Western Canadian dairy producers on calf rearing: An interview-based study. By Russell et al., page 1480. We interviewed dairy producers, asking them to describe their views on calf rearing, including weaning. Calf rearing practices varied widely, likely reflecting differences in views among producers. Producers described a reliance on calf-based measures to assess the success of their rearing methods, and described how management and personal experiences, environmental factors, and external farm support influenced rearing practices.

https://doi.org/10.3168/jds.2021-21116.

Molecular epidemiology and antimicrobial resistance profiles of Salmonella isolates from dairy heifer calves and adult lactating cows in a Mediterranean pasture-based system of Australia. By Aleri et al., page 1493. The study showed shedding of Salmonella (an important foodborne bacteria) by young and adult dairy cows in the southwest region of Western Australia. The level of resistance to tested antimicrobials was low, with Salmonella isolates being resistant to ceftoxitin, chloramphenicol, and streptomycin.

https://doi.org/10.3168/jds.2021-21084.

A survey of mastitis pathogens including antimicrobial susceptibility in southeastern Australian dairy herds. By Dyson et al., page 1504. Samples were collected from cows with clinical and subclinical mastitis from 65 dairy farms in Australia between January 2011 and March 2012. Excluding contaminated samples, the most common isolates were Streptococcus uberis, which were isolated from 39.2% of clinical mastitis samples, whereas Staphylococcus aureus was isolated from 29.1% of subclinical mastitis samples. When assayed using a disk diffusion assay and applying Clinical and Laboratory Standards Institute interpretive criteria, most of these bacterial isolates, from both clinical and subclinical samples, were susceptible to the antimicrobials used for mastitis control in Australia.

https://doi.org/10.3168/jds.2021-20955.

Reduced liner-open phase and vacuum instead of prestimulation increase parlor efficiency in dairy cows. By Tuor et al., page 1533. Milking performance and parlor efficiency were investigated in 4 different milking routines. Manual prestimulation for 15 s followed by a 1-min latency period before cluster attachment resulted in adequate milking performance but prolonged parlor occupancy time compared with immediate cluster attachment after a 5-s teat cleaning but reduced liner-open phase and vacuum until milk flow reached 400 g/min. However, a 5-s teat cleaning did not represent an adequate prestimulation if followed by a 1-min latency period before cluster attachment and milking at immediately regular pulsation and vacuum settings.

https://doi.org/10.3168/jds.2021-21170.

Feeding an acetate-based oral electrolyte reduces the ex vivo Escherichia coli growth potential in the abomasum of calves fed oral electrolytes alone or 30 minutes following a milk feeding compared with feeding a bicarbonate-based oral electrolyte. By Kasi et al., page 1542. Feeding oral electrolytes increases the pH of the abomasum and may increase Escherichia coli growth in abomasal contents. Feeding a sodium acetate-based oral electrolyte solution limited the increase in abomasal pH and ability of E. coli to grow in abomasal contents, regardless of whether the calves were fed oral electrolytes alone or 30 min after a milk feeding. Therefore, these data support that sodium acetate-based oral electrolytes may be preferred to sodium bicarbonate-based electrolytes, especially when fed shortly after a milk meal.

https://doi.org/10.3168/jds.2021-20939.
Characterizing the literature surrounding transportation of young dairy calves: A scoping review. By Goetz et al., page 1555. Transportation is a stressful event for animals, and many variables contribute to the effect of transportation on calf performance and welfare. There has been no formal synthesis of studies evaluating the transportation of calves despite its common occurrence. The aim of this scoping review was to characterize the literature surrounding the transportation of young calves. Time in transit and changes to blood parameters were the most common risk factors and outcome measures studied, respectively. There is a need to better understand methods to mitigate the stress of transportation.
https://doi.org/10.3168/jds.2021-21211.

Randomized clinical trial to evaluate the effects of a prepartum cholecalciferol injection on postpartum serum calcium dynamics and health and performance in early-lactation multiparous dairy cows. By Venjakob et al., page 1573. The objective of the present study was to evaluate the effects of prepartum cholecalciferol treatment on mineral metabolism, milk production, and reproductive performance. Although treatment led to a considerable increase in serum Ca in the first 10 d after parturition, injection of $12 \times 10^6$ IU of cholecalciferol had a negative effect on inflammatory response, milk production in early lactation, and ultimately on reproductive performance. https://doi.org/10.3168/jds.2021-20584.

Management-related factors in dry cows and their associations with colostrum quantity and quality on a large commercial dairy farm. By Borchardt et al., page 1589. The objective of this study was to evaluate the association of management-related factors in dry cows and their associations with colostrum quantity and quality on a large commercial Holstein dairy farm over the course of 3 yr. We found a clear seasonal pattern for colostrum quantity that might be associated with photoperiod length. Length of exposure to a far-off and a close-up diet played a minor role in colostrum production in multiparous cows. https://doi.org/10.3168/jds.2021-20671.

