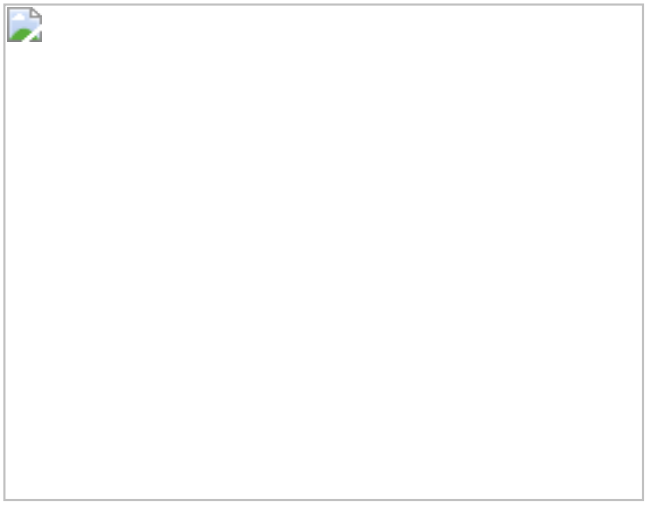
Nutrition Plus

Volume 6, Issue 3 September 2009

**IN THIS ISSUE:**



# The Environmental Impact of Modern Dairy Production



It is a common perception among U.S. consumers today that modern dairy production practices are more damaging to the environment than in the "good old days" of yesteryear. But the recent findings of a Cornell University study show that environmental sustainability actually depends on today's more efficient style of dairying, and that the carbon dioxide per kilogram of milk produced in this country today is dramatically less than it was generations ago.

Jude Capper, PhD, led a research study recently published in the *Journal of Animal Science* that compared cow numbers, milk production and carbon emissions from 1944 to the same factors in 2007. They found that improved efficiency has enabled the U.S. dairy industry to produce 186 billion pounds of milk from 9.2 million dairy cows in 2007, compared to only 117 billion pounds of milk from 25.6 million cows in 1944.

Measuring the "carbon footprint" — a current political and scientific buzzword — in terms of kilograms of carbon dioxide equivalents emitted per kilogram of milk produced, Capper found that the carbon footprint per kilogram of milk in 2007 was 63% less than that of 1944 (See Figure 1). This means that the entire dairy industry's carbon footprint was reduced by 41% between 1944 and 2007.

"Interestingly, many of the characteristics of 1940s dairy production — including low milk production; pasture-based management; and no antibiotics, inorganic fertilizers or chemical pesticides — are similar to those of modern organic dairy systems," notes Capper. "Studies

investigating the environmental impact of organic systems also have described increases in the quantity of resources required and carbon footprint per kilogram of milk compared to conventional production."

Capper credits genetic advancement due to artificial insemination; improved crop-production methods and technologies; and greater focus on animal health, cow comfort and nutrition, all with having a positive impact on dairy production efficiency in the past several decades. But she says the greatest technological contribution to improved dairy productivity was the introduction of recombinant bovine somatotropin (rbST) following its FDA approval in 1994.

In a deterministic model based on the NRC 2001 nutrient requirements of dairy cows, Capper and her peers evaluated the annual resources required and waste produced from a population of one million cows supplemented with rbST, compared to an unsupplemented population. They found that, to achieve the same level of milk production as the rbST-supplemented cows, the unsupplemented population would require an extra 157,000 milking cows and 177,000 dry cows and heifers. The rbST-supplemented group would use 2.3 million metric tons less feedstuffs; 540,000 fewer acres of land for crop production (also resulting in less soil erosion); and considerably lower fertilizer and pesticide levels. A smaller cow population also would translate into less manure produced, and thus less emission of methane and nitrous oxide gases.

"This research is critical to the U.S. dairy industry's long-term success and sustainability," comments Tim Johnson, PhD, private dairy nutrition consultant and former Dairy Extension Specialist with Purdue University. "We've been beaten up pretty badly, to the point that the ability of many producers to maximize their animal-unit efficiency by using rbST has been taken away under various circumstances in recent years." Johnson notes that recent legislative discussions suggesting per-animal "pollution taxes" are likely to resurface, and that the possibility of carbon credits and/or cap-and-trade scenarios make it even more critical that the dairy industry quantifies its true environmental impact. "Our system of recycling nutrients and diluting maintenance through more efficient milk production practices is a phenomenal success story. We need to get out and tell it," says Johnson.

### rbST AND THE ENVIRONMENT

By improving production efficiency and reducing fossil fuel, electricity and water consumption, supplementing one million U.S. dairy cows annually with rbST would result in annual resource savings equivalent to:

Heating approximately 16,000 homes;
Providing electrical power to approximately 15,000 homes; and
Supplying water to approximately 10,000 homes.

