

ABSTRACTS

Editorial: Socially-responsible media: #totweetornottotweet?

Christopher H Knight

Denmark

Language is wonderful! This Editorial considers the evolution of forms of communication with a focus on the merits and demerits of social media, from bells and smoke signals through to the modern media jungle. Tweet, comment, post, tag, like, retweet, chat and all the rest of it because, like it or not, if we don't participate we shall be left behind.

Invited review: Biomarkers of fitness and welfare in dairy animals: healthy living

André M. de Almeida, Maya Zachut, Lorenzo E. Hernandez-Castellano, Marcela Šperanda, Gianfranco Gabai,* and Ali Mobasheri

Portugal, Israel, Denmark, Croatia, Italy, Finland, Lithuania and UK

Abstract

Increased animal productivity has reduced animal fitness, resulting in increased susceptibility to infectious and metabolic diseases, locomotion problems and subfertility. Future animal breeding strategies should focus on balancing high production levels with health status monitoring and improved welfare. Additionally, understanding how animals interact with their internal and external environment is essential for improving health, fitness, and welfare. In this context, the continuous validation of existing biomarkers and the discovery and field implementation of new biomarkers will enable us to understand the specific physiological process and regulatory mechanisms used by the organism to adapt to different environmental conditions. Thus, biomarkers may be used to monitor welfare and improve management and breeding strategies. In this article, we describe major achievements in the establishment of biomarkers in dairy cows and small ruminants. This review mainly focuses on the physiological biomarkers used to monitor animal responses to, and recovery from, environmental perturbations. We highlight future avenues for research in this field and present a timely positioning document to the scientific community.

Significant genetic effects of JAK2 and DGAT1 mutations on milk fat content and mastitis resistance in Holsteins

Muhammad Zahoor Khan, Di Wang, Lei Liu, Tahir Usman, Hui Wen, Ruiqiang Zhang, Shuli Liu, Liangyu Shi, Siyuan Mi, Wei Xiao and Ying Yu

China and Pakistan

Abstract

Improving the production traits and resistance against mastitis in dairy cattle is a challenge for animal scientists across the globe. The present study was designed to investigate the genetic effects of single nucleotide polymorphisms (SNPs) in Janus kinase 2 (JAK2) and diacylglycerol acyltransferase (DGAT1) genes with production and mastitis-related traits. Four SNPs in JAK2 and one in DGAT1 were analyzed through Chinese Cow's SNPs Chip-I (CCSC-I) and genotyped in a population of 312 Chinese Holsteins. Our findings demonstrated that milk fat percentage, somatic cell count (SCC), somatic cell score (SCS), serum cytokines interleukin 6 (IL-6) and interferon gamma (IFN- γ) showed significant associations ($P < 0.05$) with at least one or more identified SNPs. Consequently, the analysis based on haplotypes amongst the SNPs in JAK2 revealed noteworthy ($P < 0.05$) association with SCC and IL-6. Collectively, our results verified the pleiotropic ability of detected SNPs in bovine JAK2 and DGAT1 for milk fat percentage as well as mastitis-related traits. The significant SNPs in both the genes could serve as powerful genetic markers to minimize mastitis risk. In addition, besides SCC and SCS, the IFN- γ and IL-6 could also be used as indicators of improved genetic resistance against mastitis.

Rumen-protected methionine supplementation during the peripartal period alters the expression of galectin genes associated with inflammation in peripheral neutrophils and secretion in plasma of Holstein cows

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USA and China

Abstract

The work described in this research communication aimed to investigate whether rumen-protected methionine (Met) supplementation during the periparturient period would affect the expression of galectins in blood-derived neutrophils, and secretion of galectins, IL(Interleukin)-1 β , IL-6, myeloperoxidase(MPO), and glucose in plasma. Because supplementation of rumen-protected Met would alleviate inflammation and oxidative stress during the peripartal period, we hypothesized that enhancing Met supply would benefit the innate immune response at least in part by altering the expression of galectin genes associated with neutrophil activity and inflammation. Galectins (Gal) have an immuno-modulating effect acting like cell-surface receptors whose activation often results in signaling cascades stimulating cells such as neutrophils. This study revealed an association between Met supplementation and galectin expression and secretion. This implies that galectin expression and secretion can be modulated by Met supplementation. Further studies are needed to evaluate the regulation of galectin gene expression for therapeutic and dietary intervention in the peripartal cow.