Single-dose meloxicam treatment improves standing ability of low-vitality dairy calves. By Kovács et al., page 1618. We tested the effect of meloxicam on parameters of lying behavior in dairy calves with low and normal vitality. The latency and the first attempt to stand were not influenced by nonsteroidal antiinflammatory drug (NSAID) treatment; however, the time spent standing, the longest standing bout, and the average duration of standing indicated increased standing ability of meloxicam-treated calves with low vitality, but not in normal-vitality calves. It seems that low-vitality calves benefit more from the administration of a single dose of meloxicam than calves with normal vitality. Sensory measurement of lying behavior might be useful to evaluate the efficiency of NSAID protocols. https://doi.org/10.3168/jds.2021-20704.

Distinct behavior of bovine-associated staphylococci species in their ability to resist phagocytosis and trigger respiratory burst activity by blood and milk polymorphonuclear leukocytes in dairy cows. By Souza et al., page 1625. Mastitis affects a high proportion of dairy cows and is still one of the greatest challenges faced by the dairy industry. Staphylococcal bacteria remain the most important cause of mastitis worldwide. We investigated how distinct staphylococcal species evade some critical host defense mechanisms, which may dictate the establishment, severity, and persistence of infection and the outcome of possible therapeutic and prevention interventions. Our findings showed some variations among staphylococcal species in their ability to resist the engulfment of bacteria and induction of the production of highly reactive chemical molecules by blood and milk neutrophils. https://doi.org/10.3168/jds.2021-20953.

Use of ATP luminometry to assess the cleanliness of equipment used to collect and feed colostrum on dairy farms. By Buczinski et al., page 1638. Luminometry is a rapid on-farm tool that is helpful to objectively assess the cleanliness of calf feeding equipment after swabbing previously cleaned equipment surfaces. This study was conducted in 42 dairy herds and showed that punctual assessment of colostrum harvest and feeding equipment cleanliness by luminometry can be useful to differentiate herds according to their hygiene and health characteristics. https://doi.org/10.3168/jds.2021-21023.

Effect of injectable trace mineral supplementation on peripheral polymorphonuclear leukocyte function, antioxidant enzymes, health, and performance in dairy cows in semi-arid conditions. By Silva et al., page 1649. Reactive oxygen species production and antioxidant defense system imbalance lead to oxidative stress, and this scenario may be aggravated in heat-stressed transition dairy cows. Trace minerals may mitigate this negative effect in dairy cows. This study evaluated the effect of an injectable trace mineral supplementation containing Cu, Se, Zn, and Mn on health, performance, immunity, glutathione peroxidase and superoxide dismutase antioxidant enzymes, and inflammatory status of dairy cows undergoing the transition period in a high temperature-humidity index. Although injectable trace mineral supplementation improved peripheral polymorphonuclear leukocyte func-
tion, it did not translate into better health outcomes, performance, or survivability. https://doi.org/10.3168/jds.2021-20624.

Meal patterns of weaned dairy calves are affected by previous dietary experience and associated with competition surrounding individual feed bins. By Horvath et al., page 1661. We characterized meal patterns in recently weaned and group-housed dairy calves to assess effects of previous dietary experience and associations between competition and meal characteristics. Upon transition to a common mixed diet of hay and starter, calves without previous exposure to hay had less frequent, shorter meals. Displacements and stealing from feed bins assigned to other calves occurred frequently with wide individual variability, and the displacement rate was negatively associated with meal frequency and duration. These results highlighted the importance of considering both previous dietary experience and social factors when evaluating feeding behavior. https://doi.org/10.3168/jds.2021-20887.

Estrous activity in lactating cows with divergent genetic merit for fertility traits. By Reed et al., page 1674. We compared estrous activity characteristics (duration, peak, total activity, inter-estrous interval) during first and second lactations between cows with positive or negative genetic merit for fertility. Estrous activity was captured using a neck-mounted, activity monitoring device. Cows with positive genetic merit for fertility traits had longer and more active estrous events, but the inter-estrous interval did not differ between the 2 groups. Furthermore, the first postpartum estrous event was associated with less activity and was shorter than subsequent estrous events in both fertility groups. https://doi.org/10.3168/jds.2021-20811.

Fatty acid profiles of milk from Holstein cows, Jersey cows, buffalos, yaks, humans, goats, camels, and donkeys based on gas chromatography–mass spectrometry. By Wang et al., page 1687. The aim of this study was to develop a high-throughput gas chromatography–mass spectrometry method for the determination of fatty acid profile in milk and to compare the fatty acid profiles of 8 types of milk. Our method had satisfactory linearity, sensitivity, accuracy, and precision. The results revealed that human and donkey milks have different fatty acid compositions from that of ruminant milk. Camel and yak milk are functional foods because of their high levels of odd- and branched-chain fatty acids and low ratios of n-6 to n-3 polyunsaturated fatty acids. https://doi.org/10.3168/jds.2021-20750.

