Invited review: Enteric methane in dairy cattle production: Quantifying the opportunities and impact of reducing emissions. By Knapp et al., page 3291. Over the past 2 decades, most research and reviews on reducing methane emissions from the gastrointestinal tract of cattle have focused on manipulating rumen fermentation through feeding practices or the use of feed additives. Although feeding and nutrition can reduce methane emissions by 2.5 to 15% on a per-unit-of-milk basis, genetic selection and herd management practices have greater potential, in the range of 15 to 30% reductions. Approaches and technologies that improve livestock productivity provide the most cost-effective means to reduce methane emissions per unit of milk. Research leading to improvements in animal health and welfare and dairy profitability is likely to concomitantly enhance environmental sustainability and consumer acceptance of dairy production practices and products. http://dx.doi.org/10.3168/jds.2013-7234.

Use of just-about-right scales and penalty analysis to determine appropriate concentrations of stevia sweeteners for vanilla yogurt. By Narayan et al., page 3262. As the use of stevia sweeteners extends to functional foods such as yogurt, it is essential to document their effect on yogurt quality. The present study aimed to determine the appropriate concentration levels of 4 processed stevia sweeteners or supplements in low-fat vanilla yogurt. Two sensory tests were conducted to determine the just-about-right (JAR) level for each sweetener, along with consumer acceptability of the same yogurts. These data were analyzed using penalty analysis with significant differences among JAR levels. Levels from 0.7 to 5.5% (wt/wt) of stevia sweeteners (depending on source) may be appropriate for use in commercial vanilla yogurt. The various bulk fillers in commercial stevia sweeteners, which influence perceived sweetness and sourness, contributed to the variability observed in consumer acceptability of yogurt with commercial stevia sweeteners. http://dx.doi.org/10.3168/jds.2013-7365.

Rheological and structural properties of differently acidified and renneted milk gels. By Liu et al., page 3292. Milk gelation is an important step in the manufacture of fermented dairy products. Milk gels can be produced by acid, rennet, or a combination of both. The mechanism and behavior of acid-induced or rennet-induced gelation have been extensively studied. However, the contribution of each on combined acid- and rennet-induced gels is not clear. The objective of this study was to assess how acid and rennet affect the behavior of combined acid- and rennet-induced gels by studying the rheological and structural properties. The findings will be useful in the production of combined acid- and rennet-induced gels. http://dx.doi.org/10.3168/jds.2013-7568.

Preventive effect of fermented Maillard reaction products from milk proteins in cardiovascular health. By Oh et al., page 3300. Milk proteins have many important health benefits and considerable nutritional value. Additionally, milk proteins are precursors of a diverse group of bioactive compounds. These compounds can be released by enzymatic proteolysis during food processing, including intestinal digestion and the process of milk fermentation. The bioactive compounds derived from milk proteins may have antioxidant, immune-modulating, antithrombotic, antihypertensive, and antibacterial properties. In particular, Maillard reaction products (MRP), which are produced by reactions between carbonyl and amine groups, not only have organoleptic properties, but also increased antioxidant activity compared with typical milk proteins. In this study, we investigated whether the fermented MRP of milk proteins by lactic acid bacteria have preventive effects in cardiovascular disease as a result of activity as antioxidants, antithrombotics, 3-hydroxy-3-methylglutaryl-coenzyme A reductase inhibitors, and cholesterol-lowering compounds. Interestingly, MRP showed a significant increase in activities related to reduction of cardiovascular risks, and fermentation of MRP synergistically improved the activities. Our findings indicate that MRP and their hydrolysates could be recommended for use as potential antioxidants and cardiopreventive ingredients for various functional, pharmaceutical, and dairy applications. http://dx.doi.org/10.3168/jds.2013-7728.

Raw milk from vending machines: Effects of boiling, microwave treatment, and refrigeration on microbiological quality. By Tremonte et al., page 3314. In Italy, raw milk sales from vending machines has been allowed since 2004. Unpasteurized milk must be boiled before consumption, because it could be a source of pathogens and thus a health hazard. This study evaluated the microbiological quality of raw milk from vending machines located in Molise (Italy), and assessed a domestic boiling treatment and 2 microwave treatments on the safety and quality of milk. The microbiological characteristics of raw milk observed in this study fully justify the need to boil raw milk from vending machines before consumption. http://dx.doi.org/10.3168/jds.2013-7744.

Short communication: Norbixin and bixin partitioning in Cheddar cheese and whey. By Smith et al., page 3321. The removal of norbixin colorant present in Cheddar cheese whey by chemical bleaching
negatively affects the flavor of dried whey ingredients. A better understanding of the primary colorant in annatto, norbixin, along with cheese color alternatives would help improve the quality of dried whey ingredients. This study determined norbixin partitioning in Cheddar cheese and whey and established the viability of bixin, the nonpolar form of norbixin, as an alternative Cheddar cheese colorant.


**Short communication:** Incorporation of inulin and transglutaminase in fermented goat milk containing probiotic bacteria. By Mituniewicz-Malek *et al.,* page 3332. The aim of this study was to determine the effect of inulin and microbial transglutaminase on the viability of *Lactobacillus acidophilus* La-5 and *Bifidobacterium animalis* ssp. *lactis* Bb-12 in fermented goat milks. No positive influence of inulin or microbial transglutaminase was observed on the viability of probiotics in fermented goat milks. Nevertheless, the population of probiotics remained above 6 log cfu/g after 8 wk of storage at 5°C.


