

COLLECTED ABSTRACTS

Editorial: Sustainable sustenance

Chris Knight

UK

The editorial is available online at www.journalofdairyresearch.org/editorials.html

Yield gap in milk production is considerable in Indian Himalayan state of Meghalaya

Evans Kemboi, S.M. Feroze, Ram Singh, Jabir Ahmed and Hehlangki Tyngkan

India

Abstract

Yield gaps in milk production are here defined as the differential between the actual yield obtained by the dairy farmer and the potential farm yield (production achieved by the top 10% of farmers: Gap 2) as well as the differential between this potential farm yield and the yield registered in the research stations (Gap 1). Assessment of yield gaps provides valuable information on potential production enhancement and drivers. Milk production can be increased by narrowing the predominant large yield gaps in resource-poor smallholder farming system. Hence, this study assessed the milk yield gap and factors affecting the yield gap in Ri-Bhoi district of Meghalaya, a state located in the north-eastern Himalayan region of India. This research paper provides a scope for exploring the possibilities for improving dairy production in the state as well as contributing to literature through incorporating crucial determinants responsible for milk yield gap. A sample of 81 respondents was drawn purposely from two blocks of the district. The results indicated that the average number of cattle per household was 9.38 in standard animal units. The total yield gap was estimated at 6.20L (91.06%) per day, composed of 0.80L (11.76%) per day of yield gap I and 5.40L (79.30%) per day of yield gap II. This demonstrates that the top performing farms were achieving a production level not dissimilar to that obtained on the research stations, but many were doing far less well. The size of cattle shed, dairy farming experience, concentrate price and human labour were the important determinants of the yield gap. Hence, encouraging the right stocking density of cattle, training on the preparations of home-made concentrates, access to cheap and quality concentrates, incorporating training and experience sharing on proper dairy management practices and use of technology could benefit the dairy farmers of the region.

Feeding wheat dried distillers' grains with solubles increases conjugated linoleic acid and unsaturated lipids in ovine milk without adversely affecting milk yield

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Cyprus

Abstract

The aim of this research communication was to examine the effect of dietary supplementation with wheat-based dried distillers' grains with solubles (DDGS), a by-product of bioethanol production, on yield, composition, and fatty acid (FA) profile of ewe milk. Forty-five purebred mid-lactating Chios ewes (average milk yield 2.23 kg/d in 96 ± 5 days in lactation) were offered three iso-nitrogenous and iso-energetic diets (15 animals per diet) for a 10 days adaptation period followed by a 5-week recording and sampling period. The diets contained 0, 6, and 12% DDGS on DM basis for the DG0, DG6, and DG12 treatment, respectively, as a replacement of concentrate mix, whilst concentrate-to-forage ratio remained at 60:40 in all treatments. Individual milk yield, milk composition, and FA profile were recorded weekly and analysed using a complete randomized design with repeated measurements. No significant differences were observed among groups concerning dry matter intake (overall mean of 2.59 kg/d), milk yield or 6% fat-corrected milk and milk protein percentage or protein yield. Milk fat percentage was decreased in the DG12 (4.76%) compared to DG0 (5.69%) without, however, significantly affecting the daily output of milk fat. The concentration of all major saturated FA between C4:0 to C16:0 was reduced, whereas long-chain (>16 carbons), mono-unsaturated and poly-unsaturated FAs were increased in the milk of DDGS groups. Among individual FA, increments of oleic acid and C18:1 *trans*-monoenes like C18:1 *trans*-10 and C18:1 *trans*-11 were demonstrated in DG12 group, whereas linoleic and conjugated linoleic acid (CLA *cis*-9, *trans*-11) were elevated in both DDGS groups compared to control. Changes in FA profile resulted in a decline in the atherogenic index of milk by 20% and 35% in DG6 and DG12 treatments, respectively, compared with control. In conclusion, feeding DDGS to dairy ewes increased the levels of unsaturated FA that are potentially beneficial for human health without adversely affecting milk, protein or fat yield.

