October 1998

Dairy Lines

Volume 4, Number 10

DAIRY RESEARCH & EXTENSION NEWS

http://www.oznet.ksu.edu/dp_ansi/dairylin.htm

Co-Editors

John F. Smith
Extension Specialist, Dairy Science

Dan Waldner
Extension Specialist, Dairy Science

Contributors

Karen Schmidt
Associate Professor, Dairy Products

John Shirley
Associate Professor, Dairy Science

Jeff Stevenson
Professor, Dairy Science

Dave Sukup
Manager, Heart of America DHI

Upcoming Events

October 28
Northeast Dairy Roundtable
Mayes County Extension
10 a.m.—Noon
Pryor, OK

October 29
Oklahoma Alfalfa Expo '98
Grady County Fairgrounds
9 a.m.—Sept. 26
Chickasha, OK

November 18, 19, 20
Dairy Days
(see insert for
more information)

The Role of Forage in Rumen Development

by Dan N. Waldner, OSU Extension Dairy Specialist

Recently, I have received inquiries regarding feeding practices for pre-weaned dairy heifers. Many of the problems stem from the lack of adequate energy intake caused by feeding low quality forages. Producers should take the following into consideration when designing a feeding program for preweaned heifers.

The Role of Forage: For many years, forages have been fed to calves to promote rumen development. The common reason was to give the calf the "scratch factor" needed to start the rumen working. However, the development of rumen function is primarily chemical and is caused by production of volatile fatty acids (acetate, propionate, and butyrate) in the rumen (Table 1). While the production of butyrate in the rumen remains fairly constant, the ratio of acetate to propionate production can be readily altered. Grains support the production of propionate, while forages support the production of acetate. Table 1 shows that propionate stimulates rumen development more than acetate. Therefore, providing grain instead of hay will generally hasten rumen development. However, forage is important to promote the growth of the muscular layer of the rumen and to maintain the health of the epithelium. Rumen papillae can grow too much in response to high levels of VFA. When this happens, they may clump together, reducing the surface area available for absorption. Also, some "scratch factor" is needed to keep the papillae from forming layers of keratin, which can also inhibit VFA absorption. Therefore, hay should be part of the diet—after weaning. A good recommendation is to wean at 4 to 5 weeks of age and offer hay from 6 to 7 weeks of age. If calves are not weaned until 8 to 10 weeks of age, it may be a good idea to feed a limited amount of hay (1 pound/day) from 6 weeks of age. However, the amount of hay should be limited to ensure calves will consume a sufficient amount of starter.

Table 1. Effect of various chemicals, feeds, and objects on development of the rumen.

Material	Effect
Milk	++
Acetate	++
Propionate	+++
Butyrate	++++
Grain	+++
Hay	++
Plastic sponges	-
Inert particles	-

J. D. Quigley, 1996. NRAES Pub. 74.

continued on page 2

Heart of America Dairy Herd Improvement Summary (September)

