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. In sheep, during this early period, very few circulating B cells are present (minimally 5-10% of all of peripheral blood lymphocytes or PBLs), and the majority of neonatal immunity is obtained passively from the mother via the milk and colostrum. Recently, it has become clear that colostrum contains not only maternal antibody, but also cells and soluble factors, which may stimulate B cell production. Immediately post-birth, there is an explosion in the production of new circulating B cells to a stable level (roughly 50% of all PBLs at 6 months of age). Furthermore, a unique subset of non-circulating B cells develop beginning at 6-8 weeks of age, to reach levels of roughly 50% of all B cells (25% of all PBLs). Coincidentally, the appearance of this subset develops alongside the development of reactivity to a number if intestinal microflora. This research project is aimed at investigating two distinct questions: (a) The role of colostrum (specifically two colostral factors, 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 will be accomplished with the use of multicolor flow cytometry analysis, which phenotypes the functional and developmental B cell subsets. The experiments, which define the function and development (differentiation) of these subsets, will rely upon the use of fluorescent tracking dyes in conjunction with multicolor flow cytometry. Fluorescent tracking dyes enable us to dye (label) and likewise follow individual cells through the body. We can then monitor the phenotypic changes and the physiological growth of the various B cell pools. The addition of these fluorescent tracking labels 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. This understanding would benefit the meat and dairy industries financially.

Melt / flow characteristics of shredded cheeses

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ABSTRACT

The most famous cultured fermented products worldwide are represented as one generic name, i.e. cheese. It is marketed in different forms viz. solids, processed, cubes, spreads, powdered and shredded. Shredded cheeses are most commonly used for pizza toppings, cheese blends, salads, sandwiches, stuffing, etc. Functional properties of shredded cheese are important from the view of softening, melt and flow properties of cheese need to be evaluating to understand it's functional properties. Reports on evaluation of functional and rheological properties of solid cheeses are available in the literature. However, scanty information is available regarding shredded cheeses.

Hypothetically it may be assumed that meltability of shredded cheeses might be different from that of solid cheeses. In the present study various samples of shredded cheese will be subjected to evaluate meltability and complete melt profile. The former will be performed by modified Schreiber test, where as melt profile, (including flow rate, softening temperature, cheese melting temperature, cheese melting time, initial cheese height, initial cheese temperature and extend of cheese flow) will be performed by a method of Muthukumarappan et al (1999). Understanding its functional properties would help the manufacturers to produce better quality of shredded cheeses with greater functionality to satisfy consumer demand.

Title: Field evaluation of potential impact of leafy spurge (*Euphorbia esula* L.) biological controls on a non-target, native species (*Euphorbia robusta* Engelm.)

Author: Stefanie Wacker

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

GRADUATE STUDENT : Sumita Chanda
ADVISOR : Dr. Rajiv I Dave
DEPARTMENT/MAJOR : Dairy Science

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 40 years by researchers. However, a better understanding of the basic chemical, biological and processing is required to enable manufacturers to produce 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 ; changes in cheese microstructure broughtabout by proteolysis; role of total starter bacterial numbers and their arrangement in cheese protein matrix. Eventually, the relationship of all these attributes to cheese functionality in terms of meltability , rheology and flowability. Thereby, develop protocols for the manufacture and storage of Mozzarella cheese using the new cultures.

Glycosylphosphtidylinositol-anchored Protein from Winter Wheat

Dong He

ABSTRACT

Proteins containing glycosylphosphatidylinositol (GPI) anchors are widespread in animal cells, yeast and parasitic cells, where they are highly localized on the outer face of the plasma membrane. Recently, their existence has been confirmed in higher plant tissues. These GPI-anchored proteins are particularly interesting, because they are released from the plasma membrane into the apoplast under stress conditions. This free form could function in signal transduction, or in stabilizing membrane function and integrity. This report describes the possible existence of GPI-anchored protein in the plant winter wheat (Triticum aestivum L.cv.Winoka). A wheat cDNA clone (pTACR7) was isolated by RT-PCR. Based on the deduced amino acid sequence, TACR7 is highly hydrophobic, with only one major hydrophilic region, however, no helices were observed. Furthermore, western blot analyses were performed with affinity purified anti-peptide TACR7 antibody or pre-immune serum. One band of about 33KD was observed in the membrane fraction but not in the soluble fraction of wheat leaf tissue with anti TACR7 antibody, another of about 17 KD was observed in the soluble fraction with anti TACRT7 antibody. These results suggest that there is a TACR7 like species in the membrane fraction and the soluble fraction. This HMW species maybe represent the GPI-anchored TACR7 protein. To determine the relation between these two species and the deduced amino acid sequence, we will determine the sequences of the 33 KD and the 17 KD species by Mass spectrometry. The western blotting of the membrane fractions treated with phosphotidylinositol specific phospholipase C (PI-PLC) will be performed to determine if this 33 KD protein is GPI-anchored. Finally we will compare this protein with other proteins in the available protein database to aid in determining its biologic function.

Title: Screening of South Dakota Native Plants for Antibiotic Potential
Author: Kathleen Gibson
Abstract:

Due to the rise in bacterial resistance to current antibiotic therapies, there is a great need for new and innovative antibiotics. One source of these new antibiotics comes from historical uses of plants by Native Americans. For this study, native plants from South Dakota are to be identified, collected and dried. Extracts of the plants will be prepared with ethanol. These extracts will then be tested against several strains of bacteria to determine their antimicrobial potential. Briefly for this assay, a paper disk assay will be used to analyze the effectiveness of each extract. A paper disk is 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) is measured. Once a potential plant has been identified, it will be tested to determine its cytotoxicity. The cytotoxic 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. When a potentially useful extract is identified, it will then be further analyzed to identify the component or components of the plant that are responsible for the antibacterial activity. HPLC and Column Chromatography will be used to purify the samples followed by GC-mass spec and NMR to identify the specific compounds.