



This research has resulted in the development of fat-reduced dairy goat products including cheeses, yogurts and ice creams, and quality evaluation including nutritional, textural and sensory properties of the developed products.

Development and Quality Evaluation of Reduced Fat Dairy Goat Products and Goat Milk Infant Formulas

Who cares and why?

Implication of dietary fat with coronary heart diseases, strokes and other health concerns has remarkably increased consumers' demand for reduced-fat (RF) dairy products in recent years. Dairy goat researchers at Fort Valley State University in Fort Valley, Ga., have conducted research on reduced-fat goat milk products and their quality evaluation, where such studies are almost non-existent. On the other hand, the development and successful marketing of the specialty reduced-fat dairy goat products and goat milk-based infant formulas would provide the limited resource goat farmer in Georgia and across the nation with important opportunities to enhance the long struggling and economically disadvantaged dairy goat industry. This project focuses on the USDA/NIFA's research priority areas such as (a) food safety, (b) sustainable agriculture of rural communities for 21st century, and (c) global food security and hunger through the development of small ruminant dairy products and their quality evaluation. Value-added products development, improved nutritional, textural and sensory properties of dairy goat products such as cheese, yogurt and ice cream would increase consumer acceptability as well as the sustainability of the dairy goat industry.

What has the project done so far?

Several studies were conducted on quality evaluation of reduced-fat goat milk cheeses, yogurts and ice cream products. The experiments included: (1) impact of fat reduction in Cheddar-like goat cheese on proteolysis and rheological properties of six months refrigerated storage, (2) comparison of the textural properties of caprine milk yogurts between control and gums supplemented groups during four weeks refrigerated storage, and (3) textural and sensory properties of low fat goat milk ice creams using three different levels of goat milk fat formulated with commercial ice cream premix. For reduced-fat cheese study, goat milk samples containing 3.6, 2.0, 1.0, and <0.5 percent fat were processed into full-fat (FF), reduced-fat (RF), low-fat (LF), and non-fat (NF) high-moisture Cheddar-like cheeses, respectively. The FF, RF, LF, and NF cheeses contained 26.3, 19.0, 9.65, and 1.50 percent fat; 48.7, 50.0, 51.5, and 55.2 percent moisture; and 21.0, 24.9, 35.9, and 38.5 percent protein, respectively. The FF, RF, and LF cheeses had similar proteolysis with a 40 percent decrease of intact caseins (α_s - and β -CN) while the intact caseins in the NF cheese decreased by 14 percent. The NF cheese, with its dense protein matrix had the highest values for hardness, chewiness, cohesiveness, fracture stress, elastic modulus and viscous modulus. Although the LF cheese was harder, chewier, more cohesive and fractured at higher stress than the FF and RF cheeses, it softened somewhat with age while the NF cheese remained a hard mass. The FF and RF cheeses had similar rheological properties and had the softest and most flexible textures. It was concluded that fat can be reduced to 19 percent in a percent-like goat cheese with minimal impact on rheology which will help in developing reduced-fat goat cheese products. For yogurt texture study, xanthan and locust bean were the best choice of gums to improve textural quality of goat yogurt. Viscosity, cohesiveness and adhesiveness of 0.3 percent and 0.5 percent added locust



bean showed more consistent textural values. For goat milk ice cream study, textural and sensory qualities of three different levels of fat in goat ice creams were compared. Three batches of three different goat ice creams were manufactured using a commercial ice cream premix (0.25 percent fat) and three levels of milk fat as skim (0.46 %), 2.0 percent fat (2.0%) and whole (3.65 %) goat milk formulated with the identical premix ingredients. The fresh soft-serve 2% fat goat ice cream had higher firmness and consistency than those of skim milk and whole milk ice cream counterparts. Compared to the soft-serve ice cream, one-day and eight week samples of frozen-stored ice creams, regardless of fat levels, showed substantial increases in firmness and cohesiveness and other textural properties due to the hardened texture of the frozen products. There were no significant differences in all sensory characteristics of flavor, body and texture and color traits during the zero to eight week storage periods for the three goat ice creams, except a few cases of flavor and body and texture. No detectable color changes were found in all three types of goat milk ice creams.



Impact Statement

Our research indicated that fat can be reduced to 19 percent in a percent-like goat cheese with minimal impact on rheology which will help in developing reduced-fat goat cheese products.

In yogurt texture study, xanthan and locust bean were the best choice of gums to improve textural quality of goat yogurt.

In the goat ice cream study, no significant differences were found in all sensory characteristics of flavor, body and texture, and color traits during the zero to eight week frozen storage periods in the three different levels of low fat formulated goat ice creams.

What research is needed?

More extensive consumer acceptability and sensory studies are needed for the marketability of the reduced-fat dairy goat products in order to enhance the profitability of the dairy goat industry. In addition, extensive studies on the development of goat milk infant formulas as well as definitive clinical feeding trials of the goat milk formulas in human infants are essentially needed and required.

Want to know more?

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[Strategic Priority: Health and Nutrition; Agriculture Systems;](#)

Additional Links: <http://www.capridairyworld.org>

www.fvsu.edu/faculty-staff/park-young

<http://www.umes.edu/ard/Default.aspx?id=46285>

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