Replacement of grain maize with spineless cactus in the diet of dairy goats

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Brazil

Abstract

Spineless cactus (*Nopalea cochenillifera*) is widely used in animal feed in semi-arid regions, due to the adaptive characteristics to such conditions and for having high levels of soluble carbohydrates. This research article describes the effect of replacing grain maize with spineless cactus in the diet of dairy goats on dry matter intake, water intake, milk yield, milk physicochemical characteristics and diet production costs. Eight multiparous Anglo Nubian goats were fed diets in which grain maize was replaced with spineless cactus at four levels (0, 33, 66, and 100%) in a double 4×4 Latin square design. Milk yield was measured and samples collected in the last three days of each period for physicochemical analysis and for determining nutrient intake. Diet production costs were also determined. Replacing maize with spineless cactus did not influence dry matter intake. Water intake via the drinker decreased linearly in response to the increasing levels of spineless cactus in the diet. The replacement of maize with spineless cactus did not change milk yield or physicochemical parameters. Total feed cost and the percentage of revenue losses from feed decreased with the replacement. Therefore, spineless cactus can fully replace grain maize in the diet of dairy goats, as

it does not change dry matter intake or milk yield, but rather reduces feed costs and the drinking-water intake of goats.

Effect of low and high concentrate supplementation on health and welfare indicators in different breeds in small-scale mountain dairy farms

Laura Flach, Sarah Kühl, Christian Lambertz, Erica DeMonte and Matthias Gauly

Abstract

We investigated and compared the effects of low and high concentrate supplementation in terms of animal welfare, health and reproductive performance in two different dairy cow breeds on small-scale mountain farms. 64 South Tyrolean dairy farms were evaluated using an on-farm assessment for animal-based and resource-based welfare indicators, data from test day records, and a questionnaire for the farmer. Farms were divided into four groups: low input Tyrolean Grey (L-TG), low input Brown Swiss (L-BS), high input Tyrolean Grey (H-TG) and high input Brown Swiss (H-BS). Effects of intensity level, breed and their interaction were calculated and analysed statistically. The predominant husbandry system across all groups was tie-stall. The average energy-corrected milk yield increased with increasing concentrate level, with L-TG showing the lowest and H-BS showing the highest milk yield. Age at first calving was lowest in H-BS when compared to all other systems, while numbers of lactations were higher in L-TG compared to H-BS. Feed efficiency (percentage of milk out of roughage) was significantly higher in L-TG and L-BS when compared to H-TG and H-BS. L-BS showed the poorest results for most of the welfare indicators such as lean cows, lesions and percentage of dirty animals. In conclusion, a higher concentrate level in diets does not lead automatically to lower animal welfare for dairy cows in alpine regions. Indeed, keeping high yielding breeds in extensive systems seems to be challenging. The dual-purpose breed TG showed some clear advantages in that calving interval was lower and the number of lactations greater.

Across-generation effects of maternal heat stress during late gestation on production, female fertility and longevity traits in dairy cows

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Germany and USA

Abstract

This research paper focuses on time-lagged heat stress (HS) effects from an across-generation perspective. Temperature x humidity indexes (THI) from the last 8 weeks of pregnancy were associated with subsequent female offspring performances. The offspring dataset considered 172,905 Holstein dairy cows from calving years 2002–2013 from 1,968 herds, located in the German federal state of Hesse. Production traits included milk yield (MKG), protein percentage (PRO%), fat percentage (FAT%), somatic cell score (SCS) and milk urea nitrogen (MUN) from the first official test-day in first lactation. Female fertility traits were the non-return-rate after 56 days (NRR56) in heifers and the interval from calving to first insemination (ICFI) in first parity cows. Longevity traits were the length of productive life (LPL), lifetime productivity in milk yield (LTP-MKG) and milk yield per day of life (MKG-DL). The association analyses for 10 traits combined with meteorological data from 8 single weeks before calving implied in total 80 different runs. $THI \geq 50$ from all single 8 weeks before calving had unfavorably significant effects on FAT%, ICFI and LPL. Heat stress in terms of THI

≥ 60 from the last 3 weeks before calving impaired MKG. NRR56 decreased with increasing THI, as observed for all 6 weeks before calving. LTP-MKG and MKG-DL decreased due to high THI in the last 4 weeks before calving. Heat stress (THI ≥ 60) during late pregnancy had no significantly unfavorable impact on PRO% and MUN. Interestingly, SCS in offspring declined with increasing THI during late pregnancy. In conclusion, for most of the primary and functional traits, unfavorable impact of HS from the dry period on time-lagged performances in offspring was identified, even on longevity. From a practical perspective, our data suggest to provide HS abatement to late gestation dams to avoid long-term adverse effects on the offspring.

