T231 Physiochemical property, microstructure and probiotic survivability of nonfat goat milk yogurt using heat-treated whey protein concentrate as fat replacer. T. H. Zhang[1], J. McCarthy[2], G. R. Wang[2], Y. Liu[2], and M. R. Guo*[2], *[1]Jilin University, Changchun, Jilin, China, [2]University of Vermont, Burlington.*

Low-fat and probiotic dairy foods are getting popular in the United States. A nonfat goat milk yogurt containing probiotics (*Lactobacillus acidophilus* and *Bifidobacterium* spp.) was developed using heat-treated whey protein concentrate (HWPC) as a fat replacer and pectin as thickening agent. The yogurt was analyzed for chemical composition, water-holding capacity (syneresis), microstructure, changes in pH and viscosity, mold, yeast and coliform counts, and probiotic survivability during storage at 4°C for 10 wk. The results showed that the nonfat goat milk yogurt made with 1.3% of HWPC (12% WPC solution heated at 85°C for 30 min at pH 8.5), and 0.35% pectin had high viscosity 1650 ± 40.2 mPa·s and low syneresis (4%). The pH value of the yogurt was decreased significantly during the first week ($P < 0.05$), but there was no significant decrease after wk 2 ($P > 0.05$). Counts for mold, yeast, and coliform were negative the 10-wk study. *Bifidobacterium* spp. remained stable and was $>10^6$ cfu/g during the 10-wk storage. However, the population of *Lactobacillus acidophilus* dropped to $<10^6$ cfu/g after 4 wk of storage. Microstructure analysis of the non-fat goats' milk yogurt by scanning electron microscopy revealed that HWPC interacted with casein micelles to form a more comprehensive network in the yogurt gel. The results indicated that HWPC could be used as a fat replacer for improving the consistency of nonfat goat milk yogurt and other products alike.

Key Words: goat milk, nonfat yogurt, heated whey protein

T232 Do dairy cattle classified as high immune responders yield nutritionally better milk compared with average and low immune response cows? K. Fleming*, M. Corredig, D. Hodgins, F. Miglior, and B. Mallard, *University of Guelph, Guelph, Ontario, Canada.*

It is known that some dairy cattle have an enhanced immune response that is capable of defending against a wide array of infectious pathogens. These High immune response (HIR) cows have more robust and balanced antibody-mediated and cell-mediated immune responses compared with Average (A) or Low (L) immune responders. In this study, it is hypothesized that HIR cows produce higher quality milk with elevated contents of nutritionally valuable components. The presence of Lactoferrin (LF) is the focus of this work. Milk (n = 5) and colostrum (n = 9) samples from Holstein cattle classified as High, A or L immune responders were analyzed. Cows had previously been classified using a patented HIR test system. Milk and colostrum samples were collected at d 5 and d 0 relative to calving, respectively. Concentrations of LF were measured using a bovine LF enzyme-linked immunosorbent assay kit (Bethyl Laboratories, Inc.). Preliminary results indicate that there is substantial biological variation of LF concentrations in milk and colostrum among cows. Values range from 0.023 to 0.24 mg/mL in milk and 0.066–1.7 mg/mL in colostrum with net differences of approximately 0.22 mg/mL and 1.6 mg/mL, respectively. These values and the moderate heritability of LF provide the potential to naturally improve the nutrition of foods by implementing selective breeding programs. Quantification of LF concentrations as well as other nutritionally valuable components (i.e., glycosphingolipids) in additional samples is currently underway. Data will be analyzed with statistical analysis software using a generalized linear model upon completion of component measurement and subsequent matching of cows to immune response categorization. Overall, consumption of functional foods such as higher quality milk with elevated contents of nutritionally important components would provide one potential solution to improve the health of individuals.

Key Words: lactoferrin (LF), high immune response (HIR), milk quality

T233 Physicochemical and sensory properties of milk supplemented with dispersible nanopowdered oyster shell during storage (II). Y. K. Lee*, M. A. Mijan, and H. S. Kwak, *Sejong University, Seoul, South Korea.*

The present study was carried out to investigate the dispersibility of nanopowdered oyster shell (NPOS), Zn-activated nanopowdered oyster shell (Zn-NPOS) or powdered oyster shell (POS) and to determine the effect on the physicochemical and sensory properties of the oyster shell-added milks during storage at 4°C for 16 d. For dispersing, 20% (w/v) oyster shell samples were added in distilled water and mixed at 800 rpm for 2 h, and then 0.5% polyglycerol monostearate (PGMS) was added and mixed again at 800 rpm for 24 h. The sizes of NPOS, Zn-NPOS and POS were measured as 257 nm, 389 nm, and 180 μm, respectively. The pH values of all the milk samples ranged from 6.62 to 6.89 during the storage. The thiobarbituric acid (TBA) of NPOS- and Zn-NPOS-added milks increased to 0.36 and 0.37, respectively, but POS-added milk was higher TBA than that of samples (0.44) at d 16. In color, L* and a* values in the milks were not significantly influenced from all treated milks ($P > 0.05$). However, b* value was significantly increased during storage ($P < 0.05$). The sensory attribute revealed that NPOS- and Zn-NPOS (0.5, 1.0 and 1.5%)-added samples were significantly increased in yellowness, calcite and astringency scores, but fishy smell, bitterness and sandy were not changed during 16 d ($P < 0.05$). However, POS-added sample was significantly increased in yellowness, calcite, astringency, bitterness and sandy scores during the storage ($P < 0.05$). Base on the data obtained from this study, it is concluded that the dispersible nanosized oyster shell could be added to milk without significant adverse effects on the physicochemical and sensory properties.

