



## **SPLASH!®** milk science update September 2020 Issue



This month's issue features an IMGC Symposium preview, California's dairy industry and the environment, breastfeeding and early menopause, and fermented foods and mastitis.

### **IMGC 17th International Symposium on Milk Science and Health Will Be Held Virtually October 13–16, 2020**

- **The International Milk Genomics Consortium (IMGC) will hold its 17th annual conference October 13–16, 2020 in a virtual, interactive, and live format.**
- **The conference will bring together a multidisciplinary group of experts from all over the world to discuss and share scientific research related to milk and human health.**
- **The symposium will feature two sessions each day for four days, with livestream talks moderated with Q&A polling followed by chat room discussions with the speakers.**
- **All livestream talks will be available as on demand recordings for up to one year.**
- **The conference will host several student social mixers, as well as prizes that can be won by participating in quizzes and interactive games.**

For nearly 20 years the International Milk Genomics Consortium (IMGC) has been the world's signature organization linking scientific research on lactation and milk to their applications in human health, from babies to adults. IMGC will hold its [17th annual conference](#) October 13–16, 2020 in a lively, engaging, and interactive virtual format. The conference will bring together a multidisciplinary field of experts from all over the world to discuss their scientific research on milk and human health. Registration for the conference is happening [here](#).



IMGC VIRTUAL Symposium 2020 will host two sessions each day for four days, with talks followed by chat room discussions with the speakers. Student social mixers will follow sessions to foster engagement with students from all over the world. Attendees may also win prizes by participating in games and quizzes about the talks and various milk-related topics. The symposium is designed to cultivate collaboration across disciplines and countries to move the field of milk science forward and help translate basic research into practical impacts on health.

Here are highlights of IMGC VIRTUAL Symposium 2020:

The first day unfolds with the hot topic, "Microbiome 2.0." The morning begins with opening remarks by Professor Bruce German, who will bridge the gap between milk's scientific discoveries and their health utility for attendees to learn how to translate lactation research for a pandemic world. Next, Professor David Mills from the University of California Davis will deliver the keynote address on the major scientific discovery describing how specific human milk components enrich specific protective taxa in the gut microbiome. From Professor Helen Raybould's lab at the University of California Davis, Postdoctoral Scholar Sunhye Lee will present findings on the effects of feeding the oligosaccharide 2'-fucosyllactose on intestinal barrier integrity and metabolic functions in mice. Dr. Giorgio Casaburi from Evolve BioSystems, Inc. will show metagenomic data of the gut microbiome that explain the widely varying abundance of antibiotic resistance genes in term infants in the US.

The 2019 Most Valuable Presentation award recipient, Dr. Christopher Stewart from Newcastle University, will update attendees on progress since his 2019 talk. In the afternoon, Professor Meghan Azad from the University of Manitoba and recipient of the Outstanding Mid-Career Investigator Award will speak about

the CHILD Study involving 3,500 Canadian families, which is studying the relationships among breastfeeding, infant microbiomes, and health and disease trajectories. Professor Sharon Donovan from the University of Illinois Urbana-Champaign will wrap up the Microbiome 2.0 session by connecting early gut colonization with firmicutes to weight gain in infants from the STRONG Kids 2 Cohort.

The next session, "Immunity, Autoimmunity and Inflammation: the 21st Century's BIG Challenge," will begin with Outstanding Early Career Investigator Awardee Dr. Bethany Henrick, Director of Immunology & Diagnostics at Evolve BioSystems, Inc., revealing the role of the gut microbiome and development of the immune system during infancy. Dr. Veronique Demers-Matthieu from Medolac Laboratories and the University of Massachusetts Amherst completes the day with the investigation of SARS-CoV-2-related antibodies in human milk.

Day 2 starts with "Immunity, Autoimmunity and Inflammation: the 21st Century's BIG Challenge," as keynote speaker Professor Belinda van't Land from University Medical Center Utrecht and Scientist at Danone Nutricia will present her work on the immune modulating- and mucosal barrier-supporting properties of human milk oligosaccharides.

