

STUDENT AFFILIATE DIVISION

SAD1 Effects and control of aflatoxicosis in dairy cattle. R. M. Beltz* and J. N. Spain, *University of Missouri - Columbia.*

Aflatoxins (AF) are metabolites produced by fungi (*Aspergillus flavus* and *Aspergillus parasiticus*) that grow on livestock feeds. Factors such as high moisture and humidity storage conditions, improper temperature levels, and kernel damage contribute to aflatoxin formation. There are four main types AF-B₁, B₂, G₁, and G₂ with B₁ being the most biologically active. Aflatoxins are harmful in four ways: as potent toxins, teratogens, mutagens, and carcinogens. Biological effects include reduced productivity, decline in reproductive capabilities, organ damage, and death. Extent of damage depends on amount of toxin consumed, duration of exposure, and animal susceptibility. In terms of production and economics, the long term, low level effects of aflatoxin consumption can have more widespread and costly effects than acute poisoning. AF-B₁ can be metabolized in the liver to form AF-M₁ and then excreted into milk. This presents potential problems in distribution and consumption of contaminated milk and milk products. Compounds such as hydrated sodium aluminosilicate (HSCAS), have been shown to reduce aflatoxin levels in contaminated foods and feeds. Also, methods such as heat treatment, oil refinement, solvent extraction, chemical inactivation, diphasic dialysis, and biological degradation are somewhat useful as correction measures. Proper nutrition and optimal health are critical for combating and reducing the hazardous effects of aflatoxin ingestion. Although moderately effective methods for detoxification, extraction, and purification of aflatoxin in contaminated animals and byproducts exist, none are entirely satisfactory, and such measures should only be considered as a last resort. To ensure optimal production and high quality products, control of aflatoxin contamination should focus on prevention rather than correction.

Key Words: Mycotoxins, Aflatoxins, Dairy Cattle

SAD2 Controlling Johne's Disease in Dairy Cattle. J. Bewley, *University of Kentucky, Lexington.*

Johne's disease is a common, under-diagnosed ailment in dairy cattle caused by *Mycobacterium paratuberculosis*. This disease is characterized by severe diarrhea, milk production loss, emaciation, and eventually death. The need to confront this problem increases as more producers request purchased cows to be tested Johne's free and the potential connection between Johne's disease in cattle and Crohn's disease in humans becomes more publicized. Significant economic losses result from clinical and subclinical cases of Johne's due to decreased production, increased mastitis, decreased fertility, and decreased value of cull cows. To help prevent further spread of this costly disease, preventative and control measures should be implemented on an industry wide basis. In most cases, management practices aimed at preventing the spread of *M. paratuberculosis* from potentially affected cows to animals under six months of age should suffice. However, when infection rates reach levels of 10% or above, a "test and cull" procedure should be used in which all animals are screened with the ELISA test, fecal culture, or DNA probe testing. Until official regulations are established, dairy leaders must continue to educate farmers on the dangers of Johne's disease.

SAD3 Vaccine use as an approach to mastitis control. M. A. DeGroot, *California Polytechnic State University, San Luis Obispo.*

With heightened public concern and increased regulation dealing with antibiotic residues in the milk supply, traditional treatment methods for mastitis have undergone serious scrutiny. There is little doubt that current practices emphasize the preventive approach as opposed to traditional antibiotic treatment protocols. One important tool in the non-antibiotic approach is the use of vaccines. This presentation will highlight the status of selected current and future vaccines against *Escherichia coli* and *Staphylococcus aureus*. General principles of vaccination will be discussed. Specific issues to be addressed will include industry response to current vaccines in use, perceived problems with existing vaccines, and one approach to future vaccine development.

