September 2000

Dairy Lines

Volume 6, Number 9

Co-Editors

John F. Smith
Extension Specialist, Dairy Science

Dan Waldner
Extension Specialist, Dairy Science

Mike Brouk
Extension Specialist, Dairy Science

Contributors

Karen Schmidt
Professor, Dairy Products

John Shirley
Professor, Dairy Science

Jeff Stevenson
Professor, Dairy Science

Dave Sukup
Manager, Heart of America DHI

Upcoming Events

K-State Dairy Days

Garden City, KS
November 9, 2000

Seneca, KS
November 15, 2000

Whiteside, KS
November 16, 2000

Emporia, KS
November 17, 2000

See Page 2 for topics and presenters.

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DAIRY RESEARCH & EXTENSION NEWS
http://www.oznet.ksu.edu/dp_ansi/dairylin.htm

Economics of Cooling Cows

Kevin C. Dhuyvetter, Extension Agricultural Economist, Kansas State University

Introduction

Heat stress can have a large impact on cow comfort and milk production, affecting the profitability of dairy operations. Drops in milk yield of 10-25 percent following heat stress are not uncommon in high-producing herds. With production decreases of this magnitude it will most likely be economical to provide supplemental cooling to avoid, or at least minimize, the impact of heat stress. But in order for producers to make informed decisions they need quantitative information. So an economic analysis that quantifies the returns associated with cooling cows (heat stress abatement) is warranted.

Studies examining the returns to reducing heat stress often consider the heat stress time period only. But published lactation curves suggest that a 1-pound increase at peak production will produce an additional 225-250 pounds of milk over the entire lactation. So it is important that any economic analysis of heat stress abatement accounts for the increased production over a cow's entire lactation and not just during the heat stress time period.

This article reports the estimated economic returns associated with reducing, or even eliminating, seasonal variation in peak milk production for a commercial dairy herd in Kansas. A hypothetical milk lactation curve was used to simulate milk production.

Economic Analysis Method

A partial budget was used to examine the impact heat stress abatement (adding cooling equipment) has on net returns. A partial budget is comprised of four values: (1) increased revenue, (2) decreased costs, (3) increased costs, and (4) decreased revenue. For the dairy analyzed here, increased revenue is simply the increased milk production due to reducing heat stress. Quantifying costs expected to decrease due to reducing heat stress is difficult, and such costs likely vary considerably between operations. Costs that might decrease as a result of reduced heat stress are costs associated with health and reproduction, specifically, those factors directly related to cow comfort. Due to the difficulty in measuring these costs accurately, they are not included in this analysis and as a result the returns associated with heat stress abatement should be viewed as lower bounds.

Increased costs associated with cooling cows are the higher feed costs due to increased feed intake and fixed and variable costs of the cooling system itself (depreciation and interest on fans and sprinklers as well as electricity and water costs). It is assumed there are no reductions in revenue associated with cooling cows.

Economics of Cooling Cows Based on Peak Production

Figure 1 on Page 3 shows the peak milk production by lactation and month for a commercial dairy operation in Kansas with freestall barns, but without fans or sprinklers for cooling cows. The interpretation of the data in Figure 1 is as follows: The average peak milk production (lbs/cow/day) for all cows in their second lactation that peaked in the month of March was 100 pounds. Peak production was relatively steady seven months of the year (December through June), but the other five months it is less, and considerably so in August, September and October. The reductions in peak production for cows in their second lactation are similar to those in their third or higher lactation on a percentage basis — about a 13 to 14 percent difference between highest and lowest peaks. The decrease in first lactation cows follows a similar seasonal pattern but is considerably less with

continued on page 3

Heart of America Dairy Herd Improvement Summary (August)