Student Award recipient Ling Xiong from Wageningen University and Research will address mechanistic relationships between heat damage to whey proteins and allergy development. Professor John Lippolis from Iowa State University and scientist of the National Animal Disease Center and Agricultural Research Service at the USDA will present findings on the effects of Holstein breeding on mastitis resistance. This session closes with speaker Professor Rebecca Powell from Icahn School of Medicine at Mount Sinai, who will present findings on SARS-CoV-2 immune responses in human milk following recovery from COVID-19.

In the afternoon, Day 2 moves to "Milk Structure-Function: Molecules in the Matrix," with the keynote address by Professor Ben Boyd from Monash University on his breakthrough discoveries of milk lipids and their self-assembly during digestion. Professor Nina Poulsen from Aarhus University will share findings showing that feed source and lactation stage affect the posttranslational modifications of cow milk caseins. Professor Michelle (Shelley) McGuire from the University of Idaho will present results on the variation in milk microbiomes and human milk oligosaccharides from the international INSPIRE Study. The day ends with a presentation on the antimicrobial and bifidogenic activities of milk peptides in the intestinal tract of breastfed infants by Student Award recipient Robert Beverly from Oregon State University.

Day 3 continues with the session topic "Milk Structure-Function: Molecules in the Matrix," with an in-depth analysis of the regulation and health implications of milk fat globule size by Outstanding Mid-Career Investigator Award recipient and Senior Lecturer, from Hebrew University of Jerusalem, Dr. Nurit Argov-Argaman. Professor Robert Ward from Utah State University completes the session with the dose-dependent improvement of casein-sugar Maillard reaction products on metabolic regulation studied in a rodent model.

Day 3 will switch gears to "Comparative Biology: Mining the Wisdom of Evolution," and open with Outstanding Mid-Career Investigator Award recipient Professor Katie Hinde from Arizona State University on the interactions between milk in early life and brain activity and social behavior in adolescent rhesus macaques. Dr. Yue Xing from Texas A&M University will follow with a presentation on regulatory long-non-coding RNAs in the cow mammary gland.

In the afternoon, Professor Kevin Nicholas from Monash University, winner of this year's Career Award, will deliver the keynote address on the development of innovative strategies to improve health outcomes of preterm infants using marsupials as an evolutionary model for lactation. Then Student Award recipient Sierra Durham from the University of California Davis describes the development of platforms to compile milk oligosaccharide profiles of mammalian species for potential commercial isolation.

Day 3 will close with the session "Artificial Intelligence (AI) for the Future of Agriculture, Food, and Health," with the keynote address by Professor Victor Cabrera from the University of Wisconsin-Madison on the development of a real-time, data-integrated, data-driven, continuous decision-making engine to

collect, integrate, manage, and analyze on- and off-farm data for practical and relevant actions. Dr. Liliana Fadul-Pacheco from the University of Wisconsin-Madison completes the day demonstrating her research on the use of machine learning algorithms to predict clinical mastitis.

Day 4 will open with a presentation on the future of artificial intelligence in nutrition research by Outstanding Mid-Career Investigator Award recipient Dr. Danielle Lemay from the Western Human Nutrition Research Center/USDA. Finally, data scientist Sufyan Kazi from Evolve BioSystems, Inc. completes the session illustrating the use of artificial intelligence to identify biomarkers of necrotizing enterocolitis in the preterm infant gut microbiome.

Day 4 begins with the conference's final topic, "Innovative technologies in milk science for human health." Distinguished Professor Carlito Lebrilla from the University of California Davis will deliver the keynote address on the development of tools to characterize various carbohydrate structures in human milk and weaning foods. Dr. Randall Robinson from the University of California Davis continues on novel methods to quantify human milk oligosaccharides.

