10th ANNUAL NORTHEAST OHIO REGIONAL DAIRY CONFERENCE

"Keeping Her Happy:
What a Girl Wants,
What a Girl Needs,
What Can You Afford."

February 25, 2009

Buckeye Event Center
Dalton, Ohio

Presented by **the Dairy Veterinarians of the Killbuck Valley Veterinary Medical Association**

The Killbuck Valley Veterinary Medical Association
Secretary: Carlton Schlatter, D.V.M.
P.O. Box 243
West Salem, OH 44287
419-853-4835 ▪ Fax: 419-853-3049

The Killbuck Valley Veterinary Medical Association is an association of veterinarians in private practice, teaching, research, and industry in the geographic area surrounding the path of Killbuck Creek. The association is affiliated with the Ohio Veterinary Medical Association at the state level, and includes veterinarians primarily in OVMA district 8; we also include some veterinarians from district 7 to the north and district 4 to the west.

The purposes of the Killbuck Valley VMA are to provide professional continuing education to our membership, provide a conduit for the membership to communicate with the OVMA, and provide public service as needed to our geographic area and local communities as our professional expertise allows.

Our annual dairy producer meeting is made possible with the generous support of local businesses and is a public service of our group, recognizing the importance of the dairy industry in our local geographic area as well as the state of Ohio in general. By our continued support of this type of educational meeting for Ohio dairy industry personnel, we of the KVVMA are striving to maintain and expand this important industry, insure the continued production of dairy products of the highest quality, and improve and protect the well-being of the dairy cow herself.

We welcome you to our 2009 meeting. We hope you find the meeting educational and stimulating.

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February 25, 2009
Buckeye Event Center, Dalton, Ohio

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SCHEDULE

9:00 - 9:50 a.m.	Registration, continental breakfast, visit with exhibitors
9:50 -10:00 a.m.	Welcome and opening remarks *Dr. William Yost, Orrville Veterinary Clinic, Inc.*
10:00 – 10:45 a.m.	"Cow Comfort. What a Girl Want" *Dr. Mark Hardesty MS, author Hoard's Dairyman*
10:45 – 11:15 a.m.	Break, visit exhibits
11:15 – 12:00 p.m.	"Controlled Energy Diets for Dry Cows: Not Your Traditional Close-up Rations" *Dr. Richard Wallace MS, University of Illinois*
12:00 – 1:15 p.m.	Lunch - Visit Exhibits
1:15 – 1:30 p.m.	"European Starlings on Ohio Dairy Farms" *Jeffrey LeJeune DVM PhD, Associate Professor for the FAHRP at OARDC*
1:30 - 2:15 p.m.	"Feeding Strategies with High Feed Costs: What to Keep and What to Cull" *Dr. Richard Wallace MS, University of Illinois*
2:15 – 2:45 p.m.	Break, visit exhibits
2:45 – 3:30 p.m.	"Thanks Doc, Got to Go" *Dr. Mark Hardesty MS, author Hoard's Dairyman*

SPEAKERS

Mark Hardesty MS, DVM, Dr. Hardesty is a three time graduate of The Ohio State University with a Bachelors degree in Dairy Science, a Masters degree in Dairy Nutrition and Management, and a Doctorate of Veterinary Medicine. He received the award for Excellence in Food Animal Medicine and Surgery. He is an active member of the American Association

of Bovine Practitioners, serving on the Finance and Program Committees, and in 2000, received the Merck Award for Excellence in Preventive Medicine. He is most widely known as the author of the monthly “Cowside Practice” column featured in Hoard’s Dairyman. He and his wife Michelle have been the owners of Maria Stein Animal Clinic since 1988 and are the parents of two teenaged daughters.