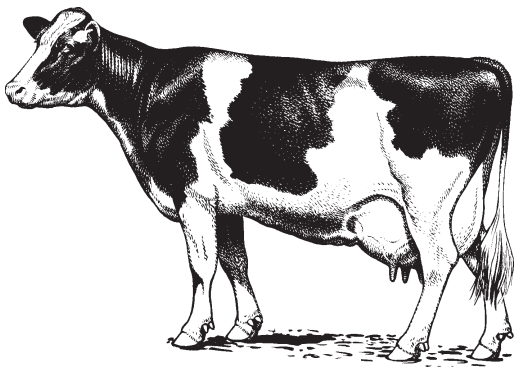
	Quartiles				Your Herd
	1	2	3	4	
Ayrshire					
Rolling Herd Average	16,495	14,431	12,116	10,432	
Peak Milk Yield 1st	66.0	56.0	48.5	39.5	
Peak Milk Yield 2nd	77.0	67.3	52.5	51.0	
Peak Milk Yield 3rd	86.0	75.6	67.5	66.3	
Peak Milk Yield Avg.	76.0	63.6	58.0	62.0	
Income/Feed Cost	917	826	832	420	
SCC Average	307	285	351	286	
Days to 1st Service	77	89	90	107	
Days Open	116	120	137	171	
Projected Calving Interval	13.0	13.1	13.7	14.8	
Brown Swiss					
Rolling Herd Average	20,425	16,159	14,332	13,894	
Peak Milk Yield 1st	66.8	56.5	51.3	50.8	
Peak Milk Yield 2nd	86.4	75.1	61.6	67.3	
Peak Milk Yield 3rd	92.8	80.1	69.5	73.5	
Peak Milk Yield Avg.	82.4	70.6	63.3	63.8	
Income/Feed Cost	1,484	1,274	1,078	879	
SCC Average	308	297	293	324	
Days to 1st Service	83	87	71	47	
Days Open	153	143	185	138	
Projected Calving Interval	14.2	13.9	15.3	13.7	
Holstein					
Rolling Herd Average	22,301	19,467	17,407	14,318	
Peak Milk Yield 1st	78.6	70.0	64.0	55.8	
Peak Milk Yield 2nd	97.4	87.1	78.4	66.5	
Peak Milk Yield 3rd	104.5	93.4	84.6	72.4	
Peak Milk Yield Avg.	92.3	82.9	75.7	66.2	
Income/Feed Cost	1,723	1,463	1,237	959	
SCC Average	329	355	382	460	
Days to 1st Service	89	89	81	72	
Days Open	157	164	166	179	
Projected Calving Interval	14.4	14.6	14.6	15.1	
Jersey					
Rolling Herd Average	16,370	13,804	12,161	9,792	
Peak Milk Yield 1st	55.7	49.0	47.5	40.0	
Peak Milk Yield 2nd	69.1	59.9	55.4	46.7	
Peak Milk Yield 3rd	74.6	63.7	58.6	50.3	
Peak Milk Yield Avg.	67.6	58.0	54.9	46.0	
Income/Feed Cost	1,499	1,136	939	661	
SCC Average	321	284	287	396	
Days to 1st Service	68	82	84	67	
Days Open	124	132	140	169	
Projected Calving Interval	13.3	13.5	13.8	14.8	
Milking Shorthorn					
Rolling Herd Average	14,715	13,623	13,099	11,283	
Peak Milk Yield 1st	55.0	53.0	47.0	51.0	
Peak Milk Yield 2nd	66.0	56.0	55.0	58.5	
Peak Milk Yield 3rd	78.0	74.0	68.0	60.0	
Peak Milk Yield Avg.	67.0	64.0	58.0	56.5	
Income/Feed Cost	1,360	1,257	954	843	
SCC Average	382	309	317	155	
Days to 1st Service	80	81	91	16	
Days Open	107	115	159	198	
Projected Calving Interval	12.7	13.0	14.4	15.7	

Rumen development continued from page 1

An exception to the above recommendation comes from the situation in which calves are fed a starter that contains small particle size. These are usually starters made on the farm and not commercial products. In these cases, some good quality chopped hay should be incorporated into the diet. Using a mixture of 20 percent chopped hay and 80 percent starter works well if particle size is regulated so calves cannot separate feed ingredients, yet enough coarse texture is maintained.

There are other reasons to limit the amount of hay offered to preweaned calves. The first is voluntary intake. Most calves do not eat significant amounts of hay if grain is offered. Therefore, producers feed calves the best quality hay on the farm only to have it turned into bedding. Another reason not to feed hay to calves prior to weaning is the energy requirement of young calves. Calves have a high energy requirement relative to their ability to consume dry feed. Therefore, if calves consume significant amounts of hay, their intake of other feeds (i.e., starter) will be limited. This will limit starter intake, which can slow growth. Finally, most hay has too little energy for calves. The energy requirement for calves can usually be met only when calves are fed high quality milk replacer, waste milk, or excess colostrum and calf starter. Even good quality legume hay generally has too little energy to support the proper growth of preweaned calves.

The Bottom Line: Most producers in the United States wean calves at 8 weeks of age (NAHMS, 1996). However, with improvements in management, this could easily be reduced to 6 weeks of age, or 4 to 5 weeks of age with careful management. Since the newborn calf lacks a functional rumen and is unable to digest fiber, establishing rumen function, a process that begins shortly after birth, is key in the development of the young calf. All calves should be fed to promote rumen development. After weaning, calves are less susceptible to disease and gain more body weight with lower labor and management costs. Therefore, it is in the producer's best interest to manage calves to promote early rumen development and to wean calves as early as feasible. There are many ways to feed calves. The above discussion was designed to incorporate common feeding practices with implications in optimizing rumen development. Feeding calves for optimal rumen development and early weaning can save money, time, and provide healthy, well-grown calves ready to enter the milking string.