Keynote speaker Professor Daniela Barile from the University of California Davis will begin the afternoon session with the promise of new "omics" techniques for high-throughput analysis of milk oligosaccharides to enhance dairy sustainability. Student Award recipient Syaza Binte Abu Bakar from Monash University will show the differences in the self-assembly of lipids during the digestion of human colostrum and emulsified colostrum-mimicking lipid mixtures, and their potential interactions with bioactive proteins. Dr. Jayne Martin Carli from University of Colorado Anschutz Medical Campus will present research strategies for the utility of single cell RNA sequencing technology to understand maternal phenotype during lactation. The session will wrap up with an overview of the IMGC's monthly publication, "SPLASH! milk science update," the very same publication you are currently reading, by Dr. Danielle Lemay, the publication's Executive Editor. Since its first issue in 2012, SPLASH! has published more than 380 articles and is read by more than 1,700 subscribers around the world, regularly attracting more than 80,000 readers a year to the IMGC website. The conference will wrap up with closing remarks, including where the 2021 conference will take place, by IMGC Director of Scientific and Strategic Development, Dr. Jennifer Smilowitz.

The four-day symposium is organized by the IMGC with support from current Elite and Premier sponsors including Arla Foods, California Dairy Research Foundation, Danone Nutricia Research, Dutch Dairy Association, and Gold sponsor National Dairy Council.

*Contributed by  
Dr. Sandeep Ravindran  
Freelance Science Writer  
Sandeep.com*

## California's Dairy Industry Has Grown Kinder to the Environment

- **An analysis of greenhouse gas emissions from California's dairy industry has found substantial improvements per unit of milk produced, between 1964 and 2014.**
- **Emissions in 2014 were less than 55% what they were in 1964, per unit of milk produced.**
- **The study pointed to the potential for improvements in how manure is stored in the state, and that solid-form storage would bring further greenhouse gas reductions.**

Milk is big business in California. It's the agricultural product that brings in more farm revenue than any other in the state. It employs about 190,000 workers, and involves 1.78 million cows. Indeed, dairy has been important to California's economy for decades, and over time innovations in animal husbandry, feeding and in growing crops that dairy cows eat have led to substantial changes in greenhouse gas emissions. Recently, Ermias Kebreab and his colleagues at the University of California, Davis, calculated exactly how much these emissions have changed in the 50 years from 1964 to 2014 [1]. Although the total emissions from the state's dairy industry increased over that period, the state also produced much

more milk, and the industry has become more efficient in terms of its emissions.



As well as milk being important to California, California's milk production is important to the US. The dairy industry has a long history in the state. It's thought that the state's export of cheese, for example, began in the year 1800, when a Russian commander called Ivan Kuskow sent produce from Sonoma to Russian settlements in Alaska [2]. In the 25 years from 1975 to 2000, the state's dairy industry boomed. California went from producing 9.4% to 19.2% of total US milk production, and overtook Wisconsin to become the state that produced more than any other [3]. These days, about 40% of California's milk leaves the state as different kinds of processed milk product, such as cheese, milk powder, butter, and whey [4].

Assessing the greenhouse gas (GHG) emissions of this activity requires a lot of data about all of the inputs and outputs of dairy farming. It also requires fairly complex modelling. The research team pulled together data to describe each aspect of four processes—feed production, enteric methane, manure storage, and farm management—as part of a life-cycle assessment (LCA). These kinds of assessments sometimes only consider carbon footprints, but Kebreab and his colleagues opted instead for a more comprehensive analysis that included water and land use. They also opted to run two different LCA models to see how different the results were for different sets of assumptions in the modelling. The first model used primary data from five Californian dairy farms. The second used off-the-shelf numbers from the California Department of Food and Agriculture. Everything was inputted in tremendous detail. For example, separate dietary data were used for calves, heifers, pregnant heifers, close-up heifers, and lactating and dry cows in 1964, and further categories were added for the 2014 analysis.

