

COLLECTED ABSTRACTS

Editorial: Breast is best, but also sadly least

Christopher H Knight

UK

A review of inbreeding depression in dairy cattle: current status, emerging control strategies, and future prospects

Miguel A. Gutiérrez-Reinoso, Pedro M. Aponte and Manuel García-Herreros

Ecuador, Chile and Portugal

Abstract

Dairy cattle breeding has historically focused on relatively small numbers of elite bulls as sires of sons. In recent years, even if generation intervals were reduced and more diverse sires of sons could have been selected, genomic selection has not fundamentally changed the fact that a large number of individuals are being analysed. However, a relatively small number of elite bulls are still siring those animals. Therefore inbreeding-derived negative consequences in the gene pool have brought concern. The detrimental effects of non-additive genetic changes such as inbreeding depression and dominance have been widely disseminated while seriously affecting bioeconomically important parameters because of an antagonistic relationship between dairy production and reproductive traits. Therefore, the estimation of benefits and limitations of inbreeding and variance of the selection response deserves to be evaluated and discussed to preserve genetic variability, a significant concern in the selection of individuals for reproduction and production. Short-term strategies for genetic merit improvement through modern breeding programs have severely lowered high-producing dairy cattle fertility potential. Since the current selection programs potentially increase long-term costs, genetic diversity has decreased globally as a consequence. Therefore, a greater understanding of the potential that selection programs have for supporting long-term genetic sustainability and genetic diversity among dairy cattle populations should be prioritized in managing farm profitability. The present review provides a broad approach to current inbreeding-derived problems, identifying critical points to be solved and possible alternative strategies to control selection against homozygous haplotypes while maintaining sustained selection pressure. Moreover, this manuscript explores future perspectives, emphasizing theoretical applications and critical points, and strategies to avoid the adverse effects of inbreeding in dairy cattle. Finally, this review provides an overview of challenges that will soon require multidisciplinary approaches to managing dairy cattle populations, intending to combine increases in productive trait phenotypes with improvements in reproductive, health, welfare, linear conformation, and adaptability traits into the foreseeable future.

The need for national livestock surveillance in Pakistan

Muhammad Aamir Shahzad

Pakistan

Abstract

Ranked amongst the top five milk-producing countries globally, the Pakistan dairy industry can help to overcome food shortage and hunger, alleviate poverty and positively impact economic growth. This influencing role could potentially be more significant while the COVID-19 pandemic severely affects humanity, challenges the economy and increases the risk of global food shortage. However, its large national population of dairy livestock contrasts with Pakistan's top-five ranking, indeed, four to five Pakistani cows produce milk equivalent to one dairy cow of countries with a well developed dairy industry. Low milk yield per cow negatively impacts the national production and compromises the development of an efficient processing sector, such that consumers are very often forced to use adulterated milk sold by local "milkmen". As a consequence, whilst committed to alleviating global hunger, Pakistan imports in excess of half a million tons of milk and milk-based products annually. Many studies have identified unproductive, inefficient and imprecise management issues combined with poor genetics and imbalanced nutrition as the leading barriers to improvement in the Pakistani dairy livestock sector. At an individual level, lack of awareness, affordability issues, illiteracy and low ambition of a large percentile of dairy farmers creates additional significant barriers. To address low productivity and poor genetics, Pakistani corporate farms and wealthier individual farmers import genetically improved breeds to attain high milk yields. However, they are then faced with the challenge of managing such breeds to attain sustainable and persistent milk yields under Pakistani climatic conditions, often risking excessive culling even to the point of business liquidation. In developed dairy industries, automated sensor-based livestock management systems are now available to help monitor, compute, and optimize procedures in real-time and are proven to increase productivity and profitability. The term precision livestock farming (PLF) is used to describe systems that monitor individual animals or groups of animals to overcome management deficiencies and optimise productivity. My stance in this Opinion Paper is that adopting and utilizing such precision technologies may support Pakistan in raising its livestock resources toward greater productivity, thereby helping to overcome the global food shortage.