	Quartiles 1	2	3	4	Your Herd
Ayrshire					
Rolling Herd Average	19,824	15,815	14,732	13,260	
Summit Milk Yield 1st	63.0	29.0	53.0	47.0	
Summit Milk Yield 2nd	87.0	64.5	68.0	53.5	
Summit Milk Yield 3rd	90.0	36.0	73.0	64.0	
Summit Milk Yield Avg.	79.0	68.0	64.0	58.0	
Income/Feed Cost	1,710	1,299	736	1,052	
SCC Average	231	68	146	268	
Days to 1st Service	80	70	72	54	
Days Open	122	182	124	123	
Projected Calving Interval	13.2	15.2	13.3	13.2	
Brown Swiss					
Rolling Herd Average	19,764	16,625	15,085	13,692	
Summit Milk Yield 1st	62.1	55.2	50.8	44.1	
Summit Milk Yield 2nd	77.1	65.4	67.1	59.2	
Summit Milk Yield 3rd	85.8	73.8	69.0	63.8	
Summit Milk Yield Avg.	74.1	64.8	63.0	58.2	
Income/Feed Cost	1,572	1,279	1,149	906.5	
SCC Average	411	368	261	277	
Days to 1st Service	72	133	91	78	
Days Open	199	167	158	212	
Projected Calving Interval	15.7	14.7	14.4	16.1	
Guernsey					
Rolling Herd Average	15,603	14,127	13,203	12,015	
Summit Milk Yield 1st	50.5	46.5	48.5	41.5	
Summit Milk Yield 2nd	67.5	58.5	58.5	50.0	
Summit Milk Yield 3rd	69.5	58.5	63.0	54.0	
Summit Milk Yield Avg.	61.0	55.5	56.5	47.5	
Income/Feed Cost	1,014	1,350	1,006	879.5	
SCC Average	618	286	372	351	
Days to 1st Service	39	88	112	69	
Days Open	204	158	185	212	
Projected Calving Interval	15.9	14.4	15.3	16.2	
Holstein					
Rolling Herd Average	23,333	20,210	17,914	1,4640	
Summit Milk Yield 1st	73.8	66.5	60.7	51.7	
Summit Milk Yield 2nd	94.3	83.7	74.8	64.1	
Summit Milk Yield 3rd	100	89.5	80.6	69.0	
Summit Milk Yield Avg.	87.7	79.2	72.5	62.6	
Income/Feed Cost	1,821	1,509	1,265	984	
SCC Average	347	373	386	499	
Days to 1st Service	92	92	89	95	
Days Open	162	171	178	199	
Projected Calving Interval	14.5	14.8	15.0	15.7	
Jersey					
Rolling Herd Average	17,114	15,068	13,547	11,423	
Summit Milk Yield 1st	55.4	50.1	45.6	42.8	
Summit Milk Yield 2nd	58.4	64.2	60.0	49.5	
Summit Milk Yield 3rd	73.6	66.3	58.8	52.1	
Summit Milk Yield Avg.	64.8	59.3	54.8	48.8	
Income/Feed Cost	1,641	1,457	1,226	781	
SCC Average	277	344	360	438	
Days to 1st Service	95	102	96	81	
Days Open	139	139	130	137	
Projected Calving Interval	13.8	13.8	13.5	13.7	
Milking Shorthorn					
Rolling Herd Average	14,998	14,952	13,710	10,846	
Summit Milk Yield 1st	52.0	48.0	50.0	21.5	
Summit Milk Yield 2nd	72.0	61.0	59.0	49.0	
Summit Milk Yield 3rd	76.0	69.0	69.0	56.0	
Summit Milk Yield Avg.	66.0	61.0	60.0	54.0	
Income/Feed Cost	1,470	1,159	1,088	701	
SCC Average	358	289	217	274	
Days to 1st Service	78	104	87	55	
Days Open	110	163	111	113	

Hay Prices—Kansas*

	Location	*Quality*	*Price ($/ton)*
Alfalfa	Southwestern Kansas	Supreme	90–100
Alfalfa	Southwestern Kansas	Premium	75–100
Alfalfa	Southwestern Kansas	Good	—
Alfalfa	South Central Kansas	Supreme	90–120
Alfalfa	South Central Kansas	Premium	90-105
Alfalfa	South Central Kansas	Good	80-90
Alfalfa	Southeastern Kansas	Supreme	—
Alfalfa	Southeastern Kansas	Premium	75-100
Alfalfa	Southeastern Kansas	Good	60–75
Alfalfa	Northwestern Kansas	Supreme	90–105
Alfalfa	Northwestern Kansas	Premium	80–90
Alfalfa	Northwestern Kansas	Good	60–70
Alfalfa	North Central Kansas	Supreme	55cents/pt
Alfalfa	North Central Kansas	Premium	80–90
Alfalfa	North Central Kansas	Good	—

