BALANCED DAIRYING

-Production-

Texas Agricultural Extension Service
The Texas A&M University System

COOLING DRY COWS

Sandy Stokes, Extension Dairy Specialist

Summer drops in production resulting from heat stress cause significant economic loss in the dairy industry. Heat stress occurs from solar radiation, high temperatures and relative humidity. This is further aggravated by heat production from the cow's own body. Generally, the higher-producing cow generates greater heat load from digestion and metabolism.

Responses to heat stress include panting and sweating. If these don't reduce the heat load, body temperature rises. That increased body temperature causes reduced feed intake, higher maintenance requirement (panting increases this as much as 25%), decreased fertility, depressed immune system function, lowered growth and milk production, and less efficient productive ability.

The higher maintenance requirement means cows need to increase feed intake to maintain milk production. However, the opposite happens. Feed intake declines when ambient temperatures exceed 78°F. The result: milk production may decline as much as 30%, percentage of milk components may shift and reproductive efficiency declines (Table 1).

ADJUST NUTRITION

Adjustments in both nutrition and management during summer months help the cow lessen her heat load. Nutrition adjustments may include bunk management, feeding schedules, and ration composition (energy density, use of feed

Table 1. Effect of heat stress on maintenance requirement, feed intake, and milk production.

Temperature (°F)	Maintenance requirement (%)	Projected intake required to maintain milk (DM, pounds)	Actual feed consumed (DM, pounds)	Milk produced, pounds
68	*100*	*40.1*	*40.1*	*59.5*
77	**104**	**40.6**	**39.0**	**55.1**
86	**111**	**41.7**	**37.3**	**50.7**
95	**120**	**42.8**	**36.8**	**39.7**
104	**132**	**44.5**	**22.5**	**26.5**

McDowell et al., 1976. J. Dairy Sci. 59:965.

additives such as buffers, potassium carbonate, yeast). While much of the diet adjustment is made with a nutrition consultant, the dairy producer decides on the cooling system.

ADD COOLING SYSTEMS

The objective of any cooling system is to keep the cow's body temperature close to normal for as much of the day as possible. An acceptable range in rectal temperature is 101.3-102.8°F. The easiest and most obvious way to help heat-stressed cows is to provide shade. Direct sunlight adds a tremendous heat load to the cow and can be blocked by either permanent or temporary shades. The second step would be to provide additional cooling with fans and sprinklers. Sprinkling the cow with water to fully wet her body and using fans to evaporate the water cools the cow and encourages greater feed intake and milk production.

COOL DRY COWS

Research has documented that the lactating cow responds to cooling. Yet, while carry-over effects of dry cow nutrition management on post-partum production have been well established, little work has been done on responses of cooling dry cows. The dry period is particularly crucial since it involves mammary gland involution and subsequent development, rapid fetal growth and the induction of lactation. This is also when follicular development and maturation begins for the following reproductive cycle. The metabolic heat load is low relative to the heat dissipation ability in this period, about one-half that of a lactating cow producing 65 pounds of milk. However, it's thought that the endocrine system is more sensitive to moderate heat stress during the dry period than during lactation.

Prepartum endocrine responses due to prepartum heat stress may include reduced concentrations of thyroid hormones, and placental estrogen as well as increased NEFA levels. These affect growth of maternal tissues (mammary gland, placental, or fetal tissue), influence postpartum mammary function and affect the rate of uterine involution. Work from the University of Arizona suggests the primary benefit from prepartum cooling may be a reduction in number of cows culled open after 10 months of lactation.

The effects of shade and cooling during the last trimester of pregnancy consistently results in increased birth weights (as much as 10%) in calves born to cows cooled prepartum. In addition, prepartum heat stress may reduce colostrum quality. Research shows lower immunoglobulin content (IgG and IgA) and reduced levels of total protein, fat and lactose in the colostrum of heifers exposed to heat stress prepartum. Several groups report that calves born during the summer nurse their dams less vigorously and may have impaired absorption efficiency. Lower absorption efficiency, coupled with the lowered Ig content of colostrum, may increase the chance of health complications and mortality in calves born during the summer and early fall.

Milk production responses to prepartum cooling on postpartum production have been variable. Reports range from no significant differences to an 8-pound increase in 150-day milk production. However, there were trends in both trials for higher milk production in cows cooled prepartum compared to noncooled cows.

SUMMARY

Prepartum heat stress may affect postpartum productivity. Research reveals consistent responses in rectal temperature, respiration rate and calf birth weight to prepartum cooling. Postpartum milk production and reproductive measures have been variable and are less defined.