Effects of increasing air temperature on physiological and productive responses of dairy cows at different relative humidity and air velocity levels. By Zhou et al., page 1701. This study aimed to quantify the effects of increasing ambient temperature (T) on physiological and productive responses of dairy cows and determine the inflection point temperatures (IPt) for the activation of adaptive mechanisms at different relative humidity (RH) and air velocity (AV) levels. Five treatments combining different T, RH, and AV were applied in this study. We observed that the respiration rate was the first indicator that showed the cow was reacting to increasing T. The IPt for respiration rate increased with decreasing RH and increasing AV. Longer exposure time to treatments resulted in physiological responses occurring earlier at lower ambient T. https://doi.org/10.3168/jds.2021-21164.

Effects of branched-chain amino acids on glucose uptake and lactose synthesis rates in bovine mammary epithelial cells and lactating mammary tissue slices. By Silva et al., page 1717. Understanding the factors governing lactose synthesis helps in developing strategies for regulating milk yields. A previous meta-analysis demonstrated that essential amino acid (AA) supply to the udder increases lactose synthesis in dairy cows, but little is known about how and which essential AA are involved in regulating lactose synthesis. In this study, we examined the effects of branched-chain AA on glucose uptake and lactose synthesis rates in vitro. We demonstrated that specific branched-chain AA can influence either glucose uptake or lactose synthesis rates and showed the importance of considering the interactions between the precursors in describing milk component synthesis. https://doi.org/10.3168/jds.2021-20950.

Impact of gonadotropin-releasing hormone administration at the time of artificial insemination on conception risk and its association with estrous expression. By Burnett et al., page 1743. Reduced intensity of estrous expression has previously been associated with lower pregnancy per artificial insemination and increased ovulation failure in dairy cows. The aim of this study was to determine whether the fertility of cows with reduced estrous expression could be increased by the administration of gonadotropin-releasing hormone (GnRH) at the time of artificial insemination. In this study, GnRH administration was found to increase fertility in cows with reduced estrous expression but not for those with greater intensity of estrous expression. This relationship could not be explained by changes in the timing of ovulation. https://doi.org/10.3168/jds.2021-20156.
Changes in plasma electrolytes, minerals, and hepatic markers of health across the transition period in dairy cows divergent in genetic merit for fertility traits and postpartum anovulatory intervals. By Grala et al., page 1754. We studied indicators of transition adaptation in seasonal-calving, grazing cows divergent for genetic merit for fertility traits (positive or negative fertility breeding value) and with various postpartum anovulatory intervals. Plasma samples were tested for metabolites, minerals, and metabolic stress markers from 3 wk before until 5 wk after calving. Differences between positive and negative cows occurred across the transition period; however, markers returned to reference intervals within 4 d after calving indicating minor effects of fertility breeding value on transition period adaptation. Magnesium and aspartate aminotransferase concentrations differed between cows with short and long postpartum anovulatory intervals from wk 4 postcalving, which appear to be related to estrus.
https://doi.org/10.3168/jds.2021-20783.

Relationship of cow and calf circulating lipodomes with colostrum lipid composition and metabolic status of the cow. By Klopp et al., page 1768. Lipidome analysis found that circulating lipids in cow plasma and calf serum were relatively similar to each other, but distinct from lipids in cow’s colostrum. One exception and a particularly interesting finding was that phosphatidylglycerol lipids were mostly absent in cow plasma, but concentrations were high in colostrum and correspondingly found circulating in the calf. Nonesterified fatty acid concentration had a positive relationship with total triacylglycerol content of plasma samples at 1 wk prepartum, and a negative relationship with total membrane lipids and phosphatidylglycerol concentration of colostrum. In conclusion, plasma fatty acid profiles and fatty acid composition of colostrum were related to the metabolic status of the cow, and colostrum might be the source of phosphatidylglycerol in calf circulation, but dam circulation is not the source of phosphatidylglycerol found in colostrum.
https://doi.org/10.3168/jds.2021-21008.

Perspective of dairy producers from California, Idaho, South Dakota, and Washington: Health and business implications of the COVID-19 pandemic during the second wave. By Valldecabres et al., page 1788. The COVID-19 pandemic has led to global social and economic disruptions. The dairy industry, dependent on daily workforce and integrated and time-sensitive supply chains, has been severely affected. Our study describes perspectives of dairy producers in California, Idaho, South Dakota, and Wisconsin on the health and business implications of the COVID-19 pandemic, summarizing responses to an anonymous mail survey. Producers were somewhat or very concerned about the effects of the COVID-19 pandemic on health and business. Results from this survey highlight the health and business concerns of dairy producers during the second wave of the COVID-19 pandemic and the mitigation efforts adopted.
https://doi.org/10.3168/jds.2021-20924.

Environment, nutrition, and management practices for far-off, close-up, and fresh cows on Canadian dairy farms—A retrospective descriptive study. By Couto Serrenho et al., page 1797. A successful lactation relies on optimal transition period management. Research data are constantly adapting, and some of the recommendations are not updated at the same pace. This, along with the lack of information regarding current practices of Canadian dairy farms, justifies the importance of describing current management practices. This work objectively describes the prevalence of transition cow management practices (far-off, close-up, and fresh periods) in 78 Canadian dairy herds. Our results demonstrate that stocking density, water access, heat abatement, and ration sortability are among the greatest opportunities for management improvement.
https://doi.org/10.3168/jds.2021-20919.