Key Words: Vaccine, Mastitis

SAD4 The impact of heifer mastitis. A. Gautreaux, *Loisiana State University, Baton Rouge.*

Mastitis is perhaps the most costly disease of lactating cattle. Its occurrence in dairy herds is a result of bacteria entering and colonizing the mammary gland. Bacteria may produce toxins that destroy secretory tissue. In addition, natural immune responses and inflammation may result in the deposition of scar tissue and loss of functional alveolar function. Present methods of mastitis control are designed for the mature cow and include teat-dipping, use of proper equipment, dry cow therapy and culling. Management practices in heifers emphasize disease control and animal health and include vaccinations against calf hood diseases, use of calf hutches, and proper nutrition. Traditionally the unbred and pregnant heifer has been regarded as uninfected and milk secretions are not examined until first milking or until the first clinical episode of mastitis. Most of the development of milk secreting tissue occurs during the first gestation. Colonization and inflammation during this critical time may negatively affect developing secretory tissue. Current research has determined that it is more cost effective to treat pre-lactation heifers a dry cow antibiotics than to use standard mastitis treatments during lactation. Returns over the first two months of lactation for pre-treated heifers have been estimated at \$42.00 and a 2.5 Kg increase in milk production.

SAD5 Yeast supplements: Are they effective? M. J. Kowalewski, *Penn State University, University Park.*

Yeast supplementation to dairy cow diets has been increasing in the past few years. Various studies have evaluated the effects of a yeast supplement when added to dairy cow rations on milk yield, rumen health, and dry matter intake. The results of these studies have been variable. A 1994 study done by Penn State University showed no advantage in adding yeast culture. A study at Rutgers University in 1997 showed a 3.0 kg/day increase in dry matter intake when yeast was supplemented to diets of early lactation cows. A study at the University of Delaware showed a 1.3 kg/d increase in milk production when fed to early lactation cows. A study at the Atlantic Dairy and Forage Institute in 1997 concluded that there was an improved efficiency of energy use for lactation with yeast supplementation. The findings of both pre- and postpartum periods showed increased net digestion in the forestomach, particularly of fiber, leading to increased energy output. This presentation will review other studies performed in recent years and will give some general background of the mechanisms of action of yeast supplements.

Key Words: Yeast, Dairy

SAD7 The rebirth of whey. J. Daubert, *Virginia Polytechnic Institute and State University, Blacksburg.*

The dairy industry is exploring new ways to market its products to increase the demand and value of milk. Once a hindrance, whey, the by-product of cheese making, has gained marketing potential through successful use of new technology. This technology has transformed whey into a low volume solid; high value product creating new markets for the dairy industry. In order to isolate the valuable whey components, protein and lactose, the techniques of spray drying and ultrafiltration have been utilized. With the utilization of these components, whey has entered the food and pharmaceutical industry by being used in bakery goods, fruit beverages, powder beverages including sports drinks, infant formulas, salad dressings, spices, flavorings, and forming pharmaceutical tablets. Manufacturers of whey components such as the Davisco Company of LeSueur, Minnesota foresee such potential for economic success in whey processing that they consider cheese the waste by-product. Utilizing a high percentage of the milk used in the cheese making process enables its value to increase. Therefore, the economic impact of this newly created market for whey will bring significant advantages by diversifying and increasing the market for milk and its components.

SAD6 Custom heifer rearing. C. M. Mowrey, *Virginia, Polytechnic Institute and State University, Blacksburg.*

To achieve success in today's highly competitive dairy industry producers must become more efficient. Specialization is one approach to improve efficiency, and one of the fastest growing dairy specialties is custom heifer rearing. Contract rearing of heifers allows producers to focus land, time and feed resources toward the needs of the milking herd. Contract raising may also result in higher quality heifers that have received more attention and care, as many producers do not give adequate priority to rearing their replacements. Producers need to evaluate their current situation to determine if contract heifer raising could reduce the cost of rearing replacements or improve the quality of their heifers. After deciding to rear heifers by contract, producers should choose the best grower available and should consider many factors including total costs, payment schedules, details of animal care, and services. The grower and producer should develop a written contract which benefits both parties. Custom heifer raising can provide a cost-effective solution to the challenge of raising healthy, well-grown heifers that calve by 24 months of age. Any producer interested in contracting heifers should carefully consider the associated benefits and costs and should objectively evaluate their current rearing program before making a decision.