Consider both immediate and long-term effects on production, Cost:benefit analyses of cooling systems, at any stage of production.

HORIZON DAIRY HOSTS SWDFD MAY 11

David and Leslie DeJong, owners of Horizon Dairy, will host the 2000 Southwest Dairy Field Day on May 11 at their Hamilton County dairy. Field Day participants can tour the dairy and visit commercial exhibits from 10 a.m. to 3 p.m.

Programs throughout the day include free stall versus drylot housing; robotic milking systems; milking system claw considerations; commodity and forage management; integration of feed and milk information; risk management opportunities; alternative synchronization programs for reproductive management; and dairy manure management.

Horizon Dairy has been in operation since the fall of 1994. Two thousand cows are milked three times-a-day in a double-35 parallel parlor. Each shift consists of three milkers and one cow pusher. The herd, which is on official DHI test, has a rolling herd average of 23,500 lbs. of milk. At any one time, the DeJong's have another 500 dry cows and replacement heifers on hand.

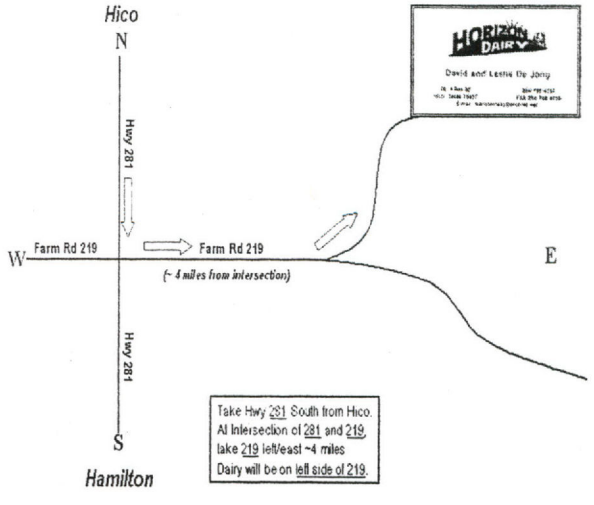
In the summer of 1998, two 400-cow free stall barns were added. Bedding in the free stalls consists of a mixture of 2/3 sand and 1/3 gin trash. All beds are groomed nightly using a slurry wagon to add bedding as needed. Cooling was added to the free stall area in 1999. Fans were installed to take advantage of the prevailing south winds and barn elevations. High pressure misters with soakers over the feed lanes are controlled by thermostats. The high pressure misters cycle on and off depending upon humidity. The soakers are on when cows are eating and cycle on and off, as well. Based on the success of the first two barns, DeJong plans to convert the entire facility to free stall housing as time and finances permit.

Nutrient management considerations are an integral part of the Horizon Dairy facility. Mechanical separators are used for the milking parlor waste. All other flush water and free stall water is separated using settling basins. The liquid portion then flows into a two-stage lagoon system. Water from the secondary lagoon is recycled as flush water and also used for irrigation. Outside lots are dry scraped into piles every other day. Once dried, the scraped solids are then used to fertilize fields.

Horizon Dairy raises coastal Bermudagrass and wheat for grazing, while wheat, oats and sorghum are grown for silage. The small grains averaged about six tons per acre, while the sorghum averaged 14-15 tons per acre of silage in 1999.

To reach Horizon dairy, take Hwy 281 south from Hico, TX. At the intersection of Hwy 281 and 219, turn left or east on 219. Continue on 219 approximately 4 miles and the dairy will be on the left side of 219.

Lunch will be provided from 11:30 a.m. to 1 p.m. courtesy of the sponsors.



TEXAS AGRICULTURAL EXTENSION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE
THE TEXAS A&M UNIVERSITY SYSTEM
COLLEGE STATION, TEXAS 77843

CALENDAR OF EVENTS

March 23, 2000	Comanche Farm Show (2 hr CEU for DOPA) Contact: Sandy Stokes - (254) 968-4144
April 11, 2000	Initial DOPA Training (8 hr CEU), Sulphur Springs, TX Contact: Larry Spradlin - (903) 885-3443
May 11, 2000	Southwest Dairy Field Day (2 hr CEU for DOPA) Contact: Sandy Stokes - (254) 968-4144
May 17-19, 2000	Mid-South Ruminant Nutrition Conference Hilton Arlington Hotel Contact: Ellen Jordan -(972) 952-9210

Michael A. Tomaszewski
Extension Dairy Specialist
College Station, TX
409-845-5709

Ellen R. Jordan
Extension Dairy Specialist
Dallas, TX
972-952-9212

Sandra R. Stokes
Extension Dairy Specialist
Stephenville, TX
254-968-4144