A meta-analysis of genetic parameter estimates for milk and serum minerals in dairy cows

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Iran

Abstract

This study aimed to conduct a meta-analysis based on a random-effects model to combine different published heritability estimates and genetic correlations for milk and serum minerals in dairy cows. In total, 59 heritability and 25 genetic correlation estimates from 12 articles published between 2009 and 2021 were used. The heritability estimates for milk macro-minerals were moderate to high and ranged from 0.311 (for Na) to 0.420 (for Ca). On the other hand, milk micro-minerals had lower heritabilities with a range from 0.013 (for Fe) to 0.373 (for Zn). The heritability estimates for serum macro-minerals were generally low and varied from 0.126 (for K) to 0.206 (for Mg). The estimates of genetic correlation between milk macro-minerals varied from -0.024 (between Na-K) to 0.625

(between Mg-P). The genetic correlations of milk Ca and P with milk yield were -0.171 and -0.211, respectively. The estimates of genetic parameters reported in this meta-analysis study are appropriate to utilize in breeding plans when valid estimates are not available for milk minerals in dairy cow populations.

Blood calcium dynamics in cows receiving an aqueous calcium suspension for voluntary consumption or a calcium bolus following parturition

Juliette N Wilms, Jean-Baptiste Daniel, Javier Martín-Tereso, Arie Klop, Roselinde Goselink, Yanming Han and Sandra van Kuijk

The Netherlands

Abstract

The form of oral calcium (Ca) supplement and the Ca source influence Ca absorption dynamics resulting in different postpartum calcemia. The objective of this study was to investigate whether an oral Ca supplement (mainly CaCO₃) offered for voluntary consumption would maintain or increase postpartum blood Ca to the same degree as a Ca bolus (mainly CaCl₂) providing an equivalent dose of a Ca. A total of 72 Holstein cows were blocked by expected parturition date and parity. Within each block of 3 animals, cows were randomly assigned to one of three treatments, including an oral Ca supplement offered for voluntary consumption (Ca-drink, n = 23), an oral Ca bolus (Ca-bolus, n = 24), or an untreated group (CON, n = 25). Treatments were administered once within 15 min postpartum. The Ca-drink provided 45 g of Ca (CaCO₃ source) and was mixed in 20 L of lukewarm water and offered to cows for 30 min. The Ca-bolus provided 43 g of Ca (71% from CaCl₂ and 29% from CaSO₄) and was administered once. Both Ca-bolus and CON cows received 20-L of lukewarm water at parturition to standardize the volume of fluids (Ca-drink or 20-L lukewarm water) offered at parturition. Dairy cows offered Ca-drink had a 19% higher fluid consumption than Ca-bolus, while CON did not differ. Milk yield and milk composition expressed in percentage protein, fat, lactose, and urea did not differ, while there was a numerical increase (7%, non-significant) in DMI in cows receiving the Ca-drink compared to the other groups. This was consistent with reduced BW losses between week 1 and 3 in cows receiving the Ca-drink suspension. Treatment by time interactions were present for blood Ca, glucose, and urea concentrations. Blood Ca was relatively stable in Ca-drink cows, while higher fluctuations were observed in Ca-bolus cows. In Ca-bolus cows, blood Ca increased from 15 min to 6 h, decreased from 6 to 24 h, and finally increased again from 24 to 48 h. At 24 h post administration, blood Ca was greater in cows receiving the Ca-drink than cows receiving the Ca-bolus. Blood glucose was 23% greater in Ca-bolus cows at 15 min after treatment administration compared with Ca-bolus and CON, while blood urea was higher in CON than Ca-drink and Ca-bolus throughout the sampling period. These results indicate that voluntary oral Ca resulted in a relatively stable calcemia, whereas higher fluctuations were observed in cows receiving the Ca-bolus. Due to a lack of differences between Ca-drink and Ca-bolus compared with CON, it is not possible to conclude regarding the efficacy in maintaining postpartum blood Ca.

Comparison of the feeding behaviour of primiparous and multiparous Jersey and Holstein cows kept under equal conditions throughout lactation

