

Title: Melt profile characteristics of shredded cheeses

Author: Ananya C. Biswas

Abstract:

The most famous cultured fermented products worldwide are represented as one generic name, i.e. cheese. Apart from solid cheeses, shredded cheeses are equally important and have various applications. Shredded cheeses are most commonly used for pizza toppings, cheese blends, salads, sandwiches, stuffing, etc. Like solid cheeses, shredded cheese's rheological and thermal characteristics are equally important towards the determination of functional properties. Softening point and meltability properties needs to be evaluated to understand the cheese functional properties. Constructive studies were carried out in various countries to determine the functional properties on solid cheeses, but research on shredded cheeses still need more attention and further evaluation must be carried out. In this study various samples of shredded cheese will be used and subject to melt profile and modified Schreiber tests for the rheological evaluation. Hypothetically it can be assumed that meltability of shredded cheeses might be different from that of solid cheeses. Understanding its functional properties would help the manufacturers to produce better quality of shredded cheeses with greater functionality to satisfy consumers.

Title: Increasing Lysine Content in Dry Distiller's Grain Using Mutant Microbial Agents

Author: Rachel J. Meyer

Abstract:

Ethanol plants take the whole corn kernel, and ferment the starch and sugar into ethanol. Once this is done, there is leftover wet distiller's grain, and thin corn stillage. The wet distiller's grain can be dried to be dry distiller's grain (DDG), thin stillage can either be dried and marketed as distillers dried solubles (DDS), or added back to the wet grain, dried and called dried distillers grains with solubles (DDGS). This DDGS has all the constituent parts of the corn except the starch and sugars. It still contains the proteins, fats and fiber found in the original corn kernel, thus it can be used in the area of animal feed, especially pigs. Unfortunately the DDGS is lacking in certain amino acids, lysine being the most limiting, this makes it unsuitable as a complete animal feed, however, it can be used as a protein supplement. To make the DDGS a complete animal feed, synthetic lysine has to be added, however, this raises the price of the DDGS. Since both the wet distiller's grain and the thin corn stillage are low in lysine, the primary aim of this project is to isolate lysine-overproducing bacterial and yeast mutants, and then use these mutants to increase the amount of lysine in the stillage add it back to the wet grain, dry it and make a complete feed for animals.

Title: Understanding the role of starter cultures in Mozzarella cheese functionality.

Author: Sumita Chanda

Abstract:

Mozzarella cheese has shown unprecedented growth among the cheese varieties in the US. It is estimated that approximately 70% of Mozzarella cheese is used as an ingredient on pizza. Mozzarella cheese functionality has been studied for for 40 years by researchers. However, a better understanding of the basic chemical, biological and processing governing melting characteristics and functionality is required to enable manufacturers to keep pace with the increasing demand by the food service industry for cheeses with functional properties tailored for specific applications viz. pizza, poppers, Mexican cuisine, nachos or as Mozzarella sticks.

The avenues for this study includes a multi dimensional approach to study the contribution of selected strains of lactobacilli starter culture proteinases in melt and microstructure of Mozzarella cheese broughtabout by proteolysis; the interaction between the type of coagulant and lactic cultures and relation to cheese functionality ; the role of total starter bacterial numbers, their arrangement in cheese protein matrix and relationship of these to cheese functionality in terms of meltability , rheology and flowability.

This study aims to identify and develop new starter cultures and finally develop protocols for the manufacture and storage of Mozzarella cheese using the new cultures.

Title: Field evaluation of potential impact of biological controls on a non-target species

Author: Stefanie Wacker

Abstract:

Leafy spurge (*Euphorbia esula*) continues to have devastating effects on the rangelands of the northern Great Plains and southern Canada. Millions of infested acres make chemical control cost prohibitive and mechanical control not feasible in many natural areas. Biological controls have an advantage of being practical in many areas where other methods are not. Several biological control agents for leafy spurge have been approved for release in the U.S., but two flea beetles, *Aphthona nigriscutis* and *A. lacertosa*, have been the most successful at reducing populations of leafy spurge in the Great Plains. However, after leafy spurge is substantially reduced, the beetles may find alternative hosts for feeding and development. The use of non-target species is just one of several ecological risks associated with the introduction of biological control agents. The non-target species with highest risk of attack are those most closely related ecologically and taxonomically to the target plant. *Euphorbia robusta* is congeneric and sympatric with leafy spurge and could potentially become a non-target species affected by biological control agents introduced for leafy spurge. We propose to use *E. robusta* as a model to investigate the potential impact of a biological control agent on a non-target species in a field setting.

Title: Screening of South Dakota Native Plants for Antibiotic Potential

Author: Kathleen Gibson

Abstract:

Native plants from South Dakota are to be identified, collected and dried. The dried plant material will be ground finely. Extracts of the plants will be prepared using ethanol and the ground plant material. These extracts will then be tested against several strains of bacteria to determine their antimicrobial effects. A paper disk assay will be used to analyze the effectiveness of each extract. A paper disk will be infused with a known amount of extract and placed on an inoculated agar plate. After 24 hours, a zone of inhibition (or no bacterial growth) will be measured. Once a potential plant has been identified, it will be tested to determine the toxicity of the extract. The cytotoxicity assay will be performed using brine shrimp. Test tubes of brine shrimp, sea water and plant extract will be observed for 24 hours. After 24 hours the number of surviving brine shrimp will be measured. If an optimal plant extract is determined, it will then be further analyzed to identify the component or components of the plant that are responsible for the antibacterial activity.

Intestinal Regulation of Neonatal Development of B Lymphocyte Subsets

Mike Graybill

Abstract

The period immediate after birth is the most challenging period for the developing immune system. This is particularly true in domestic animals, which develop in utero in the absence of exogenous antigen and are immediately bombarded with a diverse array of environmental microflora upon birth. During this early period, very few circulating B cells are present and the majority of neonatal immunity is obtained passively from the mother via the milk and colostrums. Immediately post-birth, there is an explosion in the production of new B cells which eventually rise from minimal 5-10% of peripheral blood lymphocytes

(PBLs) at birth to a stable level of roughly 50% of PBLs at 6 months of age. Recently, it has become clear that colostrum contains not only maternal antibody, but also cells and soluble factors which may stimulate B cell production. Furthermore, a unique subset of non-circulating B cells develop beginning at 6-8 weeks of age, to reach levels of roughly 50% of PBLs. Coincidentally, the appearance of this subset develops alongside the development of reactivity to a number of intestinal microflora. This research project is aimed at investigating two distinct questions: (a) the role of colostrums, and specifically soluble CD14 and macrophages, at promoting the development and release of ileal Peyer's patch B cells in the neonatal period. (b) the role of intestinal microflora in the development of B cell subsets and immune competence. Identification of unique stages of B cell development have relied and continue to rely upon 2, 3, and 4-color phenotypic analysis to define functional and developmental subsets. The experiments to define the function and development of these subsets will necessarily rely upon the use of fluorescent tracking dyes (PKH, CellTracker dyes, 5, 6-Carboxyfluorescein succinimidyl ester) in conjunction with multicolor flow cytometry. Typically, mature B cell subsets can be defined based upon the combined expression of surface immunoglobulin, CD21, and either CD11b or CD11c. The addition of either a red or a green fluorescent tracking label to monitor the phenotypic changes and the physiological growth of the B cell pools will require 4-color cytometry to obtain statistically meaningful results. These data will allow a greater understanding of the unique development of the ruminant immune system, and enhance the utility and design of neonatal agricultural vaccines.