Supreme = over 180 RFV (less than 27 ADF)
Premium = 150–180 RFV (27–30 ADF)
Good = 125–150 RFV (30–32 ADF)

Source: USDA Kansas Hay Market Report, *September 5, 2000*

Hay Prices—Oklahoma

	Location	*Quality*	*Price ($/ton)*
Alfalfa	Central/Western, OK	Premium	80–90
Alfalfa	Central/Western, OK	Good	60–85
Alfalfa	Panhandle, OK	Premium	85–90
Alfalfa	Panhandle, OK	Good	60–80

Source: Oklahoma Department of Agriculture, USDA Market News Service, *August 31, 2000*

Feed Stuffs Prices

	Location	*Price ($/ton)*
Blood Meal	Central US	350
Canola Meal		89-90
Corn Gluten Feed	Kansas City	48–50
Corn Gluten Meal	Kansas City	220-230
Corn Hominy	Kansas City	55-56
Cotton Seed Meal	Kansas City	172-173
Whole Cotton Seed	Memphis	136
Distillers Grains	Central Illinois	72–75
Pork—Meat and Bone Meal	Texas Panhandle	190-195
SBM 48%	Kansas City	168-180
Sunflower Meal		75
Wheat Middlings	Kansas City	40-44

Source: USDA Feedstuff Market Review, *September 6, 2000*

K-State Dairy Days

Seminars will take place across the state during the month of November. See the Upcoming Events section on Page 1 for dates and locations.

Topics:

Milk Quality from a Processors Point of View, Karen Schmidt
Mastitis Management, Mike Brouk, John Smith
The Silage Triangle, Keith Bolsen, Mary Kay Siefers, Estela Uriarte
Update of Nutritional Research at K-State, John Shirley

Registration information will be included in the next issue of *Dairy Lines*.

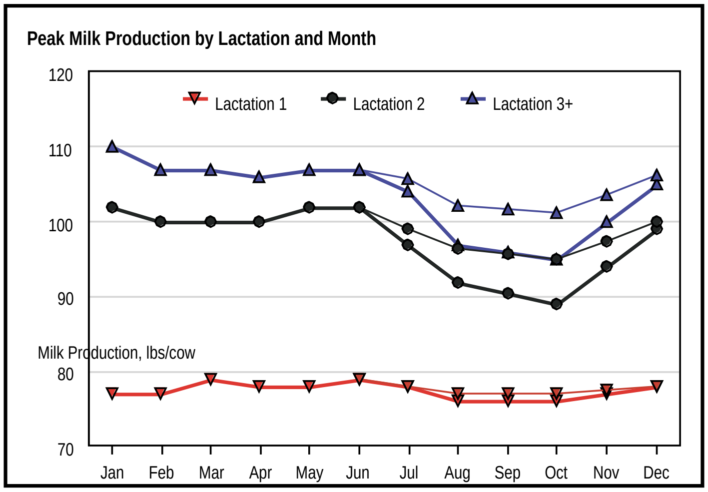


Figure 1. Peak Milk Production by Lactation for Commercial Dairy in Kansas.

a 4 percent difference between highest and lowest peaks. A logical question then is, How much would it be worth to reduce, or possibly eliminate, the reduction in peak production that occurs in July through November by cooling cows?

The dashed lines in Figure 1 represent what the peak production would be if the "gap" between the heat stress months (July-November) and the average of January through June were reduced by 50 percent. Given a lactation curve and peak production levels as displayed in Figure 1, total production for an entire dairy operation can be estimated. Given estimated milk production, economic returns can be calculated for various levels of "gap reduction" to help dairy managers determine if cooling cows is economical.

Table 1 shows the returns to reducing the variability in peak production for first, second, and third and higher lactation cows. Economic returns are based solely on changes in milk production and do not account for additional benefits cooling cows might have on reproduction and health. Production is shown for (1) base peak production levels, (i.e., the solid lines in figure 1); (2) a 25 percent reduction in the gap between heat stress months and January-June; (3) a 50 percent reduction in the gap, (i.e., the dashed lines in figure 1); and (4) a 100 percent reduction in the gap, (i.e., the elimination of seasonal variation in peak production).