Sandra Gündel, Lene Munksgaard, Christian Looft and Leslie Foldager

Germany and Denmark

Abstract

The objective of the study was to describe the feeding behaviour of primiparous and multiparous Jersey cows compared to Holstein cows housed in separate groups in the same barn. Such information could help farmers to optimise management with respect to welfare and production. Yet, it remains limited for Jersey cows over the entire period of lactation. Feeding data of 116 Danish Jersey (mean parity 2.14 ± 1.32) and 218 Danish Holstein cows (mean parity 1.90 ± 1.16) were assessed using automatic feeders from day 15 to 252 of lactation. Total eating duration, duration of eating per visit, intervals between meals, number of visits per day and the eating rate were analysed using linear mixed effects models. The cows were kept in a loose-housing system, with cubicles and automatic milking robots, and the group composition was dynamic. Compared to Holstein cows, Jersey cows visited the feeder significantly more often with shorter between meal intervals. However, the visit duration and total daily eating time and eating rates were significantly shorter for Jersey cows. There was no difference between breeds in the daily eating time and eating rate of older cows. Younger Jersey cows had significantly lower eating rates than older Jersey cows. No other difference in parity was found within Jersey cows. Weeks in milk significantly affected the eating time per day, number of visits per day and eating rate. The trajectories of outcome variables during lactation did not differ between the two breeds. In conclusion, we found substantial differences in the feeding behaviour of Jersey and Holstein cows, however, these differences could also be related to a group effect.

Prepartum measurement of serum biomarkers reflecting osteoclastic and osteoblastic bone metabolism for predicting the risk of milk fever in dairy cows

Norio Yamagishi and Chiho Kawashima

Japan

Abstract

We investigated whether prepartum levels of serum bone biomarkers are related to the degree of parturient hypocalcaemia and risk of milk fever (MF) in dairy cows with advancing parity. A total of 58 late-pregnant cattle were assigned to four groups: nulliparous, primiparous, multiparous in the 2nd lactation and multiparous in the 3rd–5th lactation. The multiparous cows were further assigned to MF and non-MF groups according to the onset of MF. Serum samples were obtained from the cows during the 3 weeks prepartum to 5 days postpartum period for the measurement of serum calcium (Ca) and three bone biomarkers: tartrate-resistant acid phosphatase isoform 5b (TRAP5b), osteoprotegerin (OPG) and bone isoenzyme of alkaline phosphatase (ALP3). The ratios of OPG to TRAP5b (O/T ratio) and ALP3 to TRAP5b (A/T ratio) were calculated. The data from all cattle showed that the severity of hypocalcaemia at parturition increased with advancing parity/age. The MF cows had elevated serum TRAP5b activity and a decreased O/T ratio after parturition, suggesting an increased number of osteoclasts due to osteoclastogenesis, in response to severe hypocalcaemia. The MF cows showed lower serum ALP3 activity during the 3 weeks prepartum than the non-MF

cows, therefore, prepartum osteoblast function was likely weak in the MF cows. During the 2–3 weeks prepartum, serum ALP3 activity and the A/T ratio had moderate associations with the serum Ca concentration at day 0 (day of calving) in the multiparous cows, and receiver operating characteristic curve analysis revealed that ALP3 activity had excellent ability to predict MF. In conclusion, prepartum serum ALP3 activity is a promising biomarker to predict MF in multiparous cows.

Perception of animal welfare and its certification system by Brazilian consumers and dairy farmers

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Brazil

Abstract

The practices adopted in dairy farms can positively or negatively affect the perception of consumers. To meet consumer expectations and improve the productivity of dairy farms, a welfare certification system has recently been initiated in Brazil. In this research communication we describe the perceptions of Brazilian consumers and farmers regarding the implementation of welfare certification systems and the most common practices that affect animal welfare on dairy farms. For this purpose, two semi-structured questionnaires were used: one applied to 409 consumers and the other to 158 dairy farmers. The results demonstrate that consumers are concerned with the adoption of welfare practices in animal husbandry at dairy farms, mainly on topics related to movement restriction and cow-calf separation. Thus, the majority of consumers state that they are willing to pay more for welfare-certified dairy products. In addition, most dairy farmers are interested in adopting a welfare certification system, especially if it could add value to the raw milk sold to industries. Veterinarians and animal scientists are important for disseminating animal welfare recommendations, and the consequences of its improper adoption need to be emphasized. Finally, dairy farms need improvements regarding environmental hygiene, thermal conditions, animal husbandry, health, and milking processes. In conclusion, consumers and farmers are interested in welfare systems and their certification, and there is a need for stakeholders to make welfare certification a reality in the Brazilian dairy supply chain.