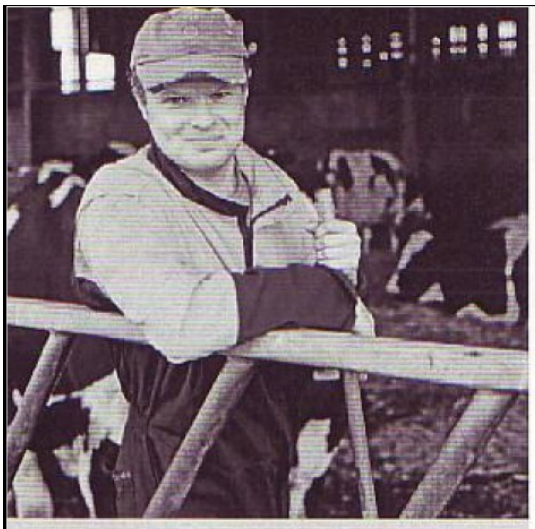
Richard L. Wallace MS DVM, is the Dairy Extension Veterinarian with the Office of Public Engagement, and an Associate Professor in the Department of Veterinary Clinical Medicine at the College of Veterinary Medicine, University of Illinois. He attended The Ohio State University and received Bachelor degree Dairy Science from the College of Agriculture (1981). In 1985, he received the DVM degree. After graduation he started his own mixed animal practice in Centerburg, Ohio (Knox County). In 1987 he joined a three person dairy practice in Door County, Wisconsin. In September 1993, he returned to his alma mater to obtain a Master degree in Veterinary Preventive Medicine. Dr. Wallace currently teaches the Dairy Herd Health Management course and the dairy portion of Problems in Large Animal Nutrition at the University of Illinois. In a cooperative role with the Department of Animal Sciences, he serves as the faculty coordinator for the University dairy farm. On a national scale, Dr. Wallace is President of the American Association of Bovine Practitioners. He serves on the Residue Avoidance Committee of the National Mastitis Council.

We gratefully acknowledge the support of our sponsors, without whom this meeting would not be possible.

Please take time to visit with those sponsors
who are present today,
and thank those who are not present
when you encounter them.

A complete listing of today’s sponsors is included in this book.

The veterinarians of the Killbuck Valley Veterinary Medical Association would like thank all our sponsors for their continued support of this educational effort for the dairy industry. A strong dairy industry is a tremendous asset for all of us in northeastern Ohio.



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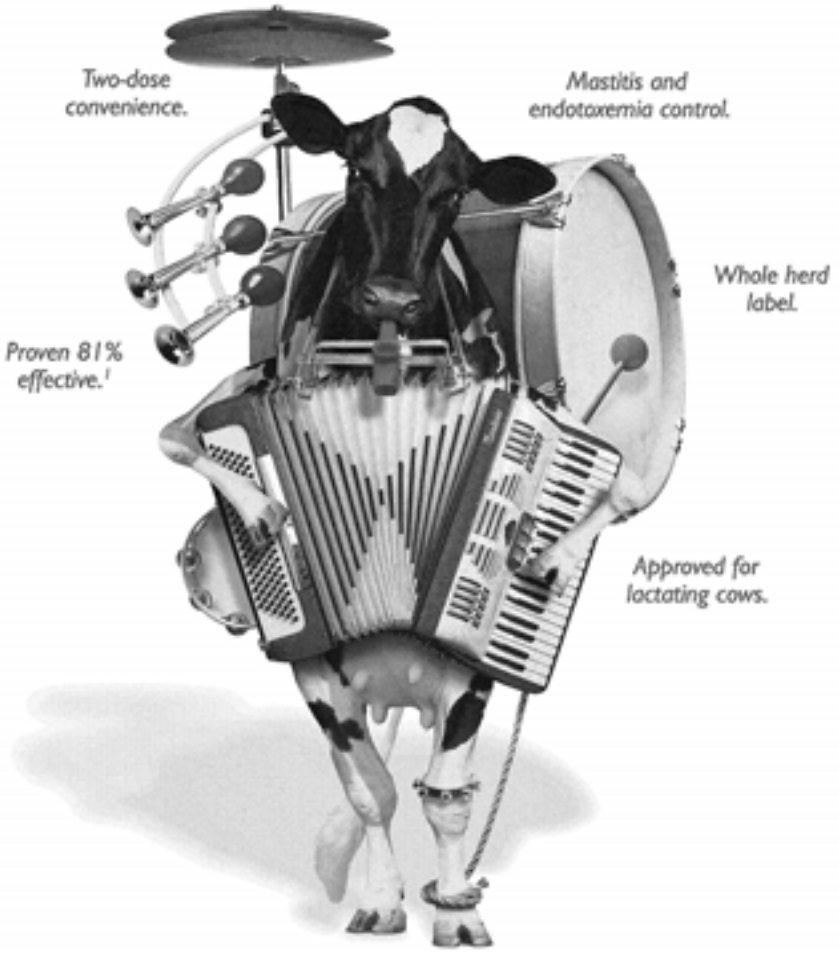