Use of the Comprehensive Climate Index to estimate heat stress response of grazing dairy cows in a temperate climate region

Rodrigo A. Arias, Cynthia Delgado, Juan Pablo Keim and Mónica Gandarillas

Chile

Abstract

The aim of the study was to assess the effect of the summer thermal environment on physiological responses, behaviour, milk production and its composition of grazing dairy cows in a temperate climate region, according to the stage of lactation. Twenty-nine Holstein Friesian multiparous cows were randomly selected and divided into two groups, according to the days in milk (DIM), as mid-lactation (99 to 170 DIM n =15) and late lactation (225 to 311 DIM, n = 14). The comprehensive climate index (CCI) was used to classify the hour of each day as thermoneutral (TN) or heat stress (HS), considering a threshold value of CCI of 20 °C. Data were collected for 16 days (summer 2017) and analysed as a completely randomized 2x2 factorial arrangement with repeated measurements over time. Vaginal temperature increased with CCI ≥ 20°C. Respiration rates were dependent on the thermal condition, regardless of DIM. There was an interaction between the time of day and the CCI category for activity and rumination. Grazing activity decreased by 17.6% but lying down, standing, and shaded animals increased by 1.6%, 9.8%, and 6.3% respectively when CCI ≥ 20°C. Over 80% of cows presented a panting score ≥ 1. However, milk production and composition (fat, protein, and lactose concentrations as well as somatic cell count) were not affected by the thermal condition, although there was a numerical (non-significant) decrease in afternoon milk protein concentration on days with CCI ≥ 20°C, while urea in milk increased. In conclusion, thermal condition challenged grazing dairy cows' behaviour and physiology independent of the stage of lactation, but had little or no effect on milk production.

Association of body condition with lameness in dairy cattle; a single-farm longitudinal study

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Germany

Abstract

This research communication describes the relationship between the occurrence of lameness and body condition score (BCS) in a sample of 288 cows from a single farm that were repeatedly scored in the course of 9 months while controlling for confounding variables. The relationship between BCS and lameness was evaluated using generalised linear mixed-effects models. It was found that the proportion of lame cows was higher with decreasing but also with increasing BCS, increased with lactation number and decreased with time since the last claw trimming. This is likely to reflect the

importance of sufficient body condition in the prevention of lameness but also raises the question of the impact of overcondition on lameness and the influence of claw trimming events on the assessment of lameness. A stronger focus on BCS might allow improved management of lameness that is still one of the major problems in housed cows.

Pathogen-specific changes in composition and quality traits of milk from goats affected by subclinical intramammary infections

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Brazil and USA

Abstract

We investigated the effects of pathogens associated with subclinical intramammary infections on yield, composition and quality indicators of goat milk. By means of a longitudinal study, individual half udder milk samples (n=132) were collected at different lactation periods and assessed for milk yield and physicochemical composition, somatic cell count (SCC), total bacteria count (TBC) and microbiological culture. Staphylococci species accounted for the great majority of the isolates (96.1%). Intramammary infections significantly reduced fat and total solids in goat milk and increased both SCC and TBC. However, these indicators were significantly higher in udder halves affected by *S. aureus* compared with other staphylococci species.