Weighting the relative importance of behaviors affecting gait score

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USA and UK

Abstract

This research communication evaluates experts' opinions on the importance and weights of six gait aspects. In 2016, a Qualtrics (Qualtrics LLC., Provo, Utah) survey was distributed to lameness experts. Six gait aspects - general symmetry, tracking, spine curvature, head bobbing, speed and abduction as well as adduction were included. Respondents were asked to rank the gait aspects from 1 (most important) to 6 (least important), and to indicate which weight each gait aspect should receive when assessing lameness. For each gait aspect, frequency (percentage %) was used to describe the distribution of rank, and medians as well as 25th and 75th percentiles were used to

summarize assigned weights. Thirty-nine percent of respondents ranked general symmetry first, followed by 32% for tracking, and 19% ranked spine curvature third. Head bobbing ranked fourth with 10% whereas, speed, abduction and adduction were not ranked. The median, 25th and 75th percentiles weight for each gait aspect were: general symmetry (25, 15, and 30), tracking (20, 10, and 30), spine curvature (20, 10, and 21), head bobbing (15, 10, and 20), speed (10, 5, and 20), and abduction and adduction (10, 5, and 10). General symmetry and tracking were deemed the most important gait aspects. A composite gait score can be calculated based on weighted importance of different gait aspects to indicate possible lameness.

Relationship between the concentration of anti-müllerian hormone and antral follicle count in pasture-managed Holstein cows in the high tropics.

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Ecuador, Spain and Venezuela

Abstract

We evaluated the relationship between plasma levels of anti-müllerian hormone (AMH) and the number of antral follicles at the restart of the follicular wave in crossbred Holstein cows reared under extensive grazing systems over 2,500 meters above sea level. The study included 140 cows from 15 farms that were in average at the 75.3 ± 2.10 day post partum. Animals were synchronized according to the following regime: day 0 = intravaginal progesterone releasing device (IPD) + estradiol benzoate (EB); day 7: withdrawal of IPD + prostaglandin; and day 8: EB, for restart of the follicular wave on day 11. On this day 11, antral follicle counts (AFCs) were made by transrectal ultrasound, and a plasma sample was taken for the determination of AMH. The mean AMH plasma level was 0.06 ± 0.03 ng/mL and the mean AFC was 17.26 ± 0.38 follicles. A strong positive linear correlation was found between these two variables ($r = 0.783$, $r = 0.613$, $p < 0.0001$). Cows were categorized according to AMH concentration as high (>0.09 ng/mL), intermediate ($0.09-0.05$ ng/mL) or low (<0.05 ng/mL). Cows with high AMH presented a higher AFC (25.0 ± 2.21 follicles) than those with low AMH (14.08 ± 2.68 follicles; $p < 0.001$). Our results suggest that the cut-off value of AMH = 0.09 ng/mL may be useful for selecting donors in multiple ovulation embryo transfer programs involving cows with these characteristics. Our data further suggest that AMH plasma concentration correlates with AFC and can be used as an endocrine biomarker of the number of antral follicles present at a given moment of the estrous cycle in crossbred Holstein cows raised at altitudes above 2,500 meters.

Effects of short and long milking intervals on milking characteristics and changes of milk constituents during the course of milking in crossbred Istrian x Awassi x East-Friesian ewes

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Croatia, USA and Switzerland

Abstract

The main objective of this experiment was to evaluate the effects of two milking intervals (8h and 16h) on milk constituents (fat, protein, lactose, dry matter, and \log_{10} SCC) of nineteen Istrian x Awassi

x East Friesian crossbred ewes in different milk fractions (0-25%, 25-50%, 50-75% and 75-100%) during the course of milking and in machine stripping (MS) milk. Furthermore, we sought to determine the effect of the two milking intervals on milking characteristics (average milk flow rate, peak milk flow rate, machine-on time, total milk yield, and milk production rate) and whether each milk constituent within each milking interval is best described by a linear, quadratic, or cubic function. Average milk flow rate and milk yield per milking decreased in the 8h milking interval compared to the 16h milking interval ($P<0.05$). Peak milk flow rate, machine-on time, and milk production rate were not different between the two milking intervals. Overall, milk fat content, dry matter content, and \log_{10} SCC increased in the 8h milking interval compared to the 16h milking interval ($P<0.05$). Milk protein content did not change through the main milk fractions at either milking interval. Milk lactose content did not change through the milk fractions at the 8h milking interval, whereas it decreased in the 75-100% and stripping milk fractions at the 16h milking interval ($P<0.05$). The 0-25% and stripping milk fractions contained the highest \log_{10} SCC compared to all other milk fractions ($P<0.05$). Changes of milk fat and dry matter content throughout milking were best described by quadratic functions, whereas milk protein content, milk lactose content, and \log_{10} SCC were best described by different functions depending on the milking interval. These results demonstrate that milking interval influenced all milk constituents in various milk fractions during the course of ewe milking. Moreover, milking characteristics such as average milk flow and total milk yield, and the appropriate mathematical function to characterize milk constituents throughout a milking, were affected by milking interval.