**Short communication:** Monitoring the presence of perfluoroalkyl substances in Italian cow milk. By Barbarossa *et al.,* page 3339. The purpose of the present work was to monitor the presence of perfluoroalkyl substances, a class of emerging pollutants, in a large number of cow milk samples from northern Italy. The study demonstrated that contamination was often present, although at low concentrations. These outcomes, in line with data reported in literature, support that milk does not seem to be a major source of perfluoroalkyl substances, although surveys including derived products would be helpful to better define the risk for consumers.


**Comparison of modeling techniques for milk-production forecasting.** By Murphy *et al.,* page 3352. Effective milk-production forecasting is very beneficial for farm management and economic planning. An easily implementable milk-production forecast tool for multiple temporal horizons would be valuable to dairy farmers, researchers, and dairy product factories. In this study, 3 different modeling techniques were used to forecast the annual milk production of a herd of pasture-based dairy cattle using 4 yr of previous milk production data. The accuracy of the 3 models was compared over short-, medium-, and long-term horizons.

http://dx.doi.org/10.3168/jds.2013-7451.

**Accuracy of milk ketone bodies from flow-injection analysis for the diagnosis of hyperketonemia in dairy cows.** By Denis-Robichaud *et al.,* page 3364. Results from flow injection analysis for milk β-hydroxybutyric acid (BHBA) and acetone were compared with blood BHBA values (reference test). Measurement of milk BHBA and acetone concentrations were highly correlated with blood BHBA concentration. Moreover, the milk BHBA and acetone test results were able to accurately detect hyperketonemia in dairy cows. Milk BHBA and acetone values from flow injection analysis could be used in herd surveillance programs for hyperketonemia.

http://dx.doi.org/10.3168/jds.2013-6913.

**Increased blood-circulating interferon-γ, interleukin-17, and osteopontin levels in bovine paratuberculosis.** By Dudemaine *et al.,* page 3382. Plasma interferon-γ, osteopontin, and interleukin-17 levels of dairy cows infected with *Mycobacterium avium* ssp. *paratuberculosis* (MAP) were higher in serum ELISA-positive cows, whereas interleukin-4 and interleukin-10 levels were not found to differ by disease status. These results indicate a T helper type 17 (Th17) response similar to that in many chronic inflammatory diseases. This Th17 response was supported by a gene-expression study of in vitro MAP-infected macrophages, suggesting a shift toward a Th17 immune response early in infection.


**Quantifying veterinarians’ beliefs on disease control and exploring the impact of new evidence: A Bayesian approach.** By Higgins *et al.,* page 3394. Veterinarians’ clinical beliefs concerning herd-level interventions to reduce 3 key endemic diseases of dairy cattle were captured numerically as probability distributions. Major differences in beliefs were revealed. By incorporating the beliefs into Bayesian statistical models, the strength of new data needed to change veterinary opinion was explored. The results have important implications for designing future research studies. The wide variation in beliefs also raises concern over the extent to which a broadly consistent approach to disease control is currently being achieved; it is argued that more clinical trials and national disease control programs are needed.

Manageable risk factors associated with bacterial and coliform counts in unpasteurized bulk milk in Flemish dairy herds. By Piepers et al., page 3409. This study evaluated to what extent differences in manageable risk factors different from those related to milking and equipment hygiene are associated with bacterial counts (BC) and coliform counts (CC) in unpasteurized bulk milk on 254 and 242 Flemish dairy herds, respectively. Several variables reflecting milking, herd health, and dry cow management were significantly associated with either BC or CC. Still, only a small proportion of total variance could be explained, suggesting that bacteriological milk quality is primarily driven by factors other than those included in this study.
http://dx.doi.org/10.3168/jds.2013-7203.

Visceral adipose tissue mass in nonlactating dairy cows fed diets differing in energy density. By Drackley et al., page 3420. Accumulation of fat in the visceral adipose tissues associated with the digestive tract is strongly correlated with chronic disease in humans. Nonlactating cows fed a high-energy diet for 8 wk consumed 42% more dry matter and 65% more metabolizable energy than cows fed a low-energy (high-forage) diet. Cows fed the high-energy diet had 76 and 92% greater omental and mesenteric adipose tissue, respectively, and had greater body weight but similar body condition scores. Thus, changes in body condition over a dry period may not be sensitive enough to detect significant internal fat deposition that might predispose cows to metabolic disorders.

Subclinical mastitis in goats is associated with upregulation of nitric oxide-derived oxidative stress that causes reduction of milk antioxidative properties and impairment of its quality. By Silanikove et al., page 3449. Subclinical mastitis caused by coagulase-negative staphylococci is associated with significant losses in milk yield and quality for cheese production. The milk produced is associated with significant loss of milk antioxidant capacity and vitamin C levels, which are particularly high in goats. Thus, these complications are associated with unfavorable changes in milk quantity and composition, which affect farmers, dairies, and consumers.
http://dx.doi.org/10.3168/jds.2013-7334.

Relationship between postmilking standing duration and risk of intramammary infection in freestall-housed dairy cows milked 3 times per day. By Watters et al., page 3456. A study was conducted to determine the association between postmilking standing duration and incidence of intramammary infection. Risk of coagulase-negative staphylococci intramammary infection was reduced in cows that spent 90 to 120 min standing following milking. An optimal postmilking standing duration can be promoted through delivery of fresh feed or freshly pushed-up feed around the time of milking by providing ample feed bunk space per cow and keeping stall stocking density low.
http://dx.doi.org/10.3168/jds.2013-7381.