Laboratory-based evaluation of a simplified point-of-care test intended to support treatment decisions in non-severe bovine clinical mastitis

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UK and Australia

Abstract

To limit the use of antimicrobials in dairy cattle, farmers are increasingly encouraged to adopt targeted treatment decisions based on knowledge of the pathogens causing clinical mastitis (CM), whereby treatment of non-severe CM is generally recommended for gram-positive mastitis but not for gram-negative or culture-negative mastitis. The objectives of this study were to conduct a laboratory-based evaluation of the performance of a simplified slide test as a tool to differentiate gram-positive CM from other cases of CM, and to compare its performance against a commercially available on-farm test that is commonly used in our area (VétoRapid). Test outcomes after 24-48 hr incubation were compared to results from bacteriological culture and matrix-assisted laser desorption/ionisation time-of-flight mass spectrometry. Milk samples (n = 156) were obtained from cases of severe and non-severe CM on seven farms and collected by farm personnel. After removal of small numbers of contaminated samples and organisms with unknown species identity, the simplified slide test showed high sensitivity and accuracy (> 80%), similar to the comparator test. For most outcomes of interest (culture positive, *Escherichia coli*, or gram-positive growth), the specificity of the slide test was higher than the specificity of the comparator test. When considering non-severe cases of CM only, and interpreting detection of gram-positive organisms as indicative of the need for antimicrobial treatment, the simplified test had higher specificity (77.4% vs 60.4%) and higher positive predictive value (79.7% vs 70.0%) than the comparator test and similar sensitivity (83.9% vs 87.5%). The proportion of sampled CM cases, contaminated samples and gram-positive

mastitis cases - which affects the positive and negative predictive value, the economic value of diagnostic testing and its potential to reduce antimicrobial use - differed between farms. The simplicity and accuracy of the slide test could make it an attractive tool for farmers to target antimicrobial treatment of non-severe clinical mastitis.

Prevalence of intramammary antibiotic usage in dairy farming

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Ireland

Abstract

This research communication describes the lactating intramammary (IMM) antibiotic formulation most used by Irish dairy farmers at farm level through interviewing 202 dairy farmers. The IMM antibiotic usage data is not easily available to the researcher and farming community. This study determined that three commercial formulations (Synulox™, Tetra Delta™ and Terrexine) made up 81% of the products used at farm level. The formulation Synulox™ was the most used at 34% first preference and 32% second preference and contains amoxicillin/clavulanic, a standard broad spectrum antibiotic, for which mastitis pathogen resistance remains low. The aminoglycosides were used in four of the IMM formulations analysed, including Tetra Delta™ and Terrexine. Of the 12 antibiotics identified in the IMM formulations studied, three including cefalexin, benzylpenicillin and penethamate are classified as highly important antibiotics (HIA) by the World Health Organisation (WHO) whilst the other 8 (dihydrostreptomycin, streptomycin, neomycin, framycetin, kanamycin, amoxicillin/clavulanic acid, and cefquinome), are considered critically important (CIA) for use in human health. This study has generated knowledge of the preferences of lactating IMM formulations used at farm level.

Characterization of biofilms and antimicrobial resistance of coagulase-negative *Staphylococcus* species involved with subclinical mastitis

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Brazil

Abstract

Biofilm formation is a central feature to guarantee staphylococcal persistence in hosts and is associated with several diseases that are difficult to treat. In this research paper, biofilm formation and antimicrobial susceptibility were investigated in staphylococcal strains belonging to several species. These strains were isolated from the milk of cows with subclinical mastitis and most of them were coagulase-negative, with the prevalence of *Staphylococcus chromogenes*. High genetic diversity was observed among the strains by pulsed field gel electrophoresis. Antimicrobial resistance was assessed by disk diffusion and more than 50% of the strains were resistant to ampicillin and penicillin G, with multi- resistance profiles (13.6%) also being observed. Most strains (65.9%) formed biofilms when cultivated in BHI supplemented with 1% glucose. Most strains (72.7%) carried the intercellular adhesion gene (*icaA*), while less than half (36.3%) carried the biofilm-associated protein gene (*bap*). Concentrations of up to 10xMIC of erythromycin and tetracycline were not sufficient to suppress cell viability in preformed biofilms. Our results revealed that a genetically diverse group of biofilm-forming *Staphylococcus* species can be involved in subclinical

mastitis. Since high antimicrobial concentrations cannot eradicate biofilm cells *in vitro*, their use in dairy animals may be ineffective in controlling infections, while supporting selection of resistant microorganisms. These data reinforce the need for alternative therapies aiming at disrupting biofilms for effective disease control.