Milkability of Holstein cows is significantly affected by the incidence of clinical mastitis for weeks after diagnosis

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Czech Republic

Abstract

The main objective of this research communication was to explore the extent of milkability changes caused by the incidence of clinical mastitis. Our second objective was to investigate if the milkability of cows shortly before mastitis incidence significantly differed in comparison with healthy cows. Milk yield, milking time, average milk flow, partial milk flows and the occurrence of bimodal milk flows were monitored during the first 120 days in milk for all cows that calved on the farm during the experimental period ($n = 127$). A veterinarian diagnosed 27 cows with clinical mastitis, while the remaining healthy cows served as a control group. The period surrounding the mastitis was monitored in a timeline from 2 weeks before to 4 weeks after the diagnosis. We did not observe any significant differences in milkability between the healthy cows and the cows in the pre-mastitis period, which suggests that monitoring these might not be useful for early mastitis detection. Milk yield and milk flow were significantly decreased in the week of mastitis diagnosis compared to the pre-mastitis period. Milking time was not affected in the week of diagnosis, but was significantly increased in the following week, because milk yield returned to pre-mastitis values, but average milk flow was still significantly decreased. Milk yield was normalized to pre-mastitis values as the first of monitored parameters. Milk flow returned to pre-mastitis values in the fourth week after mastitis diagnosis. Milking time was the only parameter that was significantly affected up to a month after diagnosis. Our results showed that milkability changes caused by mastitis are significant and should

not be ignored. The ability to adjust milking settings for cows diagnosed with mastitis could become a useful tool for improving mastitis treatment.

The prevalence, molecular characterization and antimicrobial resistance profiling of *Streptococcus agalactiae* isolated from clinical mastitis cases on large dairy farms in China

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China

Abstract

This research communication aims to characterize the prevalence, molecular characterization and antimicrobial resistance profiling of *Streptococcus agalactiae* isolated from clinical mastitis in China. A total of 140 *Strep. agalactiae* isolates were identified from 12 out of 201 farms in 6 provinces, overall herd prevalence was 18.6% and the MLST analysis showed clonal complexes (CC) 103 and CC 67 were present in these herds with CC 103 predominant, accounting for 97.9%. Isolates were mostly sensitive to the tested antimicrobials: penicillin, ceftiofur, amoxi/clav, cefquinome, and vancomycin (100%), followed by cefalexin (97.9%), oxacillin (96.4%), enrofloxacin (95.7%), erythromycin (89.3%), and clindamycin (88.6%). Only 19.3% and 0.7% of isolates were sensitive to tetracycline and daptomycin respectively and sequence type (ST) 103 was most resistant to antimicrobials. In conclusion, CC 103 was the predominant subgroup of bovine mastitis *Strep. agalactiae* in China, and most antimicrobials apart from tetracycline and daptomycin were effective.

Protection of bovine mammary epithelial cells by a nanoemulsion of the medicinal herb *Achyrocline satureioides* (Lam.) DC. and its capacity of permeation through mammary epithelium

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Brazil

Abstract

The low levels of toxicity and cytoprotective effect attributed to *Achyrocline satureioides* (Lam.) DC, a medicinal plant native to South America, are of interest for bovine mastitis therapy. This research paper reports the hypothesis that a nanoemulsion of macela extract (*Achyrocline satureioides*) exerts protective effects on bovine mammary alveolar cells -T (MAC-T) and increases the permeation of flavonoid compounds through mammary epithelium. Extract-loaded nanoemulsions (2.5 mg mL⁻¹) (NE-ML) (n=4) were prepared using high-pressure homogenization with varying concentrations of flaxseed oil and Tween 80. Permeation and retention of free and nanoencapsulated quercetin, 3-O-methylquercetin and luteolin were performed on mammary glandular epithelium using Franz diffusion cells. The cell viability was evaluated on mammary epithelial cells (MAC-T lineage) using the MTT method (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) after exposure to loaded and blank nanoemulsions (NE-ML and NE-BL). Necrotic or apoptotic cell death was evaluated by flow cytometry after exposure to nanoemulsions (NE-ML and NE-BL). Subsequently, the cell death was assessed by previously treating MAC-T cells with NE-ML for 23 h, followed by exposure to H₂O₂ (2mM) for 1 h. Higher permeation