Risk factors that affect reproductive target achievement in fertile dairy cows. By Aungier et al., page 3472. This paper identified key parameters associated with cows that achieved reproductive targets and conceived to first artificial insemination (AI). Such cows during the first 4 wk postpartum (1) were better at coping with metabolic stress (liver function), achieving normal metabolic endocrine profiles, and being in less severe negative energy balance; (2) had a more normal immune response; and (3) had adequate selenium and magnesium. Postpartum, they had clear vaginal mucus at first ovulation and normal uterine health at d 45. First AI pregnancies were associated with more ovulations beforehand, no negative energy balance at AI, and clear vaginal mucus on d 4 post-AI.
http://dx.doi.org/10.3168/jds.2013-7404.

Evaluation of udder firmness by palpation and a dynamometer. By Rees et al., page 3488. Swelling of the mammary gland is an important health status sign for clinical examination and palpation is a routine diagnostic tool for detection of clinical mastitis in dairy cows. In this study, we evaluated the repeatability of estimates of udder firmness generated by palpation and with a validated dynamometer. Udder firmness in dairy cows could be measured repeatably, especially when performed by a single observer. Additionally, we found the 4-point palpation scoring system to be a practical system for classifying udder firmness.
http://dx.doi.org/10.3168/jds.2013-7424.

A stochastic frontier approach to study the relationship between gastrointestinal nematode infections and technical efficiency of dairy farms. By van der Voort et al., page 3498. We studied the relationship between the level of exposure to one of the major gastrointestinal parasites in cattle (Ostertagia ostertagi) and the technical efficiency of dairy farms. Technical efficiency is the difference between the actual and potential optimal technical performance level of a farm. Highly infected farms are, on average, less technically efficient. The benefit of controlling the parasitic infection was relatively more important for farms with a high technical efficiency score.
http://dx.doi.org/10.3168/jds.2013-7444.

Effect of 2 herbal intramammary products on milk quantity and quality compared with conventional and no dry cow therapy. By Mullen et al., page 3509. Antibiotics are commonly used on con-
ventitional dairies for treatment and prevention of mastitis. In the United States, antibiotic use is not allowed on organic dairies except when organic treatment fails, which removes the animal from organic production. This study examined 2 herbal intramammary products with potential for use on organic dairies. No significant differences in milk production or milk quality were found among cows receiving the herbal products, conventional antibiotic treatment, or no treatment. We observed no evidence of udder irritation in response to administration of the herbal products. Further research is needed to investigate herbal alternatives to antibiotics.


Evaluation of the sample needed to accurately estimate outcome-based measurements of dairy welfare on farm. By Endres et al., page 3523. Dairy welfare assessment programs are becoming more common on US farms. Animal measurements such as locomotion, hock lesion, hygiene, and body condition scores are included in these assessments. The objective was to investigate the proportion of cows in a pen or subsamples of entire pens needed to provide an accurate estimate of the above-mentioned measurements. We learned that, on average, 15% of the pen needed to be measured to estimate lameness prevalence, 30% for severe lameness, 15% for dirty cows, 30% for severe hock lesion, and 70 to 80% for very thin and fat cows. None of the pen subsamples provided accurate estimates of herd prevalence.

http://dx.doi.org/10.3168/jds.2013-7464.

Hyperketonemia during lipopolysaccharide-induced mastitis affects systemic and local intramammary metabolism in dairy cows. By Zarrin et al., page 3531. Effects of an induced hyperketonemia during an intramammary lipopolysaccharide (LPS) challenge on systemic and local mammary metabolism in mid-lactation dairy cows demonstrated that hyperketonemia had no effect on mammary metabolism. Induced intramammary LPS mastitis increased plasma concentrations of glucose, cortisol, glucagon, and insulin, and decreased plasma β-hydroxybutyrate (BHBA) concentration. Plasma glucose and glucagon increased less in the BHBA-treated animals than in controls. The results indicate that BHBA infusion decreases glucose as an energy source for the immune system through the decline of glucagon, which may reflect the negative effect of spontaneous hyperketonemia on metabolic adaptations during mastitis in dairy cows.

http://dx.doi.org/10.3168/jds.2013-7480.

Early pregnancy diagnosis on days 18 to 21 post-insemination using high-resolution imaging in lactating dairy cows. By Scully et al., page 3542. The use of ultrasound for pregnancy diagnosis of cattle has become increasingly common. More advanced ultrasound technology is now available that may be able to identify signs of pregnancy earlier than conventional ultrasound. The aim was to assess the ability of corpus luteum (CL) and uterine ultrasound characteristics on d 18 to 21 following artificial insemination (AI) to predict pregnancy status in lactating dairy cows. It may be possible to diagnose pregnancy status, in particular nonpregnancy, by d 21 following AI with 98% accuracy.

http://dx.doi.org/10.3168/jds.2013-7518.

Inducing ovulation early postpartum influences uterine health and fertility in dairy cows. By Bittar et al., page 3558. Early ovulation postpartum is critical for high fertility because cows that cycle early have greater pregnancy per artificial insemination (AI) and shorter time to pregnancy. The objective was to evaluate the effect of gonadotropin-releasing hormone (GnRH) administered early postpartum on induction of ovulation, uterine health, and fertility in dairy cows. Administration of GnRH at 17 ± 3 d in milk (DIM) and 20 ± 3 DIM to cows without a corpus luteum at 17 ± 3 DIM effectively induced ovulation without detrimental effects on uterine health. Treatment with GnRH did not affect pregnancy per AI or hazard of pregnancy up to 300 DIM, but did reduce pregnancy loss.