Increased feed costs were based on an additional 0.40 pounds of feed for each additional pound of milk. Costs of the cooling system were based on fixed and variable costs of fans and sprinklers operated for 100 days per year. In addition to returns over feed costs, a benefit/cost ratio was calculated which simply looks at the dollars of revenue that are generated for every dollar of expense. Defined this way, a ratio less than 1.0 would be unprofitable.

The amount of improvement required in peak production for cooling to be profitable for first lactation cows is quite high. But it is economical to cool second and higher lactation cows at much smaller percentage improvements (breakeven is approximately 30 percent reduction in gap).

If the difference, or gap, in peak production between heat stress months and other months can be reduced 50 percent for older cows, there is greater than a 1.5:1 payback. This compares to a payback of only 27 cents for every dollar spent on cooling first lactation cows at this gap reduction percentage.

This indicates that the profitability of cooling cows will depend on the age distribution of the herd. At a 50 percent reduction in the gap, a dairy that has an equal distribution of first, second, and third and higher lactation cows in the herd would recognize a return of nearly $1.25 for every $1 spent on expenses associated with cooling cows. Furthermore, if the cooling equipment is used only on higher lactation cows, the returns are about $1.75 for every $1 spent.

So given that most dairies have second or higher lactation cows, management strategies that increase peak production by reducing the effects of heat stress will most likely be profitable.

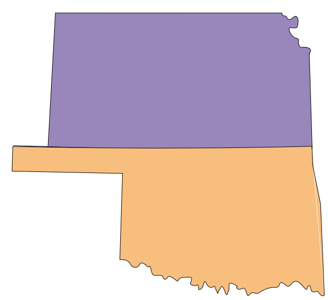
Table 1. Impact of Increasing Peak Production During Heat Stress Months.[1]

	Base[2]			25% reduction in gap[3]			50% reduction in gap[3]			100% reduction in gap[3]		
Lactation	L1	L2	L3+	L1	L2	L3+	L1	L2	L3+	L1	L2	L3+
Peak, lbs/d[4]	77.4	97.3	103.4	77.6	98.2	104.4	77.7	99.1	105.4	78.0	101.0	107.3
Total, lbs[5]	20,354	25,580	27,190	20,392	25,823	27,447	20,431	26,067	27,705	20,507	26,555	28,220
Per Cow Average:												
Return over feed costs, $/cow/yr[6]				$3.28	$20.83	$22.00	$6.55	$41.66	$44.00	$13.11	$83.33	$88.01
Benefit/cost ratio (income/cost)[7]				0.13	0.85	0.90	0.27	1.70	1.80	0.54	3.41	3.60
Dairy Average:[8]												
Return over feed costs, $/cow/yr[6]					$15.37			$30.74			$61.48	
Total return over feed costs, $/yr[6]					$9,222			$18,444			$36,888	
Benefit/cost ratio (income/cost)[7]					0.63			1.26			2.51	

[1] Heat stress months are assumed to be July through November. [2] Base represents the production without cooling cows (solid lines in figure 1). [3] Gap refers to the difference between peak production in heat stress months and the average of January through June. [4] Average peak production during the year. [5] Total production for 350 day lactation (production is annualized by multiplying by 12.0/13.5) – milk at $12.00/cwt. [6] Feed costs are based on 0.40 pounds of feed for each additional pound of milk and $120/ton diet cost. [7] Cost of cooling system is based on annual cost of fans and sprinklers ($14,680 per year for 100 days of cooling). [8] Dairy average is based on 600 cows and equal numbers of all three lactations (i.e., 33.3% L1, 33.3% L2, 33.3% L3+).

DEPARTMENT OF ANIMAL SCIENCES AND INDUSTRY
139 CALL HALL
KANSAS STATE UNIVERSITY
MANHATTAN, KANSAS 66506

Dairy Lines is jointly published for dairy producers by the Department of Animal Sciences and Industry, K-State Research and Extension, and the Department of Animal Science, Oklahoma Cooperative Extension Service. For more information or questions, please contact 785.532.5654 (K-State) or 405.744.6058 (OSU).



Kansas State University
K-State Research & Extension
Department of Animal Sciences and Industry
Call Hall, Room 139
Kansas State University
Manhattan, Kansas 66506

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John Smith
Extension Specialist
Dairy Science
K-State

Mike Brouk
Extension Specialist
Dairy Science
K-State

Dan Waldner
Extension Specialist
Dairy Science
Oklahoma State