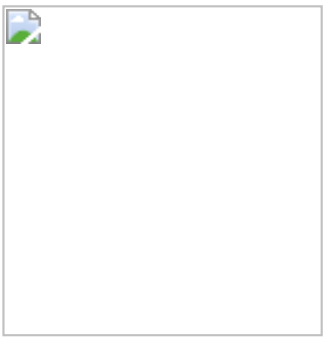
At this level of rbST use, the total carbon footprint of the dairy industry would be reduced by 1.9 billion kg per year, which is equivalent to:

Removing approximately 400,000 family cars from the road; or
Planting 300 million trees

*Source: Capper et al., (June 2007).*

## CONSULTANT'S CORNER

# Communicating Our Case



*By Timothy Johnson, PhD, PAS, Dairy and Animal Nutrient Management Services Consulting, Noblesville, Ind.*

In the more than 30 years I have worked with dairy producers, I have never failed to be impressed by their unyielding quest for quality. Due in part, perhaps, to the fact that they sell much of their product directly to consumers, dairy farmers are a proud and conscientious lot.

In many cases — particularly in the Midwest — the dairy farm is a completely self-contained unit, utilizing feed crops to produce milk, and then using the manure as a nutrient source for the next crop. It is recycling at its finest.

In addition to producing more milk from fewer cows, dairy producers have become much more cognizant of soil nutrient levels — particularly phosphorus — and have cut back on phosphorus in their rations. Methane digesters also are harnessing the energy of methane gas and producing electricity for use on the farm and, in some cases, for sale to their surrounding communities.

Despite all of this positive news, our dairy producers are facing an uphill battle when it comes to their ability to utilize technology. In the past few years, many milk processors — including those in our local area — have succumbed to pressure from consumer groups and banned the use of rbST in their patrons' herds. Due to the limited number of processors, many producers have had no choice but to discontinue use of a technology that is approved by the FDA, and has been proven to have absolutely no effect on the protein, fat, solids or hormone levels in milk. The producers in our local area estimate that income per cow was compromised by approximately $1,500 per lactation.

What is frustrating is that the same people who are willing to pay more for organically produced foods also are those who say they are concerned about the environment and carbon footprints. It is a very flawed way of thinking. At the same time, they want their homes in the country or the suburbs, often at the expense of productive farmland. They say they are worried about world hunger. Yet they advocate regulations and policies that severely impede the ability of U.S. farmers to meet the food demands of a growing global population.

American consumers need to know the results of the Cornell University study by Dr. Jude Capper, which shows that the carbon footprint of today’s dairy industry is considerably less than it was more than 60 years ago. We also need more research like it, the results of which can be translated into highly understandable, consumer-friendly terms. Finally, we need not apologize for our progress. It is a remarkable example of efficiency and responsibility of which our dairy industry should be proud .

## FROM THE MATERNITY PEN

# Colostrum management tips

Colostrum is the lifeblood of every newborn calf. Unfortunately, it also can be a major source of infectious agents during calves' first critical days of life. In addition to causing serious diseases including scours and pneumonia, it is thought that high pathogen loads in colostrum may interfere with passive absorption of colostral antibodies, reducing passive transfer of immunity in calves.

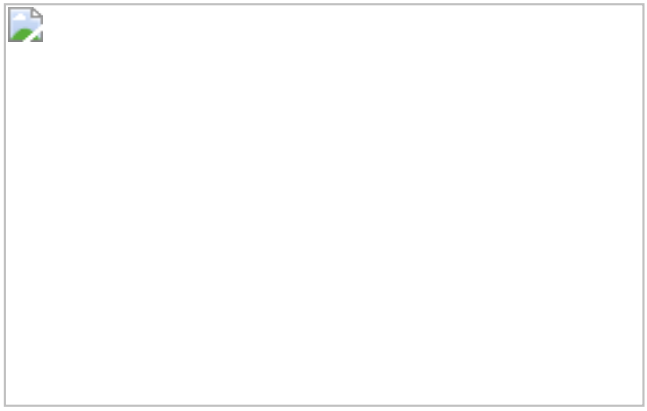
University of Minnesota calf researcher Sandra Godden, PhD, issues these recommendations for the delivery of healthy colostrum:

- Carefully prep udders of fresh cows, milk colostrum into a clean, sanitized bucket; and then transfer it into clean, sanitized storage or feeding equipment. Recent research (Stewart et al. 2005) showed that the collection bucket was the source of the greatest bacterial contamination during colostrum harvest.
- If not fed within one to two hours of collection, refrigerate colostrum for up to 48 hours, or freeze. Using a potassium sorbate preservative may stretch the refrigerated life to 96 hours.
- Discard colostrum from high-risk dams, such as those with clinical mastitis, and/or cows known to be Johnes-positive.
- Do not pool fresh colostrum.
- Thaw frozen colostrum at 140°F or less to avoid overheating and denaturation of immunoglobulins.
- Consider using a commercial colostrum replacer, particularly in herds with a history of Johne's disease. Choose a colostrum replacer that also includes a nutrient pack that provides a source of protein, energy, vitamins and minerals similar to levels found in maternal colostrum; and a minimum of 100 grams of IgG per dose. To improve levels of passive transfer of IgG, feed 1-1/2 or 2 doses for a total IgG of 150 to 200 grams per calf.
- Consider pasteurizing colostrum (140°F for 60 minutes) if an on-farm, batch pasteurizer is available.