Denaverine hydrochloride and carbetocin increased welfare during and after parturition and enhanced subsequent fertility in cattle. By Zobel and Taponen, page 3570. The aim of the study was to explore means to minimize pain during labor and improve postpartum fertility in cattle. The study included 200 animals of the Simmental breed (100 cows and 100 heifers) divided in 2 groups. Animals within a treatment group received medication when giving birth according to the protocol described. The treated animals gave birth sooner and had fewer birth canal lesions and uterine inflammation compared with control animals. The treated animals also became pregnant sooner and required fewer inseminations. Thus, treatment showed a positive overall effect on cow welfare as well as on postpartum fertility.

http://dx.doi.org/10.3168/jds.2013-7535.

Effect of prepartum photoperiod and melatonin feeding on milk production and prolactin concentration in dairy heifers and cows. By Lacasse et al., page 3589. This study investigated the effect of late-gestation photoperiod on subsequent milk production in primiparous heifers and multiparous cows. Short-day photoperiod during the last 2 mo of gestation enhanced milk production in cows. In heifers, photoperiod treatment did not affect milk production but feed efficiency was improved. For both cows and heifers, the effect was gradually lost and could not be mimicked by feeding melatonin. The stimulation was likely the result of
increased responsiveness to a photoperiodic signal in early lactation.
http://dx.doi.org/10.3168/jds.2013-7615.

A field study of the behavioral and physiological effects of varying amounts of shade for lactating cows at pasture. By Schütz et al., page 3599. Eight Holstein-Friesian herds were studied on 6 commercial, pasture-based dairy farms with a range of available natural shade (0 to 15.6 m² of shade/cow). All cows in a herd were observed using shade simultaneously when the shade amount exceeded 2 m²/cow; however, a greater proportion of the herd could use the shade at the same time as the amount of this resource increased. Providing more shade also reduced panting scores, a sign of high heat load. This study is the first to show that increasing amounts of natural shade help large groups of cattle cope with summer conditions on commercial farms.
http://dx.doi.org/10.3168/jds.2013-7649.

Evaluation of the use of dry cow antibiotics in low somatic cell count cows. By Scherpenzeel et al., page 3606. Blanket dry cow therapy is widely used to eliminate existing intramammary infection and to prevent new intramammary infections. Due to public health concerns, however, preventive use of antibiotics has become questionable. This study evaluated selective dry cow therapy in 1,657 cows with low somatic cell count at the last milk recording before drying off in 97 Dutch dairy herds by recording the effects on clinical mastitis, bacteriological status, somatic cell count, and antibiotic use. Selecting animals for dry cow therapy results in a substantial reduction in antibiotic use but leads to an increase in (sub)clinical mastitis and the need for bacteriological culture.

Association between polyunsaturated fatty acid-derived oxylipid biosynthesis and leukocyte inflammatory marker expression in periparturient dairy cows. By Raphael et al., page 3615. Unregulated inflammatory responses in cows can enhance disease pathogenesis during the periparturient period. Previous research showed that oxylipids regulate inflammation, but their role in periparturient inflammatory responses is not known. This study describes changes in both plasma oxylipid concentrations and their substrates across the periparturient period and correlates these profiles with inflammatory gene expression in peripheral leukocytes. Future studies will investigate sources of polyunsaturated fatty acid substrates of plasma oxylipids and roles of specific plasma oxylipids in inflammatory pathways.

Agonists of the G protein-coupled receptor 109A-mediated pathway promote antilipolysis by reducing Ser563 (serine residue 563) phosphorylation of hormone-sensitive lipase in bovine adipose tissue explants. By Kenéz et al., page 3626. The metabolic status of high-yielding dairy cows is strained due to the huge energy demands of lactation. However, balanced energy metabolism is important for maintaining efficient dairy production. In this context, regulation of cellular pathways to conserve fat depots and minimize excessive lipid mobilization in adipose tissues is of interest. The present study provides evidence about the inhibitory effects of the G protein-coupled receptor 109A (GRP109A)-mediated pathway on adipose tissue lipolysis in dairy cows, indicating that this pathway could contribute to energy conservation. A better understanding of bovine adipose tissue metabolism is vital for the development of strategies to control metabolic dysregulation and to improve dairy cattle health.
http://dx.doi.org/10.3168/jds.2013-7662.

Rumination time around calving: An early signal to detect cows at greater risk of disease. By Calamari et al., page 3635. We studied the pattern of rumination time around calving and its relationship with blood metabolic-inflammatory indices and health status. Inflammation around parturition is associated with a slower increase in rumination time after calving and a greater incidence of disease during the first month of lactation. These relationships support the evaluation of rumination time as a tool to identify cows with greater likelihood of developing disease post-partum. This approach might help improve welfare in dairy herds.
http://dx.doi.org/10.3168/jds.2013-7709.