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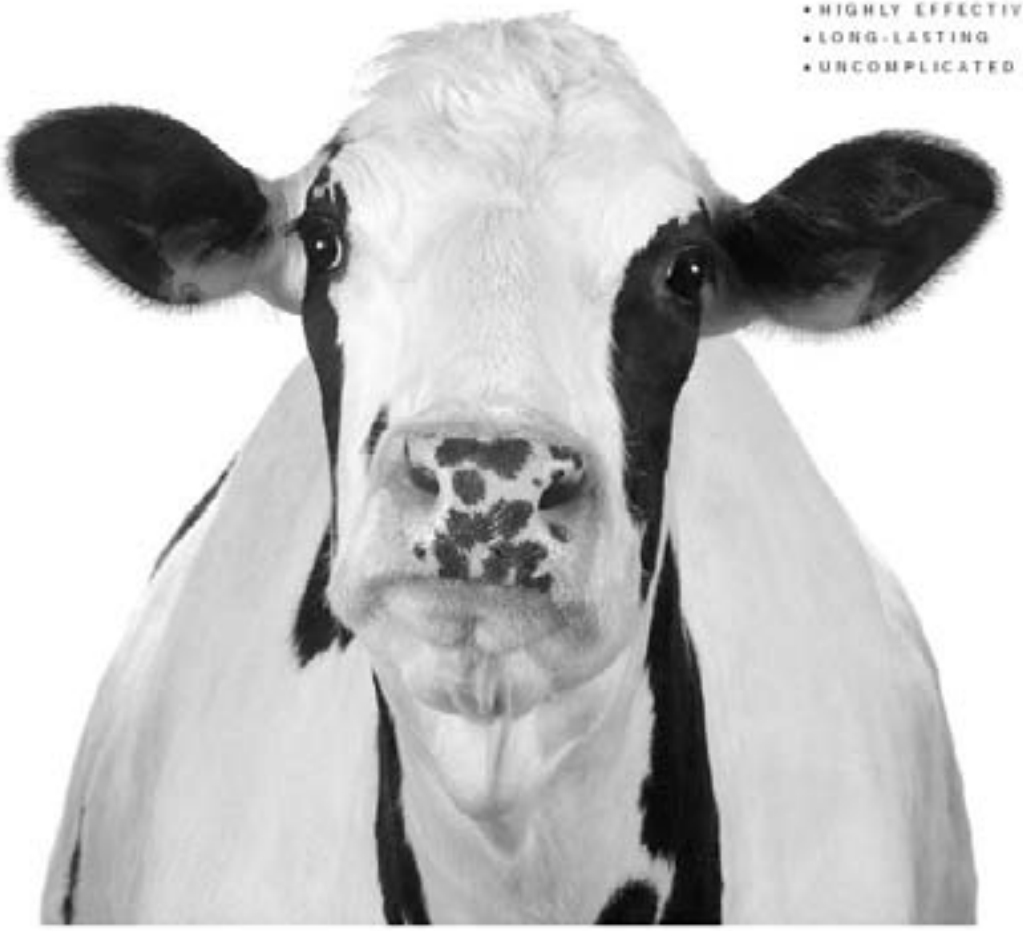

1. Zimmerman AD, et al. Efficacy of bovine herpesvirus-1 inactivated vaccine against abortion and stillbirth in pregnant heifers. *J Am Vet Med Assoc* 2007;231(9):1389-1393.
2. Data on file at USDA, Center for Veterinary Biologics.

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Legislative Affairs–ODPA speaks with a unified voice to support or oppose proposed federal and state laws that might affect the dairy industry.

Producer Education–ODPA is committed to providing opportunities for dairy producers to obtain valuable information that they can consider for their businesses.

Issue Updates–While tracking important issues, ODPA keeps members up to date with the latest news.

Research–By managing the producer-funded Ohio Dairy Research Fund and providing input on OSU Extension dairy research, ODPA helps producers make advancements in areas like animal health, nutrition and manure management.