Casein hydrolysate for drying-off lactating mammary quarters in cows with chronic mastitis

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Brazil

Abstract

In this research communication we address the hypothesis that a single intramammary infusion of casein hydrolysate (CH) would have a similar effect to three intramammary infusions of CH for drying-off quarters with chronic mastitis (CM) during lactation. Sixty cows with CM were selected and randomly distributed into two treatment groups: a) three intramammary CH infusions (100 mg, 50 mL per infusion, with 24-h intervals) or b) single intramammary CH infusion (300 mg, 50mL). Milk samples from the treated and untreated quarters were collected for microbiological culture and somatic cell count (SCC) before and after CH infusions. Milk yield was recorded and a manual pressure index measurement was used to evaluate cessation of lactation. Of the 60 quarters selected, 43 (71.67%) had positive microbiological culture. The quarters treated with three intramammary CH infusions had higher udder pressure index than those treated with single CH infusion. However, the average milk yield and composite SCC of three functional quarters were not different among treatments. Therefore, a single infusion of CH has the potential to be used as an alternative method for drying-off mammary quarters with CM during lactation.

Evaluation of Brix refractometer as an on-farm tool for colostrum IgG evaluation in Italian beef and dairy cattle

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Italy and USA

Abstract

In this study it is hypothesized that there are differences between immunoglobulin G (IgG) content in colostrum from beef (Chianina, Podolica) and dairy (Holstein Friesian) cows and that variables such as breed, and parity can influence IgG content. The further objective was to determine if these factors may vary in terms of sensitivity, specificity and the cut point when data obtained with the digital Brix refractometer is compared with the gold standard radial immunodiffusion assay (RID). A total of 90 samples of first-milking colostrum were collected within 2 hours after parturition. IgG concentration was determined indirectly by digital Brix refractometer and directly by RID. Results obtained by RID were compared among breed and parity. For the digital Brix refractometer, sensitivity and specificity to detect colostrum with an IgG concentration lower than 50 g/L were calculated and the optimal cut-point was selected for each breed. Samples containing less than <50 g/L IgG accounted for 15.9% of the total. Parity influenced colostrum IgG concentration and beef cows had a higher mean concentration of IgG (101.1 g/L in Chianina and 90.6 g/L in Podolica) than dairy cows (71.1 g/L in Holstein Friesian) First parity Chianina cows had the highest IgG mean content (116.1 g/L). At the optimal cut-point for Brix refractometer (20%) sensitivity and specificity were

0.93 (0.84-0.97) and 0.81 (0.70-0.88), however, a breed-related cut-point could be used to reduce evaluation error. Linear regression modeling showed that refractometer data were related to RID ($r = 0.78$). Results obtained suggest that breed and parity can influence IgG content of colostrum and, despite the Brix refractometer being an excellent on-farm tool, a breed-based definition of optimal cut point is needed.

Predicting colostrum and calf blood components based on refractometry

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Australia, Vietnam and Italy

Abstract

Provision of good quality colostrum is essential for the passive immunity and nutrition of newborn calves. In order to better predict the quality of colostrum and the transfer of passive immunity, the relationships between colostrum components and between calf serum components were examined in this study. Samples of bulk tank milk, colostrum pooled from several cows 0-4 days postpartum, and colostrum collected from individual cows twice daily for 3 days post-partum were compared. With the exception of fat percentage, there were strong correlations between the levels of the components in the pooled colostrum and in the individual cow colostrum collected 0-1 day postpartum. The correlations between total solids as measured by Brix refractometry and total protein, immunoglobulin G (IgG), lactose % and protein % in colostrum within 1 day postpartum and pooled colostrum were 0.92, 0.90, -0.88 and 0.98, respectively. These high correlations enabled these colostrum components to be accurately predicted from Brix % and therefore, the volume of colostrum required to feed neonate calves can be optimised based on Brix refractometry to avoid failure of passive immunity transfer. To assess whether the components obtained from colostrum were correlated in calf blood, newborn calves were separated from their dams before suckling and blood sampled before feeding (day 0), and on days 1 and 7, after receiving colostrum or milk twice a day. The correlations between glucose, total protein, IgG, and gamma-glutamyl transferase (GGT) levels in the calf blood were lower than the correlations observed between the colostrum components. The highest correlation was between serum protein measured by refractometer and serum IgG within one week postpartum. GGT activity was not a good indicator of serum IgG levels. However, serum protein refractometer measurements predicted serum IgG level with high accuracy, providing an on-farm test to determine that calves have received sufficient passive immunity and colostrum components.