Evaluation of the Minnesota Easy Culture System II Bi-Plate and Tri-Plate for identification of common mastitis pathogens in milk. By Royster et al., page 3648. The use of this on-farm culture system to identify bacterial pathogens in milk at the species level has not previously been validated. Bi-Plate and Tri-Plate results are most reliable when used to classify infections in broad diagnostic categories such as no bacterial growth, or gram-positive and gram-negative growth. The Bi-Plate and Tri-Plate have intermediate ability to identify infections caused by *Staphylococcus* spp., *Streptococcus* spp., or *Staphylococcus aureus*. On-farm users should refrain from using the Minnesota Easy Culture System II to diagnose the cause of mastitis infections at the species level except for *Staph. aureus* infections.
http://dx.doi.org/10.3168/jds.2013-7748.
Insulin stimulates glucose uptake via a phosphatidylinositide 3-kinase-linked signaling pathway in bovine mammary epithelial cells. By Zhao et al., page 3660. We found that insulin stimulates glucose uptake in lactating bovine mammary epithelial cells, potentially by enhancing expression of glucose transporter 8. This stimulation may act through a phosphatidylinositide 3-kinase-linked signaling pathway. This study brings new insight to the regulation of glucose uptake in the mammary gland of dairy cows. http://dx.doi.org/10.3168/jds.2013-7730.

Monitoring the bulk milk antibody response to bovine viral diarrhea in dairy herds vaccinated with inactivated vaccines. By Gonzalez et al., page 3684. In many countries, vaccination is commonly used as an additional measure to control bovine viral diarrhea virus (BVDV). However, a certain degree of controversy exists regarding inactivated vaccines and the difficulty in discerning between the immune response caused by the vaccine and that originating from the field virus infection. It is not entirely clear if the practitioner will be able to monitor the circulation of BVDV field virus in a herd once vaccines have been applied. This paper assesses the effect that several types of vaccines have on the enzyme-linked immunosorbent assay results obtained from the analysis of bulk tank milk, which is the most frequently used sample in monitoring programs. http://dx.doi.org/10.3168/jds.2013-7851.

Short communication: Dipping efficiency and teat dip residues in milk using an automatic dipping system. By Berg et al., page 3689. Teat dipping as an integrated part of hygiene management in dairy farms to prevent udder infections is usually performed by hand. The tested automatic teat dipping system for dairy cows improves teat dipping quality, regularity, and reliability with a success rate of 91.6 ± 1.3% (percentage of dipped teats) together with a very small amount of teat dip residues in milk. http://dx.doi.org/10.3168/jds.2013-7194.

Short communication: Application of an N-acetyl-l-cysteine-NaOH decontamination method for the recovery of viable Mycobacterium avium subspecies paratuberculosis from milk of naturally infected cows. By Bradner et al., page 3694. The present study determined the best method for decontamination and culture of milk for optimal recovery of Mycobacterium avium ssp. paratuberculosis (MAP). Decontamination of milk with N-acetyl-l-cysteine-1.5% NaOH solution before culture in liquid medium was the most efficacious method for recovery of viable MAP from milk. These results are critical for diagnostic laboratories so that proper methods can be used to assess the degree of exposure of calves on-farm to the bacterium in milk or colostrum. http://dx.doi.org/10.3168/jds.2013-7730.

Short communication: Immunoglobulin variation in quarter-milked colostrum. By Baumrucker et al., page 3700. The process of colostrum formation in dairy cows has been shown to be highly variable, resulting in first-milked colostrum of differing quality. Quarter milking of dairy cows within 3 h of parturition showed that each independent quarter can be significantly different in concentration and mass of immunoglobulin (Ig)G1. This finding helps to explain the vast variation in total first-milked colostrum IgG1 concentration and mass, in that each cow may have any number of quarters that produce high-quality colostrum, the inverse situation, or any other combination. Although this explains some of the variation in colostrum quality, it raises another question. How can each quarter be independent in colostrum formation when each gland has the same DNA and is exposed to the same concentrations of circulating endocrine factors that have been attributed to the development of colostrogenesis? http://dx.doi.org/10.3168/jds.2013-7107.

Effects of decreasing metabolizable protein and rumen-undegradable protein on milk production and composition and blood metabolites of Holstein dairy cows in early lactation. By Bahrami-Yekdangi et al., page 3707. Using a 4 × 4 Latin square design, the effects of different levels of crude protein (CP; 18, 17.2, 16.4, and 15.6%) on production performance, nitrogen retention, and nutrient digestibility in dairy cows was examined. Twelve multiparous high-producing Holstein cows were fed diets with decreasing levels of CP and rumen-undegradable protein, with methionine (Met) and lysine (Lys) requirements met. Treatments had no significant effect on milk production or milk composition; however, feed intake was higher for the 16.4% CP than for the 18% CP diet. In addition, energy-corrected milk remained unchanged but predicted N efficiency increased with lower CP diets when rumen-degradable protein, Met, and Lys requirements were met. Cows fed 18% dietary CP had higher concentrations of plasma urea nitrogen and milk urea nitrogen. The highest CP digestibility was recorded for the 18% CP diet. http://dx.doi.org/10.3168/jds.2013-6725.

Effects of d-α-tocopherol and dietary energy on growth and health of preruminant dairy calves. By Krueger et al., page 3715. d-α-Tocopherol is a highly bioavailable form of dietary vitamin E. Preruminant Holstein calves were fed all-milk diets of varying energy intake that were unsupplemented or supplemented with...
D-α-tocopherol. Supplementation with D-α-tocopherol improved plasma α-tocopherol status. Supplementation was associated with a decrease in the positive acute-phase proteins serum amyloid A and haptoglobin, and tended to increase growth in calves fed for 0.5 kg of average daily gain. These results indicate a role for α-tocopherol in amelioration of potentially proinflammatory state associated with greater dietary energy and infectious disease during the preruminant phase of growth.

http://dx.doi.org/10.3168/jds.2013-7315.