Key Words: Heifers, Custom Rearing

SAD8 Carbonation—a key to extended shelf life. N. S. Duarte, *California Polytechnic State University, San Luis Obispo.*

In order to combat losses of dairy products due to spoilage or code date expiration, researchers are looking at new methods to extend shelf life. An interesting development of this research has been the addition of carbon dioxide to dairy products. Carbon dioxide has been demonstrated to inhibit the growth of many kinds of organisms, including gram negative, aerobic, and psychrotrophic bacteria, reducing spoilage and enhancing shelf life. This presentation will describe the principles behind carbon dioxide addition, and will suggest beneficial applications of this process. Flavor aspects related to carbon dioxide treatment of dairy products will also be discussed.

Key Words: Carbonation, Shelf Life

SAD9 Pints to-go. S. Gibbs, *Louisiana State University, Baton Rouge*.

For this year's Dairy Foods paper I have chosen a topic who's interest has been dramatically increasing over the past three years. The plastic, to-go, pint bottles have become the "hot topic" in milk packaging.

Throughout this paper I will discuss a history of milk packaging and how it has changed over the last one-hundred years. I will also discuss some of the reasons and advantages that these new bottles have over gabletop cartons and glass bottles. These advantages include durability, resealability, they fit into cup holders, and certain producers are making these bottles out of PET (polyethylene terephthalate), the same clear resin used for soda bottles.

The equipment needed to produce these products varies greatly with each plant. But over time, it is proving that the payback period for this equipment is short term.

The main purpose of these plastic bottles is to satisfy the wants and needs of the consumer. More importantly though, these bottles seem to be helping the dairy industry catch up with the rest of the food industry in terms of packaging.

SAD11 Utilization of whey as a food ingredient. M. Metz, *University of Kentucky, Lexington*.

Whey is a liquid by-product of cheese manufacturing that consists primarily of protein and lactose. Before the 1980's, whey was utilized as animal feed and was not considered a food ingredient. During the 1980's, costly environmental regulations governing the disposal of whey forced the dairy industry to find alternative means of use or disposal. Today, through a series of isolation, filtration, and spray drying processes, whey can be transformed into a valuable food ingredient that contributes desirable physical, chemical, and nutritional characteristics. Whey protein concentrates (WPC) and whey protein isolates (WPI) are capable of forming a wide range of gels and are soluble in a wide pH range. In addition, whey can improve the homogeneous texture of foods and can form emulsions over long periods of time. Finally, and most importantly, when added to foods, whey serves as a good source of digestible amino acids. Due to these functional properties, WPC and WPI are used in baby foods, and salad dressings. In the future, due to its nutritional value, whey will likely be most useful in sports drinks, supplements, and other nutritive-sensitive foods.

Key Words: Whey

SAD10 Ultrafiltration of Milk. R. S. McConnell, *Pennsylvania State University, University Park*.

Ultrafiltration (UF) is a membrane process which concentrates the solids in milk by allowing lactose, water, and minerals to pass through while retaining the larger sized molecules. Milk concentrated by UF can be used to create higher quality dairy products, such as cheese and yogurt, allowing the production of these products with additional nutritional attributes, such as increased consistency, viscosity, and texture. Ultrafiltration of milk also decreases syneresis, or weeping, of fermented dairy products. Other benefits include a higher nutritional value because of the increase in non fat solids. The heat treatment for milk prepared in this manner is mild compared to other processes; therefore, the proteins are less damaged. This technological advance is an economically justified process, it is the best alternative for concentrating milk because less milk is used compared to other concentration processes and less energy is used for heat treatment.

Key Words: Ultrafiltration