Proteomic profiling of ovine milk after grading up

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China

Abstract

We have previously bred Chinese local dairy sheep through grading up with local Small-Tailed Han (STH) sheep as female parent and DairyMeade (DM) sheep as male parent. In this research communication we characterize the whey protein profile of STH sheep and their offspring (F1, F2) to reveal physiological differences and variation in milk traits. A total of 1032 whey proteins were identified through tandem mass tag labelling (TMT) proteome profiling. Three proteins were

significantly differentially abundant between F1 and STH milk, six between F2 and STH milk and five between F1 and F2 milk. In terms of differential changes between generations, WASHC4 and CUTA of F1 and Ig-like domain-containing protein of F2 milk were dominant whey proteins. Overall, the results showed that the whey protein profiles of different generations varied little. The crossbreeds of STH and DM sheep would be suitable for the development of the Chinese local sheep milk industry, and the F2 may be a better population for sheep milk production.

Fatty acid profile of milk from Nordestina donkey breed raised on Caatinga pasture

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Brazil and Portugal

Abstract

In this research communication we describe the composition of fatty acids (FA) present in the milk of the Nordestina donkey breed, and how they differ during lactation. Milk samples were taken from 24 multiparous lactating Nordestina donkeys that grazed the Caatinga, comprising 5 animals at each of around 30, 60 and 90 days in milk (DIM) and a further 9 animals ranging from 120 to 180 DIM. The milk fat content was analysed by mid infrared spectroscopy and the FA profile by gas chromatography. The milk fat percentage ranged from 0.45 to 0.61%. The main FA found in milk were 16:0 and 18:1c9. These did not differ among DIM classes and comprised 23% and 25% of total FA. Notably, the α -Linolenic acid (18:3 n-3) was the third most abundant FA and differed ($P < 0.05$) with DIM, being lowest in the 30 and 60 DIM samples (around 10.7% of total FA) and highest in the 60 and 90 DIM classes (around 14.6% of total FA). The low-fat content and the FA profile of the donkey milk gives it potential as a functional ingredient, which could help to preserve the commercial viability of the Nordestina donkey breed.

Evaluating the technological properties of lactic acid bacteria in Wagyu cattle milk

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Japan

Abstract

This paper reveals the technological properties of lactic acid bacteria isolated from raw milk (colostrum and mature milk) of Wagyu cattle raised in Okayama Prefecture, Japan. Isolates were identified based on their physiological and biochemical characteristics as well as 16S rDNA sequence analysis. *Streptococcus lutetiensis* and *Lactobacillus plantarum* showed high acid and diacetyl-acetoin production in milk after 24 h of incubation at 40 and 30°C, respectively. These strains are thought to have potential for use as starter cultures and adjunct cultures for fermented dairy products.

Diversity of yeasts and moulds in dairy products from Umbria, central Italy

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Italy, South Africa and Turkey

Abstract

In this research communication we report on the diversity of yeast and mould species in 69 samples of milk and different dairy products from three plants located in Umbria, central Italy. Isolates were characterised both macroscopically and microscopically and then identified by PCR and genome sequencing of the ITS region and the D1–D2 domain of the large-subunit rRNA gene for filamentous fungi and yeasts, respectively. Out of the 69 samples analysed, 51 (73.9%) tested positive for the presence of yeasts, whereas moulds were detected in 25 (36.2%) samples. A total of 9 yeast species belonging to 8 different genera and 13 mould species belonging to 6 different genera were isolated. The most common genera isolated were *Debaryomyces* and *Kluyveromyces* among the yeasts and *Penicillium* and *Galactomyces* among the moulds. Microbiota play a key role in the formation of flavour, aroma, texture and appearance of dairy products. This complex microbial ecosystem includes both cultured and external bacteria, yeasts and moulds. Some of them have an important role in the production of cheeses, whereas others are responsible for dairy product spoilage, resulting in significant food waste and economic losses. Some species can produce mycotoxins, representing a potential hazard for the consumer's safety. This study provides interesting information on the diversity of fungi species in dairy products from central Italy that can be of major importance to identify these products and to develop adequate strategies for fungal spoilage control and consumer safety.