Sensitivity of buffaloes (*Bubalus bubalis*) to heat stress

Bishwa Bhaskar Choudhary and Smita Sirohi

India

Abstract

Based on ten years of data (2001-10), consisting of 12673 observations on fortnightly milk yield of buffaloes reared in a dairy farm located in the Northern sub-tropics (29° 41' 0" N, 76° 59' 0" E), the present study establishes the relationship between weather conditions and production performance of lactating buffaloes. The critical threshold level of maximum temperature-humidity index (THI) was estimated to be 74, which is higher than that of crossbred cows. The duration of discomfort period for buffaloes begins in mid-March and lasts up to early November. During the aggravated stress condition (THI >82) prevailing in the region for about 5 months starting from early May, milk productivity declines by more than 1% per unit increase in maximum THI over 82. The maximum temperature and minimum humidity (viz. maximum THI) are the most critical weather parameters causing thermal stress in animals, however, the climatic conditions in the region are such that not only maximum but also minimum THI crosses the critical threshold providing little relief to the animals during the night.

Comparison of cortisol concentrations in plasma and saliva in dairy cattle following ACTH stimulation

Alexander Riek, Lars Schrader, Frank Zerbe and Stefanie Petow

Germany

Abstract

The experiments described in this research communication compared cortisol concentrations in plasma and saliva samples collected from dairy cattle before and after an adrenocorticotrophic hormone (ACTH) application. For that purpose, blood and saliva samples were collected from five dairy cows at determined time intervals before (490 min and down to 0 min) and after (10 min and up to 500 min) an ACTH application. Mean baseline cortisol concentrations were greater in plasma compared to saliva. The relative increases and decreases in plasma and salivary cortisol concentrations following ACTH were similar. After ACTH, we observed an increase in cortisol concentrations in plasma after 10 min and in saliva after 20 min. The time of peak concentrations after ACTH were reached at 70 min and 80 min for plasma and saliva, respectively. After peak concentrations, values steadily declined and returned to baseline values at 169 \pm 15 min in plasma and 170 \pm 14 min in saliva. Ratios between salivary and plasma cortisol concentrations were on

average 0.09 and did not change substantially during the ACTH challenge. There was a strong positive relationship between salivary and plasma cortisol concentrations. These results indicate that salivary cortisol concentrations can be a good indicator of ACTH-induced plasma cortisol concentrations in dairy cattle.

Evaluation of automatic milking system variables in dairy cows with different levels of lactation stage and reproduction status

Vida Juozaitiene, Arunas Juozaitis, Judita Zymantiene, Ugne Spancerniene, Ramunas Antanaitis, Vytuolis Zilaitis, Saulius Tusas and Ayhan Yilmaz

Lithuania and Turkey

Abstract

In this study, we hypothesized that differences of automatic milking systems (AMS) variables in dairy cows during estrus and through diverse stages of lactation can be suggested as alternative indicators to support the pregnancy in dairy farms using automatic milking systems. The key objectives were: 1) to determine the variation of automatic milking system indicators during lactation and to estimate the relationship with reproduction status in dairy cows; 2) to test the hypothesis that milking traits of cows can be influenced by estrus and conceiving, and can be used as a predictor of the likelihood of reproductive success in dairy herds. Estrus synchronization was performed in 368 healthy Lithuanian Black and White cows. All cows (n=368) were synchronized and inseminated for the first time on the 91st day in milk (DIM). Cows not pregnant (17.39%) were synchronized and inseminated again at 132 DIM. After the first insemination pregnant (n=304) cows were identified as group 1, after the second insemination pregnant (n=58) cows - as group 2. Overall, 1 201 713 records of udder quarters in cows from 5 to 305 DIM were evaluated. The results revealed the reduction in milk yield during estrus 11.05% on 91 DIM and 13.89% on 132 DIM (P <0.001) and an increment in milk flow traits in cows after 91 DIM (P <0.05), also a slight decline in milk flow traits on 132 DIM. Furthermore, milking frequency (MF) of cows decreased significantly (P <0.001) after conceiving. The interval between milkings (MI) increased (40.30%) during estrus of cows in group 1 (P <0.001), and thereafter gradually increased, however in group 2 there was a temporary increment (6.06%) on the 91 DIM and steady rise (42.13%) on 132 DIM was noticed. The results highlight that changes in AMS indicators of cows may be considered as an additional tool for improvement of reproductive management in dairy herds, but further research-based studies are necessary before practical application.