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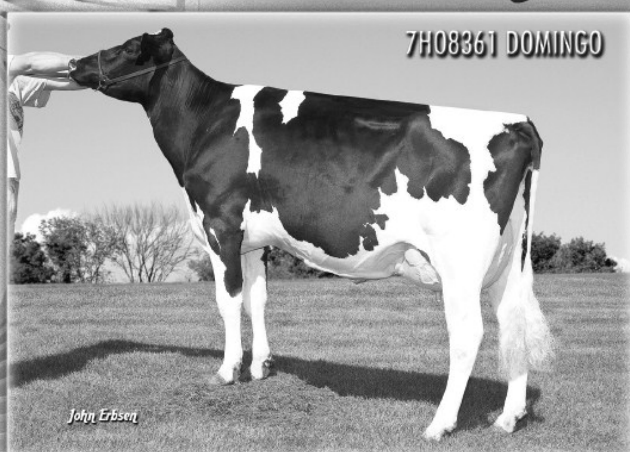

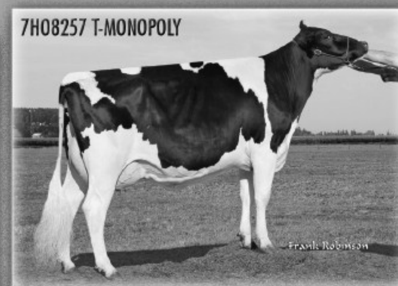

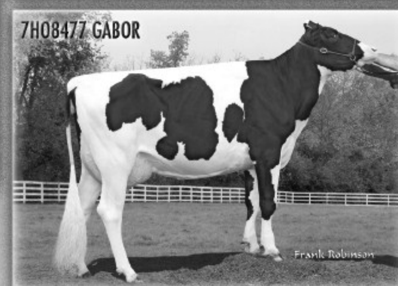

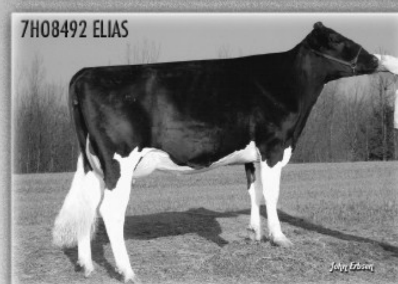

Large photo: Dominion Domingo Tamara, Oscar Koenig, Tampico, IL; Small photos (top-bottom): Curtmold Monopoly 28997-Grade, Curti Dairy, Waukena, CA; Stone-Rise Gabor Kitkat (GP-83), Stone-Rise Dairy, Hammondsport, NY; DeVries Elias 5063-Grade, DeVries Dairy, Dublin, TX.