Overall, the GHG emissions for 2014 on average ranged between 1.12 and 1.16 kg of CO<sub>2</sub>e/kg of energy-corrected milk, depending on the specifics of the diet modelled. Energy-corrected milk is a standardized way of measuring milk produced, adjusted so that the milks across all cows and farms have the same fat (here, 4%) and protein (3.3%) content. In 1964, the GHG emissions were 2.11 kg of CO<sub>2</sub>e/kg of energy-corrected milk, so the GHG emissions per bottle of milk have reduced substantially. There have been improvements across the board. Emissions from enteric methane and manure have been cut in the process of producing a unit of milk, as have water use and land requirements. California's dairy industry has fairly low emissions compared with the same industry elsewhere in the US.

However, not every aspect of dairy farming has improved to the same extent. The team's models revealed that methane from manure made up about 41% of the industry's GHG emissions in 2014, compared with just less than a quarter (24.5%) of its emissions in 1964. The root cause of this appears to be the way that manure is commonly managed in the state. It is often stored in "lagoons" as opposed to in solid form, which means that the methane conversion factor from manure is higher than it could be.

Reductions in water use—an important matter in a state that is prone to droughts—have been achieved through more careful farming of crops that comprise animal feed, as well as through genetic improvements that have led to sturdier crops that do not need as much watering. There have also been increased yields in these crops over the years. In turn, the greater yields have meant that the amount of land required to grow enough food to feed a cow for a year has come down.

This assessment points to important successes. Yet it should be considered alongside the fact that the state's dairy industry grew dramatically during the period studied. The number of dairy cows in California has more than doubled. Many Californians would probably agree that an industry that grows this much has a responsibility to keep asking how it could strive to further reduce its environmental footprint. The value of this study is that it brings answers to this question that farmers can take note of, and that industry organizations, and potentially the government, could take action to support.

1. Naranjo A., Johnson A., Rossow H. & Kebreab E. 2020. Greenhouse gas, water, and land footprint per unit of production of the California dairy industry over 50 years. *J. Dairy Sci.* 103:3760–3773.
2. Milestones in CA Cheese History, The California Dairy Press Room and Resources. Accessed 19 July 2020. Available at: [https://www.californiadairypressroom.com/Press\\_Kit/Milestones](https://www.californiadairypressroom.com/Press_Kit/Milestones)
3. Blayney D. P. June 2002. The Changing Landscape of U.S. Milk Production. *Statistical Bulletin Number 978*, United States Department of Agriculture.
4. Sumner D. A., Medellín-Azuara J. & Coughlin E. 2015. Contributions of the California Dairy Industry to the California Economy: A Report for the California Milk Advisory Board, University of California Agricultural Issues Center.

Contributed by

Dr. Anna Petherick

Departmental Lecturer in Public Policy

Blavatnik School of Government

University of Oxford

[www.annapetherick.com](http://www.annapetherick.com)

## Breastfeeding May Lower Risk of Early Menopause

- Early menopause is associated with poor health outcomes, but the relationship between risk of early menopause and reproductive factors has received little attention.
- A prospective study of over 100,000 women found that a higher number of pregnancies and a longer duration of breastfeeding both influenced the risk of early menopause.
- Women who exclusively breastfed for at least 6 months had a lower risk of early menopause, independent of how many times they were pregnant.
- Following current public health guidelines to breastfeed for 6 months could have positive health effects on women.

Recommendations from both the World Health Organization (WHO) and the American Academy of Pediatrics (AAP) to breastfeed exclusively for the first 6 months of life were developed to optimize infant health. But new research [1] suggests the mother's health may benefit from following these breastfeeding guidelines as well.