of quercetin and 3-O-methylquercetin in NE-ML was found compared to that of free extract with a final permeated amount of 50.7 ± 3.2 and 111.2 ± 0.6 $\mu\text{g}/\text{cm}^2$ compared to 35.0 ± 0.6 and 48.9 ± 1.2 , respectively. For NE-BL, the IC_{50} was at least 1.3% (v/v), while for the NE-ML, it was at least 2.6% (v/v). After exposure to NE-ML (5 and 1.2%, v/v), the percentage of apoptotic cells was reduced ($\pm 30\%$). For the H_2O_2 assay, the percentage of cells in necrosis was reduced by 40% after exposure to NE-ML1% (v/v)+ H_2O_2 2mM. The protective effects and increased permeation of macela nanoemulsion make this a promising new candidate for bovine mastitis therapy.

***Pseudomonas fluorescens* and *Pseudomonas putida* from refrigerated raw milk: genetic diversity and lipoproteolytic activity**

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Brazil

Abstract

In this research communication the genetic diversity of *Pseudomonas fluorescens* (n= 67) and *Pseudomonas putida* (n= 44) isolated from refrigerated raw milk from bulk tank trucks were verified. The relationship between the genetic profile of the isolates and their lipoproteolytic potential was evaluated using skim milk agar and tributyrin agar (21°C/72 h). The lipoproteolytic potential (low or high), evaluated by the diameter of the halos (cm), was correlated with the number of milk producing properties that contributed to each sample (one sample = one bulk tank truck; 8 to 80 producers/sample) and the distance between the dairy properties and the processing plant (21 to 370 km). *P. fluorescens* was confirmed in all samples, while *P. putida* in 60 % samples. For both species, two clusters (I and II) were observed, and the first one showed lower genotypic diversity and the presence of isolates with 100 % similarity. *P. fluorescens* isolates presenting at least 70 % similarity were 83.9 % in Cluster I (n=31) and 44.4 % in Cluster II. In both clusters (I and II) observed in the *P. fluorescens* dendrogram, the occurrence of high proteolytic and lipolytic potential were equivalent. The higher the number of farms per milk sample, the greater the lipoproteolytic intensity of *P. fluorescens* isolates. In relation to *P. putida* isolates, 74% presented at least 50% similarity in Cluster I (n=27) and only 35 % in Cluster II (n=17). The occurrence of high proteolysis linked to *P. putida* was proportional between both Clusters, but the occurrence of high lipolysis was greater in Cluster II. No significant association was detected between *P. putida* isolates and the variables studied. The results indicate the circulation of *P. putida* and *P. fluorescens* with 100% similarity in different milk producing regions. The level of genetic diversity was related only to the lipolytic capacity of *P. putida*.

Colloidal stability of milk: reinterpretation of alcohol test results by digital microscopy

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Brazil

Abstract

In this research communication we propose a new approach by portable digital microscopy with a 200x objective to improve the visualization of microparticles of pasteurized milk submitted to the alcohol test. Not only did the method reduce the subjectivity of the readings, but also generated high resolution images of the microparticles, which allows the creation of a specific image pattern for each type of final product. In comparison to a control pasteurized milk treatment, the results confirmed the effect and the specificity of added salts (sodium citrate, disodium phosphate or their combination) on the stability of the milk to the alcohol test. Finally, the mixture of stabilizing salts of citrate/phosphate provided the highest degree of stability to pasteurized milk among the treatments studied.

