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Dairy Lines

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Upcoming Events

Kansas Dairy Association Annual Meeting
Feb. 16-17

Western Dairy Management Conference
April 4-6

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

Managing Milk Composition: Evaluating Herd Potential

This article is part of a fact-sheet series produced by extension dairy specialists from Oklahoma, Texas and New Mexico.

The major components of raw milk are water, fat, protein, lactose and minerals. These components can be influenced by many factors, including genetics and nutrition.

Nutrition or dietary influences readily alter the principal solids constituents of fat concentration and milk protein concentration. Fat concentration is the most sensitive to dietary changes and can be altered over a range of nearly 3.0 percentage units. Milk protein concentration can also be altered by dietary manipulation. However, compared to the alterations possible in fat concentration, the range is much smaller, at approximately 0.60 percentage units. The concentrations of lactose and minerals, the other solid constituents of milk, do not respond predictably to dietary alterations.

It is important to evaluate the potential of a herd to respond to feed management changes before attempting to alter and improve milk fat and protein production. The following are some key points that can help determine your herd's potential.

Evaluating Potential

Fat and Protein Tests: Milk protein percent generally follows changes in milk fat content, except when milk fat depression occurs and when high levels of fat are fed. If the milk protein-to-milk fat ratio is less than 0.80 for Holsteins, milk protein depression may be a problem (Table 1). When the ratio is greater than 0.95, the herd suffers from milk fat depression (low milk fat test). In general, if results of the fats test are below the protein test by 0.2 points (e.g., 2.8 percent fat and 3.0 percent protein), rumen acidosis can be a problem. If greater than 20 percent of the cows exhibit fat:protein inversions, examine the feeding management program. Also, if protein tests below breed average, or if greater than 20 percent of cows have fats tests below 3.0 percent, reevaluate the feeding program.

Table 1. Recommended range of protein-to-fat ratios for the various breeds.*

Breed	Protein-to-Fat Ratio Range
Ayrshire	0.80 - 0.83
Brown Swiss	0.83 - 0.85
Guernsey	0.73 - 0.75
Holstein	0.80 - 0.83
Jersey	0.73 - 0.75
Milking Shorthorn	

*Ratios calculated using true protein.

Feed Intake and Peak Milk Production

Feed intake is controlled by the animal's brain and is determined by meal frequency and size. However, the individual animal, type of ration and environmental factors influence intake.

Maximum feed intake minimizes negative energy balance during early lactation. As cows move into positive energy balance by consuming more energy than they are using, body weight is regained, losses in body condition are minimized, and cows produce milk of normal fat and protein content. Increasing feed intake can improve milk protein by 0.2 to 0.3 units. This increase in milk protein percent may be caused by an overall increase in energy intake.

Cows should reach peak milk production between four to eight weeks postpartum,

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Heart of America Dairy Herd Improvement Summary (Jan)

	Quartiles				Your Herd
	1	2	3	4	
Ayrshire					
Rolling Herd Average	17,575	15,910	14,222	12,532	
Summit Milk Yield 1st	58.0	0.00	47.0	45.5	
Summit Milk Yield 2nd	0.00	69.0	57.0	53.5	
Summit Milk Yield 3rd	0.00	0.00	67.0	60.0	
Summit Milk Yield Avg.	58.0	69.0	57.0	55.0	
Income/Feed Cost	789	1,385	1,117	382.5	
SCC Average	81	66	489	275.5	
Days to 1st Service	102	0	45	110	
Days Open	212	176	124	180	
Projected Calving Interval	16.2	15.0	13.3	27.5	
Brown Swiss					
Rolling Herd Average	21,145	18,227	15,748	14,075	
Summit Milk Yield 1st	63.0	60.2	51.6	47.1	
Summit Milk Yield 2nd	66.8	70.5	67.1	63.1	
Summit Milk Yield 3rd	87.8	81.5	68.1	68.5	
Summit Milk Yield Avg.	77.1	71.0	61.8	59.1	
Income/Feed Cost	1,773	1,468	1,057	870.1	
SCC Average	579	322	395	289	
Days to 1st Service	84	80	197	65	
Days Open	158	172	185	177	
Projected Calving Interval	14.4	14.8	15.3	15.0	
Guernsey					
Rolling Herd Average	—	16,441	15,226	11,831	
Summit Milk Yield 1st	—	56.0	58.0	43.0	
Summit Milk Yield 2nd	—	75.0	65.0	59.0	
Summit Milk Yield 3rd	—	76.0	66.0	53.0	
Summit Milk Yield Avg.	—	66.0	63.0	52.0	
Income/Feed Cost	—	1,232	1,044	628	
SCC Average	—	—	294	129	
Days to 1st Service	—	68	80	118	
Days Open	—	180	156	194	
Projected Calving Interval	—	15.1	14.4	15.6	
Holstein					
Rolling Herd Average	23,537	20,635	18,363	15,005	
Summit Milk Yield 1st	73.3	67.1	61.6	52.7	
Summit Milk Yield 2nd	92.9	83.6	75.9	63.2	
Summit Milk Yield 3rd	98.2	88.8	80.7	69.0	
Summit Milk Yield Avg.	87.1	79.5	73.4	63.0	
Income/Feed Cost	1,666	1,407	1,185	909	
SCC Average	347	373	389	479	
Days to 1st Service	93	96	88	87	
Days Open	163	166	178	190	
Projected Calving Interval	14.5	14.6	15.0	15.4	
Jersey					
Rolling Herd Average	17,396	14,965	13,557	11,656	
Summit Milk Yield 1st	56.0	49.6	42.5	41.1	
Summit Milk Yield 2nd	63.8	66.4	52.2	51.3	
Summit Milk Yield 3rd	73.1	64.2	59.0	53.1	
Summit Milk Yield Avg.	64.5	59.0	53.8	47.9	
Income/Feed Cost	1,497	1,384	1,049	954	
SCC Average	301	268	395	380	
Days to 1st Service	85	89	75	90	
Days Open	143	142	133	143	
Projected Calving Interval	13.9	13.9	13.6	13.9	
Milking Shorthorn					
Rolling Herd Average	15,355	15,192	13,658	10,234	
Summit Milk Yield 1st	52.0	50.0	51.0	57.0	
Summit Milk Yield 2nd	64.0	72.0	61.0	0	
Summit Milk Yield 3rd	66.0	74.0	66.0	60.0	
Summit Milk Yield Avg.	58.0	65.0	59.0	60.0	
Income/Feed Cost	960	1,402	958	0	
SCC Average	225	290	210	255	
Days to 1st Service	89	91.0	80.0	42	
Days Open	176	121	126	128	
Projected Calving Interval	15.0	13.2	13.3	13.4	