A study of over 100,000 women found that exclusively breastfeeding for at least 6 months lowered the risk of early menopause (defined as menopause before 45 years of age) [1]. Early menopause is not a concern simply because of the symptoms related to hormonal changes; menopause before age 45 has been associated with an increased risk of cardiovascular disease, neurological diseases such as Parkinson's, osteoporosis, and an increased risk in overall mortality [2].

The age at which a woman experiences menopause—clinically defined as 12 months from the cessation of menses—varies across populations due to biology (e.g., the number of oocytes she is born with, how quickly those oocytes are depleted, hormone levels) and the interaction of these biological factors with culture (e.g., smoking, body weight, nutrition, use of oral contraceptives) [3]. Reproductive events such as pregnancy and breastfeeding have the potential to influence the rate of oocyte depletion because both interrupt ovulation. During pregnancy, higher levels of estrogen inhibit the production of follicle stimulating hormone (FSH), a hormone necessary for releasing an oocyte from the ovaries. Milk production, in itself, does not necessarily inhibit FSH. Instead, the resumption of ovulation depends on nursing intensity. Although this intensity was originally thought to be represented by how frequently an infant nursed, it is now better understood as relating to how much of a mother's energetic budget she "spends" on milk production [4]. Maternal hormones, including prolactin, will inhibit ovulation when the energetic demands of milk production are high relative to the mother's overall energetic budget. This explains why ovulation is usually suppressed during the first months of lactation when mothers are

providing the infant's only form of nutrition and the daily energetic cost is estimated to be near 500 kilocalories [3].

The most recent study to examine the relationship between reproductive factors that suppress ovulation and timing of menopause is also the largest to date and one of the few to be prospective in design [1]. Unlike cross-sectional studies that look across a study population at one point in time and rely on recall data, prospective studies recruit participants before the outcomes of interest occur, allowing for a better understanding of cause and effect.

The study population comes from the Nurses' Health Study II, which recruited 108,887 premenopausal nurses between the ages of 25 and 42 years old and collected data every two years, between 1989 and 2015, on life history events, diet, smoking, and other important variables that influence menopause. Parity was defined as the number of pregnancies lasting more than six months. The data on breastfeeding was more detailed so the researchers could identify exclusive and intense breastfeeding behavior, as this is most likely to suppress ovulation. They asked participants about the timing and use of formula, introduction of solids, if and when pumping was introduced, and when infants stopped nursing at night. With this information, they were able to discern cumulative exclusive breastfeeding, or how long the mothers provided only breastmilk and no other liquids or solids, across all of their offspring, compared with cumulative total breastfeeding, or the sum of exclusive and nonexclusive breastfeeding.

Women with more pregnancies and a longer duration of breastfeeding (both exclusive and cumulative total breastfeeding) had a lower risk of reaching menopause naturally before the age of 45. Looking at these two reproductive events separately, the researchers found that women who had never been pregnant had an increased risk of early menopause and the risk decreased with increasing parity (up to four pregnancies) [1]. Importantly, they also found that the effect of breastfeeding on risk was independent of parity. Within each group of women that had one, two, or three pregnancies, those that reported exclusive breastfeeding for 7 to 12 months had the lowest risk of early menopause [1]. This finding was novel and suggests that previous studies [e.g., 5] that only accounted for parity as a mediator in risk of early menopause may have incorrectly attributed benefits from breastfeeding to pregnancy [1]. Another important finding of this study was that the effect of exclusive breastfeeding on the risk of early menopause was not linear. Risk reached a threshold somewhere between 6 and 12 months of exclusive breastfeeding [1]. This finding makes sense biologically because the energetic cost of breastfeeding over time is also not linear. As an infant grows and their energetic requirements increase, human mothers do not respond by producing more milk or making higher energy milk. Mothers simply could not keep up with those energetic demands [6]. Instead, infants are supplemented with other foods and liquids, usually around the six-month mark. At this time, the daily energetic cost to the mother decreases and, for many but not all mothers, the hormonal stop signs for ovulation are removed.