Gene Microarray Integrated with iTRAQ-Based Proteomics for the Discovery of NLRP3 in LPS-Induced Inflammatory Response of Bovine Mammary Epithelial Cells

Yu Sun, Lian Lia, Chengmin Li, Genlin Wang and Guangdong Xing

China

Abstract

Mastitis, a major infectious disease in dairy cows, is characterized by an inflammatory response to pathogens such as *Escherichia coli* and *Staphylococcus aureus*. To better understand the immune and inflammatory response of the mammary gland, we stimulated bovine mammary gland epithelial cells (BMECs) with *E. coli*-derived lipopolysaccharide (LPS). Using transcriptomic and proteomic analyses, we identified 1019 differentially expressed genes (DEGs, fold change ≥ 2 and P-value < 0.05) and 340 differentially expressed proteins (DEPs, fold change ≥ 1.3 and P-value < 0.05), of which 536 genes and 162 proteins were upregulated and 483 genes and 178 proteins were downregulated following exposure to LPS. These differentially expressed genes were associated with 172 biological processes; 15 Gene Ontology terms associated with response to stimulus, 4 associated with immune processes, and 3 associated with inflammatory processes. The DEPs were associated with 51 biological processes; 2 Gene Ontology terms associated with response to stimulus, 1 associated with immune processes, and 2 associated with inflammatory processes. Meanwhile, several pathways involved in mammary inflammation, such as Toll-like receptor, NF- κ B, and NOD-like receptor signaling pathways were also represented. NLRP3 depletion significantly inhibited the expression of IL-1 β and PTGS2 by blocking caspase-1 activity in LPS-induced BMECs. These results suggest that NLR signaling pathways works in coordination with TLR4/NF- κ B signaling pathways via NLRP3-inflammasome activation and pro-inflammatory cytokine secretion in LPS-induced mastitis. The study highlights the function of

NLRP3 in an inflammatory microenvironment, making NLRP3 a promising therapeutic target in *Escherichia coli* mastitis.

Screening candidate microR-15a- IRAK2 regulatory pairs for predicting the response to *Staphylococcus aureus*-induced mastitis in dairy cows

Zhi Chen, Jingpeng Zhou, Xiaolong Wang, Yang Zhang, Xubin Lu, Yongliang Fan, Yongjiang Mao, Juan J. Looor and Zhangping Yang

China and USA

Abstract

We established a mastitis model using exogenous infection of the mammary gland of Chinese Holstein cows with *Staphylococcus aureus* and extracted total RNA from *Staphylococcus aureus*-infected and healthy mammary quarters. Differential expression of genes due to mastitis was evaluated using Affymetrix technology and results revealed a total of 1,230 differentially expressed mRNAs. A subset of affected genes was verified via Q-PCR and pathway analysis. In addition, Solexa high-throughput sequencing technology was used to analyze profiles of miRNA in infected and healthy quarters. These analyses revealed a total of 52 differentially expressed miRNAs. A subset of those results was verified via Q-PCR. Bioinformatics techniques were used to predict and analyze the correlations among differentially expressed miRNA and mRNA. Results revealed a total of 329 pairs of negatively associated miRNA/mRNA, with 31 upregulated pairs of mRNA and 298 downregulated pairs of mRNA. Differential expression of miR-15a and interleukin-1 receptor-associated kinase-like 2 (IRAK2), were evaluated by Western Blot and luciferase reporter assays. We conclude that miR-15a and miR-15a target genes (IRAK2) constitute potential miRNA-mRNA regulatory pairs for use as biomarkers to predict a mastitis response.