Effects of hydroxy trace minerals on oxidative metabolism, cytological endometritis, and performance of transition dairy cows. By Yasui et al., page 3728. Trace minerals play important roles in modulating oxidative metabolism, maintaining immune function, and supporting optimum health and performance. The objective of the current study was to investigate effects of feeding hydroxy forms of Zn, Cu, and Mn compared with sulfate forms or a blend of sulfate forms and organic complexes on oxidative stress, cytological endometritis, and performance of transition dairy cows. Supplementation of hydroxy trace mineral sources may modulate markers of oxidative stress and inflammatory response; however, we observed no effect on cytological endometritis and only slight effects on the pattern of performance in early lactation.

http://dx.doi.org/10.3168/jds.2013-7331.

Effect of a high-palmitic-acid fat supplement on milk production and apparent total-tract digestibility in high- and low-milk-yield dairy cows. By Rico et al., page 3739. The effect of a high-palmitic-acid (PA) fat supplement on intake, milk and milk component yields, milk fatty acid (FA) profile, and nutrient digestibility was investigated in high- and low-producing dairy cows. Compared with control, PA decreased intake and increased 16-carbon FA digestibility, but had no effect on milk yield or milk fat concentration or yield. However, in high-producing cows, calcium salts of palm FA altered ruminal biohydrogenation and reduced milk fat concentration compared with PA. High-PA fat supplements are efficiently absorbed and minimally affect digestibility but may reduce intake.

http://dx.doi.org/10.3168/jds.2013-7341.

The effect of rumen digesta inoculation on the time course of recovery from classical diet-induced milk fat depression in dairy cows. By Rico et al., page 3752. Re-establishment of the microbial community is required for recovery from diet-induced milk fat depression. We investigated the effect of inoculating the rumen with rumen digesta from a cow without milk fat depression on the time course of recovery of milk fat synthesis. The inoculation did not change milk fat yield or concentration, but increased de novo synthesized fatty acids on d 6 and decreased trans-10, cis-12 conjugated linoleic acid on d 3 and 6 of the recovery period. Recovery of de novo fat synthesis and normal biohydrogenation pathways can be slightly accelerated by inoculation with flora from cows without milk fat depression.

http://dx.doi.org/10.3168/jds.2013-7342.

Effect of replacing grass silage with red clover silage on nutrient digestion, nitrogen metabolism, and milk fat composition in lactating cows fed diets containing a 60:40 forage-to-concentrate ratio. By Halmemies-Beauchet-Filleau et al., page 3761. Effects of replacing grass silage (GS) with red clover silage (RCS) on digestion, nutrient utilization, and milk fatty acid composition were examined. Feeding a mixture of forage species resulted in higher intake and milk yield but not milk fat secretion compared with GS or RCS alone. Replacing GS with RCS progressively increased the escape of dietary protein from the rumen, and lowered microbial protein synthesis and the efficiency of N utilization for milk protein synthesis. Replacing GS with RCS also altered milk fat composition, with increases in 18:2n-6 and 18:3n-3 and decreases in 14:0 and 16:0 concentrations in the absence of alterations in total trans fatty acids.

http://dx.doi.org/10.3168/jds.2013-7358.

Effects of 3-nitrooxypropanol on methane emission, digestion, and energy and nitrogen balance of lactating dairy cows. By Reynolds et al., page 3777. Ruminant animals lose a part of the digestible energy in their diet due to the production of methane by microorganisms in the rumen. The present study investigated the effects of 3-nitrooxypropanol on methane production by lactating dairy cows. Dosing 3-nitrooxypropanol into the rumen twice daily reduced methane production, but the pronounced inhibitory effect after dosing was transitory and diet digestibility was reduced. Thus, although 3-nitrooxypropanol is effective at inhibiting methane production, a more continuous supply of 3-nitrooxypropanol to the rumen may be more effective than twice-daily dosing and therefore feeding may be a more appropriate method of delivery.

http://dx.doi.org/10.3168/jds.2013-7397.

Effects of ethyl-3-nitrooxy propionate and 3-nitrooxypropanol on ruminal fermentation, microbial abundances, and methane emissions in sheep. By Martínez-Fernández et al., page 3790. In the last decade, intensive research effort has been made to develop nutritional strategies to reduce methane emissions from ruminants, resulting in contradictory and highly variable results. This work used nitroxy alkanoic acids as antimethanogenic compounds and observed 29 and 21% reductions in methane yield (L
of CH₄/kg of dry matter intake) after 15 and 30 d of treatment, respectively. The inhibition was accompanied by a decrease in acetate:propionate ratio and no detrimental effect on dry matter degradability in the rumen.

**Grazing season and forage type influence goat milk composition and rennet coagulation properties.** By Inglingstad et al., page 3800. Interest in rennet-coagulated goat milk cheeses in Norway is increasing. Consistent milk quality is important for the industry and for farmers. Hence, it is important to establish how different factors influence the milk quality and protein composition. In this study, we characterized the effects of different pasture types and hay qualities in both the early and late grazing season. Diet influenced milk yield, content of individual caseins, total casein, and protein but not coagulation properties. Coagulation properties and milk yield were influenced by grazing season.
http://dx.doi.org/10.3168/jds.2013-7542.

