

YC addition increased DMD in both diets (74.97 vs. 73.65 ± 0.7%; $P < 0.05$). No differences were found among the 2 ages ($P > 0.3$). N intake (128.13 ± 1.85 g/d) and apparent ND were similar in all treatments. HC diets decreased fecal output on DM (1.49 vs. 1.77 ± 0.06; $P < 0.01$) and wet (10.48 vs. 7.28 ± 0.36 kg; $P < 0.01$) bases, and YC had a significant effect in both parameters ($P < 0.05$). Urine volume

excretion was not different; therefore total manure output was lower for HC diets. We conclude that YC increased DMD in HC and LC diets; HC diets were more digestible and generated less fecal output, with YC enhancing this effect.

Key Words: Yeast culture, Forage:concentrate, *In vivo* digestibility

ADSA-SAD Undergraduate Competition - Dairy Production

188 The potential for use of sexed semen technology in the dairy industry. S. N. Van Exel*, *California Polytechnic State University, San Luis Obispo.*

Recent developments in flow cytometry have made sexed dairy cattle semen a potential tool for dairy producers. This technology makes possible a 90% probability of conceiving a heifer calf using sexed semen. What are the economics of this technology? Will sexed semen technology be accepted as an alternative to conventional artificial insemination in the dairy industry? Beneficial and potentially negative aspects of this technology will be discussed. What producers may likely benefit from the use of sexed semen in their reproductive programs? A profile of the potentially successful candidate for adoption of sexed semen will be discussed.

Key Words: Sexed Semen, Artificial Insemination, Reproduction

189 Management considerations for automated milking systems. S. J. Miller*, *The Pennsylvania State University, University Park.*

As labor costs increase and technology advances, more producers will find automated milking systems (AMS) to be a viable option. However, there are management considerations when switching from a conventional milking system to an AMS. Van de Vorst and de Koning (2002) showed that the introduction of robotic milking systems caused an increased milk SCC. Gygax et al. (2006) indicated that cows milked using AMS exhibited elevated cortisol secretion which may be linked to these higher SCC levels. Canadian producers reported between a 0% and 3.2% cull rate due to the switch to robotics. Culled cows had very close teat placement, rear teats that touched, or raised rear udders that made teats hard to detect in a horizontal plane. Genetic selection should be placed on these traits to avoid future culls. The biggest challenge will be to decrease the percentage of involuntary milkings. Involuntary milkings occur when cows do not enter the milking station in a specified period of time and producers must bring the cows to the system. Rodenburg and Wheeler (2002) found that it takes 3 to 4 weeks to reach an 80% voluntary milking rate. After the transition to an AMS, the study showed that an average of 12.6% of milkings were involuntary. Almost half of the involuntary milkings were due to lazy milkings, where cows with no signs of physical distress did not go to the milking station. Lazy milking fetch rates can be reduced by feeding small amounts of concentrate in the AMS to entice cows to be milked. The same study showed that by switching the concentrate from low energy (1.56 Mcal/kg) to high energy (1.96 Mcal/kg), voluntary visits per day increased from 3.40 to 4.04 and voluntary milkings per day increased from 1.72 to 2.06. Milk from AMS will have to comply with the Pasteurized Milk Ordinance in the U.S. The PMO has been revised to specifically address issues related to AMS. As labor becomes more of a challenge and producers become more aware of the management

adaptations necessary to make a smooth transition, AMS will become more commonplace in the dairy industry as long as they are approved to meet legal milk standards according to the PMO.

Key Words: Automatic Milking System, Robotic Milking

190 The sale and consumption of raw milk. T. Webb* and D. Winston, *Virginia Polytechnic Institute and State University, Blacksburg.*

Niche marketing of dairy products including organic and raw milk sales are growing. Historically, raw milk has been consumed by producers themselves. Recently, the sale of raw milk has received great attention. Some consumers prefer raw milk over pasteurized milk because they believe it is more natural, is healthier and tastes better. Producers prefer it because of its convenience. Others claim that it is part of their culture to consume raw milk and milk products. The level of cheese illegally produced from raw milk in California is equivalent to four percent of all cheese produced in the state each year, much of it attributed to the culture in the area. Raw milk contains many pathogens, such as *Salmonella*, *Campylobacter jejuni*, *Escherichia coli* and *Listeria monocytogenes* that can cause severe health issues when consumed by humans. Nearly 76 million people are affected by food borne illness and 5000 people die each year, costing society nearly \$20 billion. On average 250 of these deaths are from raw milk consumption, which tarnishes the image of the dairy industry. Twenty-eight states have banned the sale of raw milk to prevent such illness. Some consumers are circumventing these regulations through cow share and lease programs. Educational programs should be developed to educate dairy producers, consumers and decision makers about the health risks associated with the consumption of raw dairy products. Pasteurization has been shown to reduce microbial content in milk. The level of inactivation depends upon the temperature and time at which the milk is pasteurized.