Breastfeeding has been shown to decrease the mother's risk of [stroke](#), [cancer](#), and cardiovascular disease [7]. And now a large, prospective study [1] suggests that following current public health guidelines to nurse exclusively for six months can decrease a woman's risk of early menopause. Public health initiatives aimed at increasing the number of women who breastfeed for at least six months should emphasize the positive benefits to both maternal and infant health. The results of this study also speak more broadly to the need for public policy that supports a mother's ability to meet this breastfeeding milestone, such as longer paid maternity leave.

1. Langton CR, Whitcomb BW, Purdue-Smithe AC, Sievert LL, Hankinson SE, Manson JE, Rosner BA, Bertone-Johnson ER. 2020. Association of parity and breastfeeding with risk of early natural menopause. *JAMA Network Open* 3, e1919615-e1919615.
2. Shuster LT, Rhodes DJ, Gostout BS, Grossardt BR, Rocca WA. 2010. Premature menopause or early menopause: long-term health consequences. *Maturitas* 65(2): 161-166.
3. Ellison PT. 2001. *On Fertile Ground: A Natural History of Human Reproduction*. Harvard University Press: Cambridge, USA.
4. Vallengia C, Ellison PT. 2009. Interactions between metabolic and reproductive functions in the resumption of postpartum fecundity. *American Journal of Human Biology: The Official Journal of the Human Biology Association* 21(4): 559-566.
5. Mishra GD, Pandeya N, Dobson AJ, Chung HF, Anderson D, Kuh D, Sandin S, Giles GG, Bruinsma F, Hayashi K, Lee JS. 2017. Early menarche, nulliparity and the risk for premature and early natural menopause. *Human Reproduction* 32(3): 679-686.
6. Hinde and Milligan. 2011. Primate milk: proximate mechanisms and ultimate perspectives. *Evolutionary Anthropology* 20: 9-23.

*Contributed by  
Dr. Lauren Milligan Newmark  
Researcher, Science Writer*

## Turkish Mothers Show Fermented Food Products Protect against Mastitis

- **A study of mothers with and without mastitis shows that consuming fermented foods is associated with lower incidence of the condition.**
- **All six types of fermented foodstuffs assessed were found to be protective, including lacto-fermented pickles.**
- **The study also found that eating or drinking many different types of fermented foods was associated with a lower risk of mastitis.**

The idea of using probiotics in place of antibiotics was born in the dairy industry. But in recent years, humans as well as cows have been taking probiotics as alternative treatments for mastitis, especially as multidrug resistance has become more commonplace. Evidence that probiotics work has been gathering. Until recently no study had evaluated one easily available source of them—fermented foods such as kefir—alongside mastitis' common risk factors. Based on interviews about fermented food-product consumption with more than 600 Turkish women, a new study finds that both the frequency with which mothers consume these foodstuffs, and the diversity of the products that they consume, are associated with lower odds of developing mastitis [1].



Turkey is the perfect place for such a study. First, fermented food products are popular there, and many different kinds are widely available. The study in question, by Pelin Basım and Yasar Ozdenkaya of Medipol University, in Istanbul, assessed the consumption of no fewer than six types of fermented foodstuffs. These included four liquid foods—kefir, homemade yogurt, conventional yogurt, boza (a fermented drink made from wheat and yeast)—and two more solid kinds of fermented foods, tarhana (a grain that is mixed with yogurt or fermented milk) and pickles. The pickles in question are vegetables such as cucumbers that are fermented with lactic acid bacteria, which, as in yogurt, are crucial to the fermentation (or pickling) process.

Second, the specific substrains of lactic acid bacteria and yeasts found in Turkish fermented foods have been shown to be the same as those that are known to be effective in the treatment of staphylococcal mastitis [2]. This means that there was a good chance of the study finding a result, if a protective effect truly of consuming fermented foods exists.