Cottonseed Hulls as a Replacement for Forage in Dairy Cattle Diets

By Dan Waldner, OSU Extension Dairy Specialist

Cottonseed hulls (CSH) are a by-product of cottonseed processing to cottonseed meal. This by-product is low in protein, energy, calcium and phosphorus, but high in fiber. Published values for the nutrient content of CSH are as follows: DM=89.9%, CP=5.0%, ADF=67%, NDF=86.9%, NEL=0.45Mcal/lb., Ca=0.15%, P=0.09% (National Cottonseed Products Assn.).

Despite the poor nutrient profile, research indicates CSH are unique and may have a place in the diets of lactating dairy cows. In a series of experiments by Harris et al. (1983), cows consuming rations containing 30 to 40 percent CSH had higher feed intakes, greater milk yields and slightly higher milk fat percentages than cows consuming corn silage-based rations. Further, Morales et al. (1989) showed cows fed 30 percent CSH had greater milk and protein yield but less milk fat percent and yield compared to cows fed 35 percent alfalfa silage. Additionally, cows fed 35 percent alfalfa silage and 14 percent CSH ate and produced almost identically to cows fed 35 percent alfalfa silage. Cottonseed hulls had been substituted for corn (adjusted slightly with soybean meal to equalize protein). Thus, in this comparison, CSH appeared equal to corn, a much higher energy value than book values suggest. Adams et al. (1995) compared CSH to alfalfa (18.5% CP, 29% ADF, 40% NDF) and Bermudagrass hay (9.6% CP, 41% ADF, 81% NDF) at 11 percent of the diet dry matter. Milk production was 1.5 and 5.2 pounds/day and dry matter intake 1.0 and 3.8 pounds/day higher for CSH than for alfalfa and Bermudagrass hay diets, respectively. Milk fat percentage was 0.13 percentage units higher with CSH (3.62 vs. 3.49). Again, CSH appeared to contribute beneficial associative effects in excess of its estimated nutritive value of .45 Mcal of NEL/pound of dry matter.

Cottonseed hulls are palatable and can be used as a roughage source for dairy cattle, especially when good quality forages are scarce. Complete feeds or total mixed rations may contain 30 to 35 percent cottonseed hulls. However, most producers may elect to use lesser amounts of cottonseed hulls (15 to 25 percent) and some hay or silage. The decision to use CSH should be made based upon price, availability, storage and handling facilities and existing forage supplies. Based on current corn and soybean meal prices the relative value of CSH is about $42 per ton. However, with limited forage available, CSH may be worth $72 to $88 per ton or higher depending on the quality and cost of the forages on hand. Current quotes from handlers for CSH range from $80 to $98 per ton. Producers interested in using CSH to stretch forage supplies are encouraged to consult a nutritionist or contact their county extension office or state extension dairy specialist for assistance.

Hay Prices—Kansas*

	Location	Quality	Price ($/ton)
Alfalfa	Southwestern Kansas	Premium	85–95
Alfalfa	Southwestern Kansas	Good	65–80
Alfalfa	South Central Kansas	Premium	80–95
Alfalfa	South Central Kansas	Good	65–75
Alfalfa	Southeastern Kansas	Premium	85–100
Alfalfa	Southeastern Kansas	Good	75–85
Alfalfa	Northwestern Kansas	Premium	85–100
Alfalfa	Northwestern Kansas	Good	80
Alfalfa	North Central Kansas	Premium	85–95
Alfalfa	North Central Kansas	Good	80–85

Source: USDA Weekly Hay Report, *Week ending October 2, 1998*

*Premium Hay RFV = 170–200
Good Hay RFV = 150–170

Hay Prices—Oklahoma

	Location	Quality	Price ($/ton)
Alfalfa	Central/Western, OK	Premium	90–120
Alfalfa	Central/Western, OK	Good	80–85
Alfalfa	Panhandle, OK	Premium	85–95
Alfalfa	Panhandle, OK	Good	80–90