Key Words: Raw Milk, Pasteurization

191 Breeding strategies for today's commercial dairy producers. M. M. Welper*, *Iowa State University, Ames.*

Implementation of crossbreeding programs is becoming increasingly popular as many commercial dairy producers try to take advantage of heterosis, or hybrid vigor. Heterosis describes the desirable outlying traits of a crossbred individual that are obtained by combining the diverse traits of its purebred parents. In today's dairy industry, many outstanding sires are readily available through AI to almost every producer across the globe, but these sires come from relatively few genetically distinct lines. Producers often utilize only bulls ranking in

the top percentiles over several generations to focus on the desirable traits that they are selecting for in their herd. Unfortunately, most of the top ranking bulls available in AI are even more or very closely related to each other since the top ranking bulls of one generation sire most of the next generation of bulls sampled in AI programs. Consequently, herds utilizing only top-ranking AI sires become increasingly inbred with each passing generation. Many producers are beginning to realize the drawbacks caused by inbreeding depression. This occurs when the genetics in a line of cattle becomes so focused that not only the desirable traits become more emergent but so do the non-desirable recessive traits. This often is expressed as negative consequences on performance parameters such as health, fertility, and longevity. Implementing crossbreeding into a dairy herd, ensures the prevention of inbreeding depression, and also incorporates into the herd traits from outside the current breed. Producers need to develop a crossbreeding strategy which maximizes heterosis, is easy to implement, and allows for long-term success.

Key Words: Heterosis, Crossbreeding

192 Waste milk vs. milk replacer. J. Downing* and C. C. Williams, *Louisiana State University, Baton Rouge.*

Two methods of raising dairy calves include feeding waste milk and feeding milk replacer. Waste milk is non-saleable milk such as excess colostrum, transition milk, mastitic milk, or antibiotic treated milk. Milk replacer is a powder which is mixed with water and resembles

milk. Some of the common ingredients of milk replacer include whey, whey protein concentrate, animal and vegetable fats, vitamins, minerals and amino acids. Both practices have recommendations and guidelines to follow once a method of feeding has been selected. Disadvantages of feeding waste milk include microbial infections, antibiotic residues and resistance, higher calf mortality and increased veterinary costs. The most common microorganisms found in waste milk are *Streptococcus*, *Enterobacter*, *E coli*, *Listeria*, *Salmonella*, Bovine Viral Diarrhea, and Bovine Leukosis Virus. Organisms responsible for mastitis and Johne's disease can also be found in waste milk. If waste milk is going to be fed, pasteurization is a good idea. Pasteurization of waste milk can reduce the microbial load, decrease mortality and vet costs, and increase body weight gain of calves, but it does not remove antibiotic residues from the milk. There are guidelines for feeding waste milk which can help prevent disease causing microorganisms from being spread to calves. If milk replacer is fed, its nutritional quality should be evaluated before using. Milk replacers should contain a minimum of 20% protein and 15% fat. Vegetable oils should not be used in the milk replacer because they are poorly utilized by calves. Advantages of feeding milk replacer include disease prevention, convenience, increased performance, and economics. Beneficial additives can also be incorporated into the milk replacer which aid in growth and preventing calf-scours. Many farmers consider waste milk to be cheaper than milk replacer, but this is not the case when looking at opportunity cost. Waste milk can be a good source of nutrition for calves but negative factors such as antibiotic residues and infectious pathogens may impact your calves' health and decrease performance. Management practices are key factors in deciding which method is best in raising dairy calves.

Key Words: Calves, Waste Milk, Milk Replacer

Dairy Foods: The Dairy Management Inc. National Dairy Foods Research Center Program: Responding to Industry Needs for New Technologies, Products and Markets

193 The Dairy Management Inc.™ National Dairy Foods Research Center Program: responding to industry needs for new and improved technologies, products and ingredients. J. K. Kondo*, *Dairy Management, Inc., Omaha, NE.*

Successful dairy and dairy-based product innovations rely on research. While customer and market insights fuel the product concepting process, the latest science and technologies can transform those concepts from ideas into successful products and ingredients. Through its Product Innovation Program, Dairy Management Inc.™ (DMI) provides industry with leading-edge dairy product and ingredient research and technical resources. The National Dairy Foods Research Center Program, a unified coordinated national research program conducted through six research centers, three applications labs and other universities, helps industry innovate to address unmet consumer demand for dairy and dairy-based products by providing the science for innovation as well as the knowledge to address product challenges. Presentations by center directors and scientists, representing each research center, will review current research under way in their facilities. The research covers technologies and processing methods for extended shelf-life products, high-value whey ingredients and co-product utilization, cheese with improved functionality and performance, and ingredients with enhanced functionality and performance.

Key Words: National Dairy Foods Research Centers, Dairy Centers, Dairy Research

194 Manufacture and application of casein concentrates. L. E. Metzger*, *South Dakota State University, Brookings.*

Milk protein concentrate (MPC) is extensively used as an ingredient in process cheese product formulations. In MPC approximately 20% of the total protein is whey protein and 80% is casein. In process cheese product applications casein provides a desirable firm un-melted texture and stringy, elastic melted texture, whereas whey protein forms a thermo-irreversible gel and produces a process cheese product that has restricted melt characteristics. Consequently the casein portion of milk protein is more valuable for use in process cheese product applications as compared to whey protein. The objective of this research was to develop a microfiltration process utilizing spiral wound membranes that is capable of producing a casein enriched protein concentrate (CEPC). Subsequently the performance of CEPC in process cheese product formulations was compared to conventional MCP. Three replicates of skim milk were processed into MPC using ultra/diafiltration and CEPC using micro/diafiltration. The mean total protein, casein, whey protein, ash, and lactose of the MPC and CEPC respectively were 74.3, 60.4, 13.1, 7.60, 11.9% and 73.2, 65.6, 6.6, 7.8, 6.1%. The MPC and CEPC were then utilized in process cheese product formulations. The process cheese product formulations were standardized to contain 15 and 25% MPC or CEPC (corrected to 75% protein). Each formulation was processed at 80 and 95°C. The process cheese products produced using CEPC had a significantly ($P < .05$) higher apparent