The study established two groups of mothers. One group had not reported any signs of lactational mastitis. Before these women were included in the study, physicians examined their breasts to check that they were really infection-free. The same doctors examined mothers in the other group, which was made up of women who were having episodes of mastitis while they were breastfeeding. Sometimes ultrasound was used to check the diagnosis. On average, having mastitis or not was the only identified difference between the two groups, which were statistically the same by age, income, education, body mass index, and number of pregnancies and births.

The researchers administered a face-to-face interview, using a questionnaire, to both groups of mothers. The purpose of the questionnaire was not only to find out about fermented-foodstuff eating or drinking habits, but also to probe whether the women had risk factors that the medical literature associates with mastitis. Infection of the mammary gland has, for example, been linked to developing cracked nipples or some sort of nipple trauma, and to using antibiotics around the time of giving birth. For each of the six types of fermented foods in the study, the participants were asked whether they consumed them once or

less than once per month, once a week, two or three types per week, or every day.

Both the frequency with which women reported eating or drinking these foods and diversity of consumption across these foods mattered in the results. When the researchers analyzed the frequency of consumption of the six types of food one by one, all six were associated with lower incidence of mastitis. Surprisingly, perhaps, pickles had the strongest association. Women who said that they ate pickles every day were 4.5 times less likely to develop mastitis than women who ate pickles less frequently. The analogous results were 1.4 times for daily consumption of kefir, 1.2 times for daily consumption of yogurts, and 1.9 times for daily consumption of tarhana.

For the most part, the study confirmed that many of the protections against mastitis already found in the literature appear to work in the Turkish context. Of particular note, receiving breastfeeding education from an expert was linked to ten times greater protection against developing mastitis than not doing so. Moreover, women in the group confirmed to not have mastitis on average consumed three different kinds of fermented foodstuffs; those in the group with mastitis consumed one fewer kind, on average.

This study adds weight to the evidence that fermented foods offer a cheap means of reducing the odds of developing mastitis. The question, of course, is how they do so. Various mechanisms have been suggested. For example, some studies propose that lactic acid bacteria increase IgA antibodies and transform growth factor b2 in the milk in the breast, which in turn makes it harder for bacteria to attach to the mammary epithelium [3]. But, for the time being, to know the extent to which drinking kefir helps to ward off a desperately uncomfortable condition, compared with everything else that a mother can do, is valuable.

1. Basim P. and Ozdenkaya Y. 2020. Can Traditional Fermented Food Products Protect Mothers Against Lactational Mastitis. *Breastfeed. Med.* 15 (3): 1-7.
2. Sanlier N., Gokcen B.B., and Sezgin A.C. 2019. Health Benefits of Fermented Foods. *Crit. Rev. Food. Sci. Nutr.* 59: 506–527.
3. Arroyo R., Martin V., Maldonado A., Jimenez E., Fernandez L., and J.M. Rodriguez. 2010. Treatment of Infectious Mastitis During Lactation: Antibiotics Versus Oral Administration of Lactobacilli Isolated from Breast Milk. *Clin. Infect. Dis.* 50: 1551–1558.

*Contributed by*

*Dr. Anna Petherick*

*Departmental Lecturer in Public Policy*

*Blavatnik School of Government*

*University of Oxford*

*[www.annapetherick.com](http://www.annapetherick.com)*

Editorial Staff of *SPLASH!*® milk science update:

*Dr. Danielle Lemay, Executive Editor*

*Dr. Katie Rodger, Managing Editor*

*Dr. Anna Petherick, Associate Editor*

*Dr. Lauren Milligan Newmark, Associate Editor*

*Dr. Sandeep Ravindran, Associate Editor*

*Prof. Peter Williamson, Associate Editor*

*Cora Morgan, Editorial Assistant*

**Funding provided by California Dairy Research Foundation and the International Milk Genomics Consortium.**

**The views and opinions expressed in this newsletter are those of the contributing authors and editors and do not necessarily represent the views of their employers or IMGC sponsors.**