Influence of processing and packaging conditions on probiotic survivability rate, physico-chemical and sensory characteristics of low calorie synbiotic milk beverage

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India

Abstract

The work presented in this research communication present was carried out to prepare low calorie synbiotic milk beverage by optimizing water and sugar level and to investigate the effect on its storage ability of different packaging materials (polypropylene, high impact polystyrene, high-density polyethylene and glass). Addition of both water and sugar significantly ($p < 0.05$) affected the viscosity, probiotic count and sensory properties. Based on the findings, 40% water and 8% sugar level were optimized for the preparation of the beverage. Apparent viscosity and acidity increased whilst pH and probiotic counts declined during storage, irrespective of packaging materials. The prepared beverage remained most acceptable at refrigeration temperature up to a period of 15 and 12 days when packaged in glass and high impact polystyrene, respectively. Furthermore, it retained a minimum recommended level of probiotic (7 log cfu/mL) during storage for 15 days at 4°C.

Occurrence of methicillin-resistant *Staphylococcus aureus* (MRSA) in “coalho” cheese produced in Brazil

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Brazil

Abstract

The experiments reported in this research communication analysed the presence of methicillin-resistant *Staphylococcus aureus* (MRSA) in 112 samples of “coalho” cheese, from 56 dairy producing

farms in 28 cities in all mesoregions of the State of Ceará, Brazil. To assess antimicrobial resistance we also examined the presence of genes encoding enterotoxins and toxic shock syndrome toxin, as well as the presence of the *blaZ* gene for β -lactamases, and resistance to oxacillin. The research found 69 isolates of *S. aureus*, of which 13.04% had the *mecA* gene encoding the penicillin-binding protein, which confers resistance to methicillin, in cheese samples from 6 different cities. This included the state capital, Fortaleza, which had the largest prevalence (23.19%) of *mecA* positive isolates. It was also found that 55.07% of the isolates of *S. aureus* had the *blaZ* gene, and 7.25% demonstrated resistance to oxacillin in the plate disc diffusion tests. We did not show the presence of isolates carrying toxigenic genes. The findings suggest that strict supervision of production processes in the dairy industry is necessary in all production scale processes, thus preventing contamination and possible problems for consumers.

Effects of the thermal denaturation degree of a whey protein isolate on the strength of acid milk gels and the dissociation of κ -casein

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Japan

Abstract

In this study, the effects of the degree of thermal denaturation of whey protein (WP) added to milk on the dissociation of κ -casein from casein micelles were investigated, since they are related to the strength of acid milk gel and its factors. Acid milk gels were prepared by heating thermally denatured WP isolate (WPI) and undenatured milk mixtures and treating them with glucono- δ -lactone as a coagulant. The strength of these gels was negatively correlated with the WPI denaturation degree and strongly positively correlated with the extent of κ -casein dissociation from casein micelles. This behaviour was ascribed to the fact that α -lactalbumin (α -La) and β -lactoglobulin (β -Lg) contained in WPI denatured after heating and engaged in disulfide bond formation with each other. With an increase in the degree of denaturation and disulfide bond formation, the bonding between β -lactoglobulin and κ -casein was suppressed to decrease the amount of κ -casein–WPI complexes. When β -Lg forms SS bonds with α -La, the number of highly reactive, free SH groups decreases, which complicates the formation of SS bridges between β -Lg and κ -casein. Thus, the denaturation degree of WPI largely determined the degree of κ -casein dissociation from casein micelles and, consequently, the strength of acid milk gels. Adding WP to milk increases the strength of acid milk gel, and it can be controlled by changing the degree of thermal denaturation of the WP. Furthermore, it was clarified for the first time that the dissociation of κ -casein from casein micelles influences this effect. Further studies are needed to elucidate the structural features of κ -casein-dissociated micelles.

Rheological and microstructural characterisation of heat-induced whey protein isolate gels affected by the addition of caseinomacropeptide

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Brazil

Abstract

Caseinomacropeptide (CMP) is derived from the chymosin cleavage of κ -casein during cheese production. This study developed gels from CMPs, which were isolated by different ultrafiltration systems, and whey protein isolate (WPI), and studied their rheological and ultrastructural characteristics. The 30% WPI gel showed high elastic modulus (G') values and stronger structure than the other samples with CMP. Another gel, with 50% protein, 30% WPI and 20% CMP sample isolated from the 30 kDa retentate, had a weaker structure and lower G' value. The third gel, with 30% WPI and 20% CMP sample from the 5 kDa retentate derived from the 30 kDa retentate, presented intermediate structural strength. Despite the increase in protein concentration from the addition of CMP, there was a decrease in the strength of the gel network. Different CMP isolation processes also contributed to differences in the microscopic analysis of gel structures with the same protein content.