Hay Prices*—Kansas

	Location	Quality	Price ($/ton)
Alfalfa	Southwestern Kansas	Supreme	110-120
Alfalfa	Southwestern Kansas	Premium	100-110
Alfalfa	Southwestern Kansas	Good	—
Alfalfa	South Central Kansas	Supreme	100-110
Alfalfa	South Central Kansas	Premium	90-100
Alfalfa	South Central Kansas	Good	—
Alfalfa	Southeastern Kansas	Supreme	—
Alfalfa	Southeastern Kansas	Premium	90-105
Alfalfa	Southeastern Kansas	Good	—
Alfalfa	Northwestern Kansas	Supreme	90-105
Alfalfa	Northwestern Kansas	Premium	90-100
Alfalfa	Northwestern Kansas	Good	—
Alfalfa	North Central/East Kansas	Supreme	50-58cents/pt
Alfalfa	North Central/East Kansas	Premium	90-105
Alfalfa	North Central/East 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, *January 16, 2001*

Hay Prices—Oklahoma

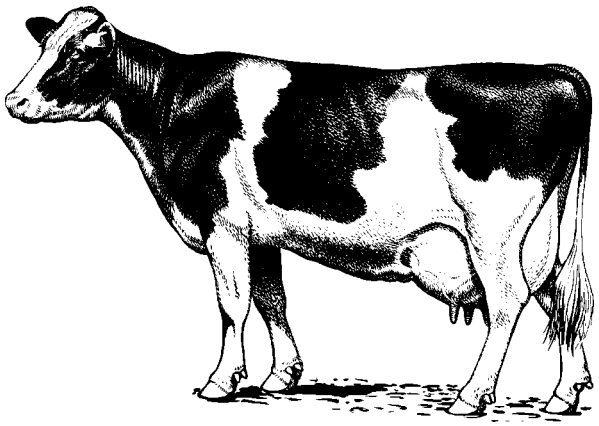
	Location	Quality	Price ($/ton)
Alfalfa	Central/Western, OK	Premium	90-120
Alfalfa	Central/Western, OK	Good	80-95
Alfalfa	Panhandle, OK	Premium	95-110
Alfalfa	Panhandle, OK	Good	85-95

Source: Oklahoma Department of Agriculture, *January 11, 2001*

Feed Stuffs Prices

	Location	Price ($/ton)
Blood Meal	Central US	433
Corn Gluten Feed	Kansas City	75-85
Corn Gluten Meal	Kansas City	290-300
Corn Hominy	Kansas City	78-80
Cotton Seed Meal	Kansas City	202-210
Whole Cotton Seed	Memphis	127
Distillers Grains	Central Illinois	99-105
Pork—Meat and Bone Meal	Texas Panhandle	200
SBM 48%	Kansas City	179-189
Sunflower Meal		—
Wheat Middlings	Kansas City	98-102

Source: USDA Feedstuff Market Review, *January 17, 2001*



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followed closely by peak dry matter intake between 10 to 14 weeks postpartum. High producing cows eat 3.5 to 4.0 percent of their body weight daily as dry matter. If a herd is consuming less than 3.5 to 4.0 percent of body weight as dry matter, production of solids-corrected milk may be limited.

A slow rise in postpartum feed intake lengthens the days to peak milk production and may reflect metabolic problems or obese cows. Research has demonstrated that fat cows have depressed appetites at calving compared to thin cows. This results in longer delays to peak milk yield.