Effect of a pre-milking teat foam and a liner disinfectant on the presence of mesophilic and (proteolytic) psychrotrophic bacteria prior to milking

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Belgium

Abstract

Contamination of raw milk by psychrotrophs can lead to the production of heat-resistant proteases and subsequent spoilage of UHT milk. Therefore, this research communication evaluated the effect of a pre-milking teat disinfectant (active components: L-(+)-lactic acid and salicylic acid) and a liner disinfectant (active components: peracetic acid and hydrogen peroxide) on the number of mesophilic and (proteolytic) psychrotrophic bacteria prior to milking. The teat orifices of 10 cows were sampled using a swabbing procedure before and after treatment with a pre-milking teat disinfectant on six subsequent days. On the teat orifices, there was a small but statistically significant decrease in the psychrotrophic bacterial counts between pre and post dipping. No differences were observed for the mesophilic bacterial counts and proteolytic active counts. Liners were also sampled using swabs pre and post disinfection. No statistically significant decrease in the bacterial counts was observed post liner disinfection, although there was a numerical decrease. Sixty-two percent of the proteolytic psychrotrophs were pseudomonads: 16.5% of which were *P. fragi*, 14.3% *P. lundensis*, 10.0% *P. fluorescens* and 2.9% *P. putida*. Trinitrobenzenesulfonic acid (TNBS) analysis revealed a wide variety in proteolytic activity (from 0 to 55 μmol glycine/mL milk) and the presence of high producers. It can be concluded that there was only a minor effect of teat and liner disinfection on the psychrotrophic bacterial counts indicating that the measures presented did not result in a reduction of the targeted bacteria on teat orifices and liners.

Prevalence and antimicrobial susceptibility of udder pathogens isolated from dairy cows in Slovakia

Ivan Holko, Vladimír Tančín, Martina Vršková and Kristína Tvarožková

Slovak Republic

Abstract

The data presented in this research communication represent the first comprehensive report on the prevalence of udder pathogens and their resistance in Slovak dairy cattle breeds. A total of 633 milk

samples from 42 herds were tested. The most frequently isolated pathogens were coagulase negative staphylococci CNS or non-aureus staphylococci (NAS) followed by Escherichia (E.) coli, Staphylococcus (S.) aureus, Streptococcus (Str.) uberis and Streptococcus (Str.) agalactiae. Generally, isolated pathogens showed common resistance to aminoglycosides (streptomycin, neomycin), which are the most commonly used antibiotics to treat mastitis in Slovakia.

Upgrading the smallholder dairy value chain: a system dynamics ex-ante impact assessment in Tanzania's Kilosa district

Kanar Dizyee, Derek Baker and Amos Omoro

Australia and Tanzania

Abstract

This paper examines ex-ante impacts of two policy interventions that improve productivity of local-breed cows through artificial insemination (AI) and producers' access to distant markets through a dairy market hub. The majority of cattle in Kilosa district in Tanzania are local low productivity breeds kept by smallholders and agro-pastoralists. Milk production is seasonal, which constrains producers' access to distant urban markets, constrains producers' incomes and restricts profitability in dairy processing. We developed and evaluated an integrated system dynamics (SD) simulation model that captures many relevant feedbacks between the biological dynamics of dairy cattle production, the economics of milk market access, and the impacts of rainfall as an environmental factor. Our analysis indicated that in the short (1 year) and medium (5-year) term, policy interventions have a negative effect on producers' income due to high AI costs. However, in the long term (5+ years), producers' income from dairy cattle activities markedly increases (by, on average, 7% per year). The results show the potential for upgrading the smallholder dairy value chain in Kilosa, but achievement of this result may require financial support to producers in the initial stages (first 5 years) of the interventions, particularly to offset AI costs, as well as additional consideration of post-farm value chain costs. Furthermore, institutional aspects of dairy market hub have substantial effects on trade-offs amongst performance measures (e.g. higher profit vs. milk consumption at producer's household) with gain in cumulative profit coming at the expense of a proportional and substantial reduction in home milk consumption.