**BEYOND BYPASS**

## Cows tell the story of heat stress

Cassandra Tucker, PhD, researcher in the Department of Animal Sciences at the University of California-Davis, has performed an analysis using animal behavior to help determine the best methods for heat-stress reduction in dairy cattle. Together with her colleague Karin Schultz, PhD, from AgResearch Ltd., Hamilton, New Zealand, she conducted her own research, and evaluated the work of others, to determine how cows attempt to cool themselves, via the behaviors they express. Their findings:



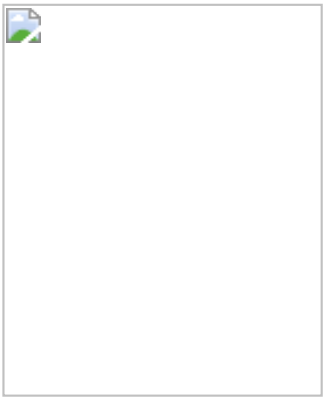
- When forced to choose between the two, cows will choose shade over lying down. Tucker cites a study (Schutz et al. 2008) in which cows chose to stand in shade versus lying in warm conditions at an ambient air temperature of greater than 86°F, even when they were deprived of lying for the previous 12 hours.
- Cows start to use shade more as air temperature and solar radiation increase (Kendall et al. 2006), and cows will engage in aggressive behavior to gain access to shade in hot weather.
- Standing may be a heat-abatement strategy itself, as Tucker and her colleagues found that time spent standing increased by 10% (13.8 to 15.3 hours per day) when heat load increased by 15%.
- Cows will change their feeding behavior in response to heat stress. In addition to eating less in hot conditions (possibly as a result of not wanting to leave shaded areas), one study found that cows will change their grazing times to cope with heat stress, grazing

more at night and using shade more during the day (Kendall et al. 2006).
- Increased time around water troughs is another well-documented, heat-stress-relief behavior, particularly when shade is not available. Tucker theorizes that this behavior helps cows stay cool due to increased water consumption, greater evaporation near the water source, or both.
- Cows will increase respiration rate to promote heat loss via evaporation. In one recent study of feedlot cattle (Brown-Brandl et al. 2005), respiration rate increased from approximately 64 breaths per minute at a Temperature-Humidity Index (THI) of less than 76, to 93 breaths per minute when THI exceeded 84.

Tucker and her colleagues used this collective behavioral information as the basis for evaluating various methods of cooling cows via shades and sprinklers. Read their full study and conclusions.

## QUALITY CORNER

# Introducing Tim Brown: New Director of Technical Support



West Central is a true cooperative, owned by farmers, and operated for the purpose of providing those farmers with marketing opportunities for the crops that they grow. When it comes to SoyChlor® and SoyPLUS®, two products made by West Central for use in dairy nutrition, West Central is blessed with a well-organized and multi-disciplined team of individuals. Each team member has his/her own areas of expertise, ranging from research and development, manufacturing, quality assurance/quality control, risk management and pricing, transportation, sales and customer service after the sale. My role in technical support at West Central is to serve as a resource for all of the folks involved with the production and sales of SoyChlor® and SoyPLUS®, as well as to serve as a resource for our customers who use those products. As a means of introduction, and to give you some idea of my experiences that I will draw upon in this role, I was asked to provide a short professional bio.

I received my B.S. in animal sciences from Virginia Tech, my M.S. in animal nutrition from Kansas State, and my Ph.D. in ruminant nutrition from Kansas State. I have worked as a research scientist with the Louisiana Agricultural Experiment Station, and as a teaching professor at Tarleton State University in Stephenville, Texas. Including the research involved in graduate school, I have about 25 years of academic research and teaching experience. Throughout a large portion of that time, I also raised dairy replacement heifers and worked part-time as an independent nutrition consultant. More recently, I have another seven years experience in dairy nutrition consulting, working with herds in Kansas, Nebraska, and Iowa. Each of these very different jobs provided me with experiences that I can use in my current role with West Central. Like the other members of the SoyChlor® and SoyPLUS® team, I hope to use these experiences to help our customers reach a better economic position.

West Central

406 First Street
Ralston, IA 51459
(800) 843-4769
www.west-central.com