Key Words: milk, nanopowdered oyster shell, sensory properties

T234 Comparison of physicochemical properties in nanopowdered red ginseng and powdered red ginseng (I). K. H. Choi*, M. A. Mijan, and H. S. Kwak, *Sejong University, Seoul, South Korea.*

Red ginseng is known to have several health benefits, such as antiinflammtory, anticancer, and antioxidative activities, In addition, red ginseng contains some distinct functional ingredients, such as Rg_3, Rg_5 and Rk_1 ginsenoside, which are not found in white ginseng. However, low bioavailability was attributed previously to their poor oral absorption. Nanotechnology may be capable of enhancement of the bioavailability for red ginseng. Therefore, this study was carried out to compare the physicochemical properties of nanopowdered red ginseng (NRG) with powdered red ginseng (PRG) and to determine the quantitation measurement of ginsenosides in NRG. To study the physicochemical properties of the NRG, the size of particles, proximate composition, pH, tapdensity, color, and water or oil holding capacities were measured. In the result, sizes of NRG and PRG were 200.6 ± 13.7 nm and 120.810 ± 1.171 μm, respectively under the particle size analyzer, and similarities were observed between NRG and PRG in proximate composition. But, the pH value was decreased from 5.6 to 5.4 when the concentrations were increased from 2 to 8%, and tap densities were 0.3030 and 0.6667 g/cm^3 in NRG and PRG, respectively. Color of NRG was significantly different from PRG, and water- and oil-holding capacities were 2 to 3 times higher in NRG than in PRG ($P < 0.05$). In quantitative analysis, total ginsenosides of NRG

(4,609.30 mg/kg) was 30% higher than that of PRG (3,335.71mg/kg). In conclusion, NRG was significantly different from PRG in most properties and nanosizing markedly increased the total ginsenosides of red ginseng. Considering these results, NRG is worth to make functional cheese.

Key Words: nanopowdered red ginseng, physicochemical property, ginsenoside

T235 Isolation of lactic acid bacteria from Xin Jiang fresh cheese and the studies of property. L. Zhang, Y. Zhang*, and X. Xu, *College of Food Science and Engineering, Harbin Institute of Technology, Harbin, China.*

Sixteen lactobacillus and 6 lactococcus were screened from traditional fermented fresh domestic acid-coagulated cheese. Then, the acid production ability, sticky production ability, fragrance production ability, textural property, the content of diacetyl, proteolysis and lipolysis capacity of these screened strains was analyzed. The strains that had the fastest production of acid were C63M and C34M. The higher production of sticky was C63M, C34M, and C61–2M. The higher content of diacetyl was C34M and C103M, which were 7.47 ± 0.01 and 6.62 ± 0.01 μg/mL separately. The higher proteolysis capacity were found in strains C104 and C61–2M, the free amino acid of these 2 strains were 469.42 mg/L and 390.68 mg/L separately. These selected 5 strains showed almost no lipolysis capacity but had good textural properties. Combined these 5 strains each other and fermented milk to make fresh acid-coagulated cheese. One group was selected for have good characteristics. Then the inoculate rate were studied. The results showed that cheese have the fastest yield with 5% inoculate, the amount was 56.79%. And the cheese moisture, texture property and its sensory evaluation are also good.

Key Words: acid-coagulated cheese, lactic acid bacteria, quality

T236 Effects of mineral content of bovine drinking water: Does iron affect milk quality? G. R. Mann, S. E. Duncan*, S. F. O'Keefe, K. A. Knowlton, A. D. Dietrich, R. E. James, C. Martel, and X. Feng, *Virginia Polytechnic Institute and State University, Blacksburg.*