Influence of treatment and refrigeration time on antimicrobial activity of goat and sheep colostrum

Maria D. Ruiz-Diaz, Anastasio Argüello, Daniel Padilla, Bernadette Earley and Noemi Castro

Spain, Ireland and UK

Abstract

The aim of the studies presented in this research communication was to compare species of origin (goat and sheep) and the effect of treatment (pasteurization at 56, 63 and 72 °C, skimming and curding) and refrigeration time on colostrum antimicrobial activity (AnAc). Two experiments were performed. In experiment 1, twenty-four first milking colostrum samples were obtained (12 goats, 12 sheep) and an aliquot of each sample was subjected to 6 different treatments, control (untreated), pasteurization at 56, 63 and 72 °C, skimming and curding. Colostrum AnAc was tested directly against E. coli using disks in a Petri dish and Enrofloxacin (antibiotic) and saline serum as positive and negative control, respectively. Species had no effect ($P>0.05$) on colostrum AnAc, and neither did pasteurisation at different temperatures or skimming. However, curding showed the lowest colostrum AnAc ($P<0.05$) in both species. In the second experiment, four treatments were assayed, control, pasteurization at 56 and 63 °C and skimming. An aliquot of twelve goat colostrum samples were refrigerated after treatments for 10 days at 4 °C. Colostrum AnAc was measured at 0, 2, 4, 6, 8, and 10 days. A reduction in colostrum AnAc was observed due to refrigeration time. The results suggest that if farmers use frozen colostrum for neonates, the process of curding colostrum or refrigeration at 4 °C longer than 4 days is not recommended.

The effect of physiological state, milk production traits and environmental conditions on milk fat globule size in cow's milk.

Leonie Walter, Sue Finch, Brendan Cullen, Richard Fry, Amy Logan and Brian J Leury

Australia

Abstract

This research was carried out to quantify the effects of a range of variables on milk fat globule (MFG) size for a herd of Holstein-Friesian cows managed through an automatic milking system with year-round calving. We hypothesised that the overall variation in average MFG size observed between individual animals of the same herd cannot sufficiently be explained by the magnitude of the effects of variables that could be manipulated on-farm. Hence, we aimed to conduct an extensive analysis of possible determinants of MFG size, including physiological characteristics (parity, days in milk, days pregnant, weight, age, rumination minutes, somatic cell count) and milk production traits (number of milkings, milk yield, fat yield, protein and fat content, fat-protein ratio) on the individual animal level; and environmental conditions (diet, weather, season) for the whole herd. Our results show that when analysed in isolation, many of the studied variables have a detectable effect on MFG size. However, analysis of their additive effects identified days in milk, parity and milk yield as the most important variables. In accordance with our hypothesis, the estimated effects of these variables, calculated using a multiple variable linear mixed model, do not sufficiently explain the overall variation between cows, ranging from 2.70 to 5.69 μm in average MFG size. We further show that environmental variables, such as sampling day (across seasons) or the proportion of pasture and silage in the diet, have limited effects on MFG size and that physiological differences outweigh the effects of milk production traits and environmental conditions. This presents further evidence that the selection of individual animals is more important than the adjustment of on-farm variables to control MFG size.

Application of a linear regression model to study the origin of C17 branched-chain fatty acids in caprine milk fat

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Spain

Abstract

This research communication addresses the hypothesis that a part of iso 17:0 and anteiso 17:0 in milk fat could come from endogenous extraruminal tissue synthesis. In order to confirm this a linear regression model was applied to calculate the proportions of iso 17:0 and anteiso 17:0 in milk fat that could come from elongation of their putative precursors iso 15:0 and anteiso 15:0, respectively. Sixteen dairy goats were allocated to two simultaneous experiments, in a crossover design with four animals per treatment and two experimental periods of 25 d. In both experiments, alfalfa hay was the sole forage and the forage to concentrate ratio (33:67) remained constant. Experimental diets differed on the concentrate composition, either rich in starch or neutral detergent fibre, and they were administered alone or in combination with 30 g/d of linseed oil. Iso 15:0, anteiso 15:0, iso 17:0 and anteiso 17:0, the most abundant BCFA in milk fat, were determined by gas chromatography using two different capillary columns. The regression model resolved that 49% of iso 17:0 and 60% of anteiso 17:0 in milk fat was formed extraruminally from iso 15:0 and anteiso 15:0 elongation.