Cows with body condition scores greater than 3.75 at calving (obese) suffer from dry matter intake depressions of 1.5 to 2.0 percent for every 0.25 body condition score over 3.75. Therefore, monitor feed intake and days to peak milk production to determine if cows are managed properly with adequate, but not excessive, body condition.

Rumen pH

Evaluating rumen pH can be a useful tool in determining if acidosis is a potential problem in a herd and a cause for low fat tests or fat:protein inversions. The pH within the rumen can vary from 5.5 to 6.8, with 6.0 to 6.3 being optimal. The critical pH threshold is less than 5.0 for acute acidosis and less than 5.5 for subacute acidosis. In many dairy operations, subacute acidosis is a frequent challenge. Daily episodes of pH less than 5.5 ultimately predispose cattle to low-grade acidosis. Symptoms include erratic appetite, body weight loss, diarrhea and lameness.

Historically, stomach tubing has been used to collect samples of rumen fluid for pH determination. However, this procedure can lead to false interpretation because saliva contamination causes pH values higher than the actual rumen environment. Recently, rumenocentesis has been promoted as a means of collecting rumen fluid for diagnosis of low-grade acidosis. However, research indicates the rumenocentesis procedure can result in the development of abdominal abscesses accompanied by a temporary loss in milk production.

Cannulation of the rumen by a veterinarian is probably the preferred method for obtaining representative samples of rumen fluid. Cannulation has traditionally been used for research purposes and is not particularly suited for use on commercial dairy operations. In comparing results from the two methods, pH values from cannula collections will be approximately 0.35 points higher than those obtained by rumenocentesis.

Take rumen samples for pH determination 5 to 8 hours after feeding for herds receiving total mixed rations and two to five hours after concentrate feeding when forage and concentrate are fed separately. To obtain the best results and reduce variations, collect samples from a minimum of 10 to 12 animals per affected herd. If more than 30 percent of the cows within this subgroup have a pH less than 5.5, consider the entire group abnormal. Evaluate feeding management practices and adjust as needed.

Ration Particle Size

Adequate particle size in the ration is necessary to avoid digestive upset and low milk fat production. Cows require fiber and forage to stimulate chewing activity and saliva production, both of which are necessary for maintenance of rumen pH and rumen health.

Particle size separators have been developed to measure particle size distribution in feeds. Separators consist of a series of stacked screens that separate a ration sample into various sized particles. This provides a visual, quantitative assessment of particle size distribution as it occurs in the rumen.

Use of a separator, such as the Penn State Particle Size Separator, is simple and can be used on-farm to monitor changes in forage harvesting procedures or feed mixing protocols. This tool separates particles into three groups: particles greater than 0.75 inches, between 0.31 and 0.75 inches, and less than 0.31 inches. The upper screen identifies particles that will be included in the rumen mat and will stimulate cud chewing and saliva production. The middle screen identifies the portion of the total mixed ration (TMR) that is moderately digestible. The bottom pan collects particles that are readily digestible or rapidly removed from the rumen. Table 2 contains particle-size distribution recommendations from Pennsylvania State University for forages and total mixed rations.

Chewing Activity

The level of fiber feeding and the physical size of the fiber particles contribute to the effectiveness of a fiber source for stimulating rumination (cud chewing), buffer production (salivation) and maintenance of milk with normal fat and composition. Feeding diets low in forage (less than 40 percent on total ration dry matter) or forages that are finely ground result in inadequate stimulation of chewing activity (less than 8 to 10 hours per day) and lower saliva production. As a general rule, approximately 40 percent of the cows not eating or drinking should be chewing their cuds during daylight hours.

Manure Evaluation

Manure that contains large amounts of undigested corn or with a pH less than 6.0 indicates that too much grain or nonfiber carbohydrates are being fed. It also indicates that acidosis may be a potential problem, resulting in low fat tests or protein:fat inversions.

Manure also can be evaluated and scored based on its consistency, which may indicate ration imbalances and signal potential problems.

Producers using DHIA (Dairy Herd Improvement Association) records are in the best position to critically evaluate their nutrition and feeding management programs. They are encouraged to work with their management teams to consider the above points in determining if their herds will respond to feed management changes to improve milk component composition.

Table 2. Recommended forage and total mixed ration particle sizes for the Penn State Separator[1].

Sieve[2]	Corn Silage	Haylage	Total Mixed Ration
Top screen (>0.75")	2 - 4 % if not sole forage 15 - 25 % bunker silo, wet mixture	10 - 15 % if chopped and rolled 6 - 10 % or more	10 - 15 % in sealed silo 3 - 6% focus on TNDF & FNDF
Middle screen (0.75 - 0.31")	40 - 50 %	30 - 40 %	30 - 50 %
Bottom pan (<0.31")	40 - 50 %	40 - 50 %	40 - 60 %

[1] Pennsylvania State Cooperative Extension Service. DAS 96-20

[2] Portion remaining on screen

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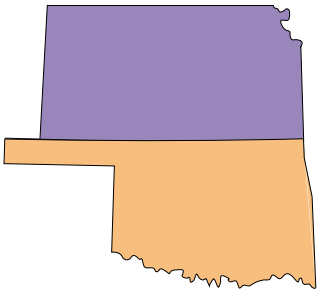

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