**Effects of supplemental chromium propionate and rumen-protected amino acids on productivity, diet digestibility, and energy balance of peak-lactation dairy cattle.** By Vargas-Rodriguez et al., page 3815. Feeding chromium in early lactation can increase milk production, but responses during peak lactation have not been studied. The objective of this study was to evaluate responses to chromium propionate during peak lactation as well as the interactions between chromium and rumen-protected lysine and methionine. Chromium propionate increased feed intake and tended to increase energy-corrected milk yield. Primiparous cows showed greater responses in feed intake and milk protein yield than multiparous cows. In this study, feeding chromium propionate near peak lactation increased feed intake and tended to increase productivity, but no benefits of supplementing rumen-protected lysine and methionine were observed.
http://dx.doi.org/10.3168/jds.2013-7767.

**Effects of supplemental chromium propionate and rumen-protected amino acids on nutrient metabolism, neutrophil activation, and adipocyte size in dairy cows during peak lactation.** By Yuan et al., page 3822. Chromium and amino acids are commonly supplemented in lactating cow diets to improve production or metabolism. This study evaluated effects of chromium propionate, rumen-protected lysine and methionine, or both, on metabolism, immune cell function, and adipocyte size in lactating cows. Feeding these supplements for 35 d had minimal effects on metabolism or adipocyte size but might modulate immune function in peak-lactation cows.
http://dx.doi.org/10.3168/jds.2013-7770.

**Performance of dairy cows fed silage and grain produced from second-generation insect-protected (Bacillus thuringiensis) corn (MON 89034) compared with parental line corn or reference corn.** By Castillo-Lopez et al., page 3832. Sixteen multiparous Holstein cows were used in an experiment that investigated the effects of feeding corn grain and silage produced from second-generation insect-protected (Bacillus thuringiensis; B.t.) corn (MON 89034), parental line corn, or reference corn. Dry matter intake (DMI) was significantly greater in B.t. corn-fed cows with no difference in efficiency of milk production (3.5% fat-corrected milk/DMI) and milk components. The second-generation, insect-protected B.t. corn (MON 89034) supported the same level of milk production as conventional, nontransgenic corn grain and corn silage when fed to dairy cows.
http://dx.doi.org/10.3168/jds.2013-7894.

**Evaluation of a Brix refractometer to estimate serum immunoglobulin G concentration in neonatal dairy calves.** By Deelen et al., page 3838. The objective of this study was to evaluate the utility of a digital Brix refractometer a compared with serum total protein by refractometry for the assessment of success of passive transfer. Brix refractometer measurements were highly correlated with serum immunoglobulin (Ig) G measured by radial immunodiffusion in 397 neonatal calves. A value of <8.4% Brix most accurately predicted failure of passive transfer as defined by serum IgG concentration of <10 g/L. Serum total protein was also positively correlated with percentage Brix and IgG concentration.

**Short communication: Prediction of intake in dairy cows under tropical conditions.** By Souza et al., page 3845. A meta-analysis was conducted to develop an empirical model for predicting feed intake in dairy cows under the tropical conditions of Brazil using body weight, milk production, and days in milk as independent variables in the model. In addition, 5 currently available dry matter intake prediction models (2 American, 1 British, and 2 Brazilian) were evaluated using an independent dataset. The new derived model was more precise and accurate than its previous counterparts for estimating dry matter intake in lactating dairy cows raised in Brazil.

**Short communication: Intestinal digestibility of amino acids in fluid- and particle-associated rumen bacteria determined using a precision-fed cecectomized rooster bioassay.** By Fonseca et al., page 3855. Digestibility of amino acids in fluid- and particle-associated bacteria isolated from ruminally
cannulated lactating cows was determined by feeding to cecectomized roosters. Amino acid digestibility was not different between fluid- and particle-associated bacteria, but differences in digestibility were observed among amino acids within bacterial type.
http://dx.doi.org/10.3168/jds.2013-7880.

Short communication: Effects of molasses products on productivity and milk fatty acid profile of cows fed diets high in dried distillers grains with solubles. By Swenson et al., page 3860. Cane molasses can partially alleviate milk fat depression when cows are fed high-concentrate rations containing corn distillers grains. The objective of this study was to determine whether dietary molasses would alter milk fatty acid profile or improve milk solids yield in more typical lactation diets and to assess production responses to increasing ruminal N supply when molasses was fed. Neither exchanging molasses products for corn at 2.9 to 5.8% of dietary dry matter nor altering ruminal N supply influenced production parameters or milk fatty acid profiles.

Effects of breed and casein genetic variants on protein profile in milk from Swedish Red, Danish Holstein, and Danish Jersey cows. By Gustavsson et al., page 3866. Detailed protein composition has been determined in 3 Scandinavian dairy breeds: Swedish Red, Danish Holstein, and Danish Jersey. Protein composition varied both between and within breeds. The variation within breeds could partly be explained by composite αS1-β-κ-casein genetic variants. One of the most common composite casein genetic variants resulted in higher relative concentrations of αS1 and αS2-casein and lower relative concentrations of κ- and β-casein. The composite casein genetic variants can be used in breeding programs to achieve a targeted quality of raw milk.
http://dx.doi.org/10.3168/jds.2013-7312.