The effects of denatured major bovine whey proteins on the digestive tract, assessed by Caco-2 cell differentiation and on viability of suckling mice.

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Japan

Abstract

Alpha-lactalbumin (α -LA) and β -lactoglobulin (β -LG) are contained in bovine milk whey. Chemical and physical treatments are known to alter the conformation of these proteins and we have previously reported that α -LA denatured with trifluoroethanol (TFE) and isolated from sterilized market milk inhibited the growth of rat crypt IEC-6 cells. In the present study, we aimed to evaluate the effects of TFE-treated α -LA and β -LG on cell growth using cultured intestinal cells and on their safety using a suckling mouse model. First, we investigated the effect of the TFE-treated whey proteins on human colonic Caco-2 cells at various differentiation stages. In the undifferentiated stage, we assessed cell growth by a water-soluble tetrazolium-1 method. The native whey proteins enhanced cell proliferation, whereas the TFE-treated whey proteins strongly inhibited cell growth. We investigated cell barrier function in the post-differentiated stage by measuring transepithelial electrical resistance (TER). Not only native but also the TFE-treated whey proteins increased TER. Next, we evaluated whether the TFE-treated α -LA and β -LG have adverse effects on healthy suckling mice. No mice given by the TFE-treated samples showed any adverse symptoms. We also performed a safety test using a human rotavirus infected gastrointestinal disease suckling mice model. Even

the TFE-treated whey proteins appeared to prevent the development of diarrheal symptoms without any adverse effects. Although we cannot know the effect of long-term ingestion of denatured whey proteins, these results suggest that they have no adverse effects on differentiated intestinal cells and digestive tract, at least in short-term ingestion.

Consumer perceptions on the origin of infant formula: a survey with urban Chinese mothers

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Ireland

Abstract

The consumer survey reported in this research paper aims to understand how Chinese mothers learn about and confirm the origin of powdered infant formulas (henceforward formulas), their knowledge level and preferences between formulas from different origins. With globalization, dairy companies can source ingredients for domestic production and manufacture finished products across the world. Chinese consumers are now facing a variety of formulas with different brand origin, main ingredient origin (“*nai yuan*”), manufacturing origin, and country-of-purchase. Drawing on a large representative sample of Chinese mothers who have purchased formulas, we found that most of them had intensively engaged in learning about and confirming formulas' origin through different strategies. However, they may not interpret related cues correctly: a majority of Chinese mothers incorrectly considered the ‘main ingredient origin’ as the ‘manufacturing place’ and could not necessarily recognize between ‘foreign’ and ‘domestic’ brands. Among formulas from different origins, authentic foreign branded, produced and packaged formulas showed a high popularity in Tier 1&2 cities and among more knowledgeable consumers. In low-tier cities, these products were equally popular as domestically branded and produced formulas using imported milk powders and other ingredients. Formulas directly acquired from overseas markets through unofficial channels were least favoured by consumers. The study shows that Chinese consumers’ previous one-sided endorsement towards foreign formulas appears to have weakened. Decisions made by formula companies on the origin of the main ingredient and the place of manufacture would influence product attractiveness, and the segments of Chinese consumers to target.

Why knowledge is the best way to reduce the risks associated with raw milk and raw milk products

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Brazil

Abstract

In an age of flexible conditions about mandatory milk pasteurisation, this opinion-based research reflection supports the view that the knowledge and the awareness of milk-borne infections are key requirements to decrease the risks associated with raw milk. Providing an analysis of the current potential risks related to consumption of raw milk and raw milk products, we discuss the main reasons to continue to be vigilant about milk-borne pathogens and the current scenario in relation to the formal and clandestine sale of raw milk. Finally, we select some highly effective strategies to reduce the risks associated with raw milk in food services. Regardless of whether a country regulation allows or prohibits the trade of raw milk and its products, this is not the time to be negligent.