Validation of strip tests for the rapid screening of ethanol residues in milk

Rafael Fagnani, Fernanda Montanholi de Lira and Carla Rosolém

Brazil

Abstract

The aim of this work was to use X-ray diffraction to identify substances used for adulteration of raw milk and to determine if crystallographic analysis can detect extraneous substances in milk. Two unknown substances were sent anonymously by employers linked to the dairy chain, who claimed that they were added directly in milk prior to water addition by truck drivers. The samples were analyzed by X-ray diffraction and submitted to physicochemical analysis. The first substance was identified by X-ray diffraction as sodium citrate, complying with its physicochemical attributes, such as the powerful ability to decrease the freezing point. The second substance was identified by X-ray diffraction as sucrose and this result was also in agreement with its ability to increase the density,

decrease the freezing point and finally, to be positive for sucrose in the resorcinol qualitative test. To evaluate if X-ray diffraction can detect extraneous substances already mixed in milk, fresh raw milk samples tampered with urea, sodium hydroxide, sodium citrate and sucrose were freeze dried and analyzed by X-ray diffraction, with no detection of any extraneous substances at any percentage. This is the first report of attempted diagnosis of extraneous substances in milk by X-ray diffraction. However, this technique can be useful only when applied to identify substances used for adulteration prior to its dilution in milk, once the amorphous nature of milk seems to be a limitation for the accurate detection of extraneous substances.

Lipoproteolytic capacity and potential of *Pseudomonas* spp. isolated from cold raw milk

Bruna de Moura Aguiar, Rosana de Longhi, Regina Celia Poli-Frederico, Rafael Fagnani and Elsa HW de Santana

Brazil

Abstract

The objective of the work described in this research communication was to determine the lipoproteolytic capacity and potential of *Pseudomonas* spp. from the microbiota of refrigerated raw milk. The influence of temperature and bacterial population on these activities was also evaluated. *Pseudomonas* spp. (PS) counts (30°C/48 h) were confirmed by PCR. Proteolytic (10% milk agar) and lipolytic capacities (PLC) (tributyryn agar) were evaluated (21°C/72 h). Proteolytic (PP) and lipolytic potential (LP) were assessed by measuring the diameter of the halos and were categorized as low or high. A total of 91.3% PS possessed PLC. The PP of 64.16% isolates was high and was frequently observed in PS from milk samples with higher counts and lower temperatures. The LP of 70.52% isolates was low, and higher LP was associated with low microbiological counts and temperatures. Genetic studies evaluating *Pseudomonas* spp. strains in the milking environment and investigating the origin of these isolates could be useful to improve the quality and shelf life of dairy products.

The impact of sodium chloride reduction on Grana-like cheese production and quality

Flavio Tidona, Marco Bernardi, Salvatore Francolino, Roberta Ghiglietti, Johannes A. Hogenboom, Francesco Locci, Vittorio Zambrini, Domenico Carminati and Giorgio Giraffa

Italy

Abstract

With the aim to reduce the Na content, hard cheeses manufactured using the same technology as for Grana Padano cheese (Grana-like) were salted using three brines containing different amounts of KCl (K-brines) and compared with control cheeses, salted with marine NaCl. A lower weight loss was observed in cheeses salted with K-brines (K-cheeses), whereas the yield and dry matter did not differ significantly between K-cheeses and controls. After 3 months of ripening (T3), the distribution of the Na cations (Na) was centripetal, with a higher Na concentration in the outer (0–3 cm of depth) layer, whereas the K cations (K) seemed to diffuse into the cheese more rapidly and homogeneously. Starting from the 6th month (T6), the distribution of both Na and K was stabilized through the different cheese layers. The use of the brine with the highest concentration of potassium (53.8% K) enabled us to successfully halve the Na content compared to the controls whereas, with the other brines, the reduction of Na was below 30%. At the end of ripening (T9), all the cheeses were without defects and the partial substitution of Na with K did not impact on the chemical composition, microbiological characteristics and ripening process. The sensory evaluation did not show any difference between K-salted and control cheeses in discriminant analysis.