Genomic evaluation, breed identification, and discovery of a haplotype affecting fertility for Ayrshire dairy cattle. By Cooper et al., page 3878. Genomic evaluations have been available for US Holsteins, Jerseys, and Brown Swiss since 2009. As of January 2013, the North American database included genotypes for over 1,000 Ayrshires, which allowed investigation of Ayrshire genomic evaluation. The mean gain in reliability for genomic evaluations over parent averages for all traits was 8.2 percentage points. A haplotype that affected fertility was discovered on chromosome 17 and had a carrier frequency of 26.1%. Sire conception rate was 4.3 percentage points lower for carriers. Genomic evaluations for Ayrshires were officially implemented in the United States in April 2013.
http://dx.doi.org/10.3168/jds.2013-7427.

Incorporating heifer feed efficiency in the Australian selection index using genomic selection. By Gonzalez-Recio et al., page 3883. Feed costs represent up to 50% of total costs of running a dairy farm. Improved feed efficiency of dairy cattle would allow either increased production without an increase in costs, or reduced feed costs for the same level of production. In this study, an extension of the Australian Profit Ranking index was proposed for the Holstein population that accounts for residual feed intake (RFI), a measure of feed efficiency. This index would result in a decrease of RFI of 1.76 kg/cow per year. At a population level, this means that the next generation of Holsteins in Australia could consume 1.73 × 10⁶ kg less feed and increase profitability of the dairy industry by approximately A$0.55 million per year, an increase of approximately 3%. An unfavorable, but weak, correlation between fertility and RFI was observed. With appropriate selection index weights, gains can be made in both fertility and RFI simultaneously. Improved feed efficiency of dairy cattle will be increasingly important in the future as competition for cereals and crops intensifies.

International genetic evaluations for feed intake in dairy cattle through the collation of data from multiple sources. By Berry et al., page 3894. Feed constitutes a major contributor to the costs of production in dairying. Dairy cattle breeding goals do not explicitly include feed intake primarily because of a paucity of data on feed intake. We collated dairy cattle dry matter intake data from several populations. Genetic variation in feed intake was shown to exist although feed intake in high-input confinement-based production systems and grazing production systems seem to be genetically different traits.
http://dx.doi.org/10.3168/jds.2013-7548.

Gastrointestinal tract size, total-tract digestibility, and rumen microflora in different dairy cow genotypes. By Beecher et al., page 3906. This study aimed to measure whether differences exist among dairy cow genotypes in gastrointestinal tract size, digestibility, and selected rumen microbial populations. Jersey and Jersey × Holstein-Friesian cows had proportionally greater gastrointestinal tract weights than Holstein-Friesian cows. Jersey cows had a superior total-tract digestibility and lower relative abundance of Ruminococcus flavefaciens in the rumen than Holstein-Friesian cows. These differences could contribute to the previously reported production efficiency differences among genotypes.

Efficiency of multi-breed genomic selection for dairy cattle breeds with different sizes of
reference population. By Hozé et al., page 3918. Single-breed genomic selection is now implemented in a number of major cattle breeds. However, building large enough reference populations remains a major challenge for other breeds. Combining reference populations and implementing a multi-breed approach appears to be an alternative for small breeds. Normande training datasets with different sizes were pooled to 4,989 Holstein and 1,788 Montbéliarde bulls to investigate the benefit of multi-breed genomic evaluation. In addition, factors affecting the accuracy of multi-breed evaluation were investigated.
http://dx.doi.org/10.3168/jds.2013-7752.

Are evaluations on young genotyped animals benefiting from the past generations? By Lorenzo et al., page 3930. Data sets of US Holsteins, Israeli Holsteins, and pigs from PIC (a Genus company, Hendersonville, TN) were used to evaluate the effect of different numbers of generations of data on the ability to predict genomic breeding values of young genotyped animals. The influence of including only 2 generations of ancestors or all ancestors was also investigated. For homogeneous populations, truncating old data did not decrease the accuracy of genomic predictions for young genotyped animals and did reduce computation requirements. For populations that include local and imported animals, truncation may be beneficial for one group of animals and detrimental to another group.
http://dx.doi.org/10.3168/jds.2013-7769.

Using recursion to compute the inverse of the genomic relationship matrix. By Misztal et al., page 3943. Computing the inverse of the genomic relationship matrix, which is needed for genomic evaluation, was investigated using genomic recursions. In general, the cost of obtaining recursions depends on their sparsity pattern and needs to be determined experimentally. In a specific case where the genotyped population included proven and young animals, the approximate cost was cubic with the number of proven animals and linear with the number of young animals. Genomic recursions can provide new insight into genomic evaluation and possibly reduce costs of genetic predictions with extremely large numbers of genotypes.

Random regression test-day model for clinical mastitis: Genetic parameters, model comparisons, and correlations with indicator traits. By Gernand and König, page 3953. Application of threshold random regression methodology enables the estimation of genetic parameters for binary clinical mastitis in the course of lactation. Genetic correlations between clinical mastitis from the beginning and the end of lactation were close to zero, which indicates a changing genetic background. Lactation estimated breeding values for clinical mastitis from the random regression model were in agreement with breeding values estimated with “conventional” multiple-trait or repeatability models. Genetic correlations between indicator traits representing udder health and clinical mastitis were only low to moderate.
http://dx.doi.org/10.3168/jds.2013-7830.

Survey of preweaning dairy calf-rearing practices in Czech dairy herds. By Staněk et al., page 3973. We evaluated selected management strategies of calf-rearing practices from birth to weaning. We focused especially on cow housing during the transition and calving period, calving management, care of the newborn calves, colostrum management, calf feeding, calf housing, weaning, dehorning, and calf management activities. We evaluated farms having 100 to 600 cows and also examined differences in practices and management between farms keeping the Czech Fleckvieh or Holstein breed.