Source: Oklahoma Department of Agriculture, *September 25, 1998*

Feed Stuffs Prices

	Location	Price ($/ton)
SBM 48%	Kansas City	130.50–146.50
Cotton Seed Meal	Kansas City	126.50–128
Whole Cottonseed	Memphis	137
Blood Meal	Central United States	310–316
Corn Hominy	Kansas City	60–62
Corn Gluten Feed	Kansas City	55
Corn Gluten Meal 60%	Kansas City	210
Distillers Dried Grain	Central Illinois	73–76
Brewers Dried Grain	St. Louis	87
Wheat Middlings	Kansas City	46–50

Source: USDA Weekly Feed Stuffs Report, *Week ending October 2, 1998*

COOPERATIVE EXTENSION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
KANSAS STATE UNIVERSITY
MANHATTAN, KS 66506–3403

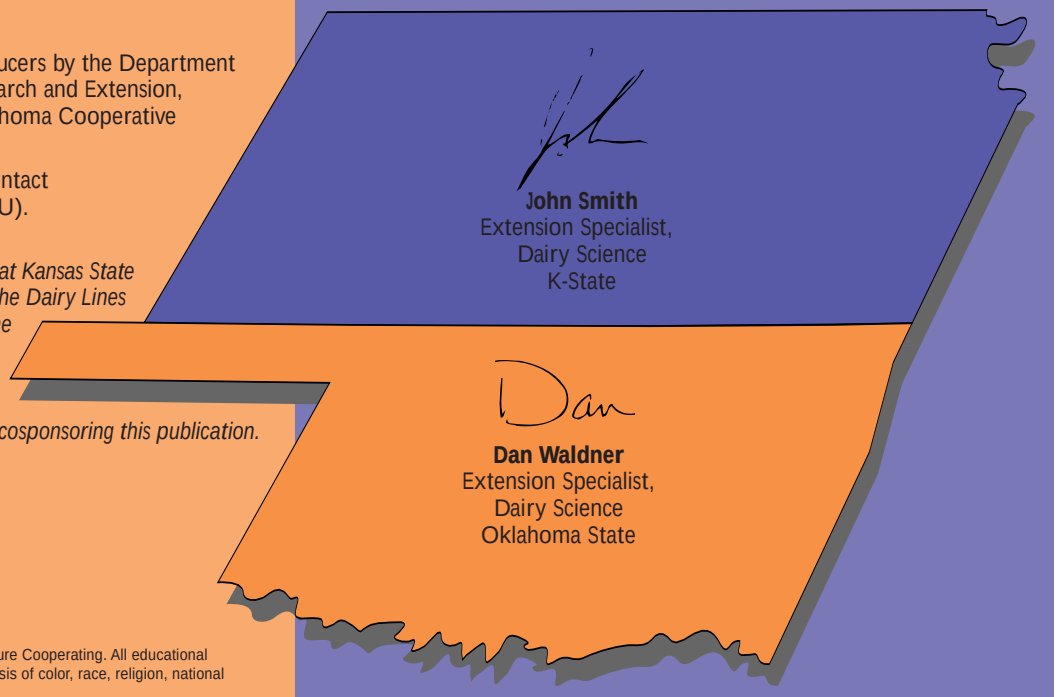
OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

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 913.532.5654 (K-State) or 405.744.6058 (OSU).

The Department of Animal Sciences and Industry at Kansas State University greatly appreciates the sponsor(s) of the Dairy Lines Newsletter. These sponsorships in no way imply the Department's endorsement of the products and services offered by the sponsors. The Department welcomes inquiries from other individuals, associations and firms that may be interested in cosponsoring this publication.

Kansas State University
Cooperative Extension Service
Department of Animal Sciences and Industry
Call Hall, Room 139
Kansas State University
Manhattan, Kansas 66506



John Smith
Extension Specialist,
Dairy Science
K-State

Dan Waldner
Extension Specialist,
Dairy Science
Oklahoma State

Dairy Lines

DAIRY RESEARCH AND EXTENSION NEWS
K-State Research and Extension
and Oklahoma State University