5-Hydroxymethylfurfural formation and colour change in lactose-hydrolyzed Dulce de leche

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Brazil

Abstract

The work described in this Research Communication concerns the production of Dulce de leche (DL), that is a traditional product from South America obtained by concentration. Maillard reaction (MR)

products are mainly responsible for the formation of colour and flavor in this product. Lactose-hydrolyzed products have been developed to supply consumer demand, but this hydrolysis may affect the flavor, colour, taste, texture and even some nutritional aspects of the product. We studied the influence of different levels of lactose-hydrolysis, sucrose addition and initial pH on the development of MR, appraised by the determination of 5-hydroxymethylfurfural (HMF). A process simulator with multi-monitoring system was used to produce the fifteen DL. Box-Behnken 33 experimental design was applied for the three factors: pH, lactose-hydrolysis level and sucrose concentration. Lipids, protein, ashes, carbohydrates, water activity, dissolved solids, colourimetric analysis and HMF (free and total) are among the physicochemical attributes and MR indicators analyzed in this work. The products showed significant differences in composition but all the values were in agreement with the literature. Moreover, higher levels of lactose hydrolysis and higher pH presented a direct relation with the development of MR, observed by an increase in colouration (lower luminosity) and more formation of HMF, both free and total. The present study expands the knowledge about DL spread made of lactose-hydrolyzed milk, allowing the food industries to produce a lactose free DL with nutritional and sensory characteristics closer to the traditional product.

Effect of modified atmosphere packaging on physicochemical and microbiological characteristics of Graviera Agraphon cheese during refrigerated storage

Nikolaos Solomakos, Maria Govari, Evropi Botsoglou and Andreana Pexara
Greece

Abstract

The aim of this work was to examine the effect of modified atmosphere packaging on the physicochemical and microbiological changes of Graviera Agraphon cheese during refrigerated storage. Blocks of Graviera Agraphon cheese weighing around 200 g were packaged under natural (control) or modified atmosphere packaging (MAP) conditions (50% N₂ – 50% CO₂) and stored at 4°C or 10°C for up to 85 days. Prior to packaging, groups of cheese blocks were inoculated with one each of the following foodborne pathogens at around 10⁴ log cfu/g: *Listeria monocytogenes*, *Salmonella* Typhimurium, *Escherichia coli* O157:H7 or *Staphylococcus aureus*, whilst further groups of cheese blocks were not inoculated. The protein, fat, moisture and salt contents as well as the pH of control and MAP cheese samples did not change significantly (P>0.05) throughout 4°C storage, while the pH values of control and MAP cheese samples were significantly (P<0.05) reduced at 10°C storage. At 10°C storage, yeasts and molds, psychrotrophs and lactic acid bacteria (LAB) were significantly higher (P<0.05) for the normal atmosphere than the MAP cheese samples after the 4th, 8th and 4th days, respectively. At 4°C storage, the yeasts and molds or psychrotrophs were significantly higher (P<0.05) than those of control after the 6th and 15th days, respectively at 4°C storage. All foodborne pathogens showed a higher decrease (P<0.05) at 10°C than 4°C storage. *S. aureus* proved more sensitive in inactivation in the MAP conditions than atmospheric conditions. *L. monocytogenes* and *S. aureus* presented a higher decrease than that of *E. coli* O157:H7 and *S. Typhimurium*. In conclusion, MAP proved efficient in retarding the growth of yeasts, molds, psychrotrophs and *E. coli* O157:H7, *L. monocytogenes*, *S. Typhimurium* and *S. aureus* in Graviera Agraphon cheese during refrigerated storage at 4°C and 10°C.

Invited review: Cultivation media for lactic acid bacteria used in dairy products

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USA, Saudi Arabia and Bulgaria

Abstract

This review aims to familiarize the reader with research efforts on the cultivation media of lactic acid bacteria (LAB). We have also included a brief discussion on standard ingredients used in LAB media and chemically defined media as related to bacterial growth requirements. Recent research has focused on modifying standard media for the enumeration, differentiation, isolation, and identification of starter cultures and probiotics. Even though large numbers of these media have been developed to serve dairy microbial control, they have failed to provide consistent results. The research consequently points to the need to develop a reliable lactobacilli growth medium for the dairy industry.