Water is an important nutrient for dairy cattle; however, influences of water chemistry on milk synthesis are not well described. High mineral concentrations (>0.3 mg/kg Fe and other metals) may be from natural sources in ground water, run-off from contaminating sources, drought, or water storage systems. This study evaluated the effects of added iron in bovine drinking water on milk composition and oxidative stability. Ferrous lactate treatments corresponding to 0, 2, 5, and 12.5 mg/kg drinking water concentrations were delivered through the abomasum at 1 L/d to 4 lactating dairy cows over 4 periods (1 wk infusion/period), in a Latin square design. On d 6 of infusion milk was collected, processed (homogenized, pasteurized), and analyzed. Mineral content (Fe, Cu, P, Ca) was measured by inductively coupled plasma mass spectrometry. Oxidative stability of whole processed milk was measured by thiobarbituric acid reactive substances (TBARS) assay for malondialdehyde (MDA) and sensory analysis (triangle test) within 48 h of processing and after 7 d of refrigerated storage. Significant sensory differences ($P < 0.05$) between processed milks from cows receiving iron treatment and the control infusion were observed. No differences in TBARS (1.46 ± 0.04 mg/kg MDA) or mineral content (0.22 ± 0.01 mg/kg Fe) were noted. A case study of raw milk from cows receiving water with naturally high (1.4 mg/kg) and low (0.02 mg/kg) iron content revealed no significant differences ($P > 0.05$) in mineral composition (0.23 ± 0.06 mg/kg Fe) or analytical measures of oxidation (0.77 ± 0.03 mg/kg MDA). While iron added directly to milk causes changes in oxidation of milk, high levels of iron given to cattle in drinking water did not have such an effect.

Key Words: milk, oxidation, iron

T238 Tetracycline residues in pasteurized goat milk. R. Attaie* and A. Mora-Gutierrez, *Prairie View A&M University, Prairie View, TX.*

Twelve milking does, 5 La Monchs, 5 Alpines, and 2 Nubians were randomly selected from the milking herd of the International Goat Research Center at Prairie View A&M University. The objective was to determine the residual amount of tetracycline in the milk of treated goats after pasteurization. The tolerance limit of this antibiotic in milk for human consumption is 300 ppb. The selected goats were treated with recommended doses of tetracycline and then the milks of treated animals collected and analyzed. The residual amount of tetracycline was quantified for each milking time until the level went below the tolerance limit. High-performance liquid chromatography was used to quantify the residual amount of tetracycline in milk. Milk samples containing antibiotic residues were deproteinized by 1 *N* hydrochloric acid and addition of 15 mL acetonitrile. The sample was filtered and concentrated by using sample concentrator to approximately less than 1 mL. The samples were adjusted to exactly 1 mL using deionized water. The samples were filtered (0.45 μm) before injection into reversed-phase HPLC using isocratic procedure. For analysis, a Wakosil II C_{18} column was used with mobile phase of 0.02 *M* H_3PO_4 and 0.01 Na decanesulfonate:acetonitrile (35%:65%) at the rate of 1 mL/min using UV detector at 380 nm. The HPLC procedure was able to detect the tetracycline residues at levels less than the tolerance level in goat milk. Furthermore, it was determined that pasteurization significantly reduced the level of tetracycline residues in goat milk compared with fresh or 72 h aged goat milk.

Key Words: tetracycline residues, goat milk, high-performance liquid chromatography

T384 Assessment of consumer perceptions, preferences, and behaviors with fluid milk from different packaging. M. Paterson*[1], S. Clark[1], and M. Bozic[2], *[1]Iowa State University, Ames, [2]University of Minnesota, St. Paul.*

The objective of this study is to understand consumers' "intellectual" (beliefs or expectations) and actual sensory perceptions about fluid milk. Seven sessions, composed of approximately 10 consumers in each, were carried out. All sessions began with explanation of a consent form and process for the experiment; panelists filled out a survey about demographics and milk purchasing/consumption behaviors. Consumers were blindly served 2 pairs of milk samples (2% and skim; from 1/2 gallon translucent plastic and paperboard containers) and asked to indicate preference and acceptability for each sample using a 7 point scale. A panel of 9 judges was trained to evaluate milk quality attributes on a 15cm line scale; all samples tasted by consumers were simultaneously evaluated by the trained panel. All milk was from the same source, processed on the same day, and evaluated within 5 to 7 d of packaging; milk had only been stored in the dairy warehouse; none of the milk was exposed to a lighted dairy case. Only 2 participants (3%) indicated preference for glass in the surveys; 7% indicated preference for paperboard, and 90% indicated preference for plastic packaging. However, upon tasting, consumers did not have a preference for 2% milk from translucent plastic over paperboard, or for skim from translucent plastic over paperboard ($P > 0.05$). These findings were in agreement with their acceptability scores, which were 4.6 for skim in plastic, 4.7 for skim in paperboard, 5.0 for 2% in plastic and 5.0 for 2% in paperboard ($P > 0.05$). Trained panelists did not detect oxidized off flavor in skim milk from translucent packaging (4.7) or paperboard (3.5), or 2% milk from translucent plastic (3.6) or paperboard (1.6) ($P > 0.05$). These results confirm that trained panelists and consumers cannot distinguish fresh milk from different packaging before exposure to lighted dairy cases. Additionally, purchasing behavior is not necessarily linked to actual sensory experience. A future paper will discuss the relationship of these findings with consumer perceptions about milk after exposure to UV light.

Key Words: milk, packaging, consumer perceptions