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		NM$	Type	PL	SCS	DPR
• 7H06417	O MAN CE	+778	+0.78	+6.1	2.69	+2.6
• 7H06745	ONYX❖ CE	+384	+1.98	+1.5	2.49	+1.9
• 7H06759	MORGAN† CE	+426	+1.69	+2.4	2.46	+0.4
• 7H06782	ZENITH† CE	+383	+2.22	+2.7	2.60	+1.7
• 7H06834	DALE CE	+375	+2.50	+4.7	2.63	+1.0
• 7H07004	DAMION CE	+138	+4.00	+0.4	2.87	-0.1
• 7H07020	FORTUNE CE HB	+290	+2.60	+1.5	2.72	+1.0
• 7H07043	DISON CE	+426	+1.30	+4.3	2.69	+0.8
7H07287	JINX CE HB	+478	+1.30	+5.3	2.85	+2.5
• 7H07313	NATHAN† CE	+405	+1.80	+1.5	2.91	+0.7
7H07463	PONTIAC CE	+298	+2.60	+3.5	2.67	+1.6
• 7H07514	RE DESIGN HB	+299	+3.10	+2.6	2.91	+0.6
507H07515	D RUDY†* CE	+365	+2.17	+2.9	2.58	+2.9
• 7H07566	DEX† CE	+356	+2.00	+3.2	2.84	+1.0
• 7H07615	COLBY❖	+432	+2.30	+5.4	2.87	+2.4
• 7H07653	ROSS†❖ CE HB	+189	+3.10	+2.1	2.81	+0.1
• 7H07737	MENDEV HB	+452	+2.30	+4.8	2.45	+1.4
• 7H07853	MICHAEL†❖ CE HB	+593	+2.10	+5.7	2.77	+3.2
7H07872	ADVENT-RED CE HB	+125	+3.48	+2.3	3.01	+2.9
• 7H08081	PLANET†❖ CE	+737	+2.40	+5.8	2.88	+0.3
• 7H08170	PAT† CE	+501	+1.80	+3.9	2.58	+0.3
• 7H08192	DISCOVER	+364	+2.30	+1.4	2.98	+0.2
• 7H08194	DUNSTON† CE	+303	+1.90	+1.1	2.70	+0.1
• 7H08227	LOGAN IRON† CE HB	+368	+1.80	+2.6	2.48	+0.3
• 7H08257	T-MONOPOLY CE *New*	+453	+2.00	+2.1	2.76	+1.1
• 7H08306	ALTITUDE❖	+353	+1.95	+3.4	2.91	+1.1
• 7H08351	LUCIUS†❖ CE	+343	+1.80	+4.0	2.86	+0.6
• 7H08361	DOMINGO	+560	+1.60	+4.5	2.72	+0.8
• 7H08368	LIGHTNING†❖ CE HB	+348	+2.70	+0.7	2.88	+1.1
• 7H08398	MUFFIN HB *New*	+339	+3.00	+1.2	2.92	+0.4
• 7H08477	GABOR†❖ CE *New*	+425	+2.98	+2.4	2.80	+0.4
• 7H08492	ELIAS CE HB *New*	+563	+1.90	+5.1	2.70	+1.3
• 7H08534	PENNY CE HB *New*	+605	+1.09	+4.5	2.68	+0.9
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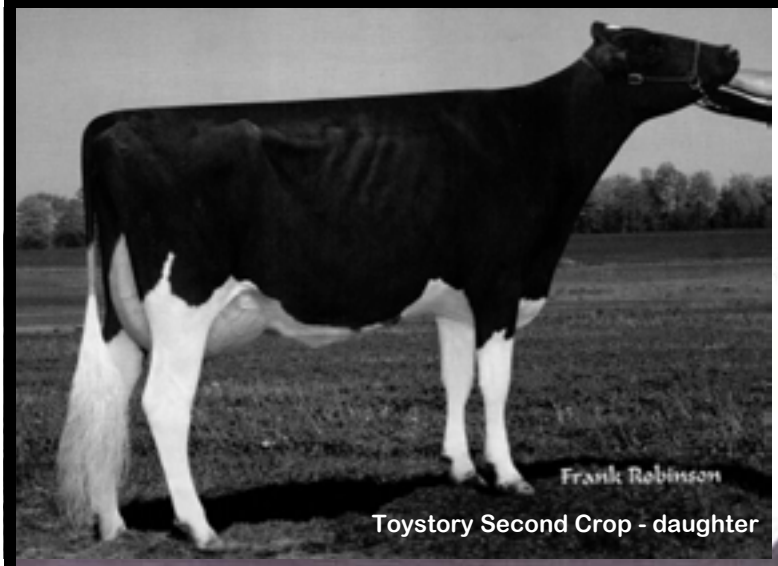

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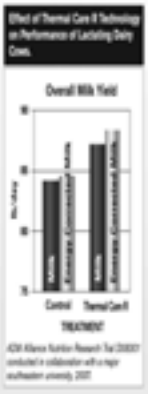

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Mark E. Hardesty, DVM, MS

Cow comfort has changed from a good idea for economic reasons 15 years ago to a mandate for animal well-being now. We continue to learn how to best care for cows and with that comes some controversy as we try new ideas. We will focus on freestall housing as we have no herds in our practice with compost barns or grazers. We will look at various segments of comfort including lying, rising, bedding, eating, walking surfaces, milking time, and ventilation and cooling.

Lying The comfort of freestall housed cows while lying is dependent upon the space that the stalls give them to rest. Most commonly, stalls have been too small. We can get more stalls in a barn, less bedding will be used, and we may have less manure in the stalls if we make them too small to be comfortable, but those should not be our objectives. Comfortable, productive, long last cows should be our objective. As others choose to tell us how to run our dairy business, they will come with mandates. Better that we achieve the objectives by social license than by legal or market access mandate. This table shows the guidelines that we currently follow as we build or recondition freestall housing.

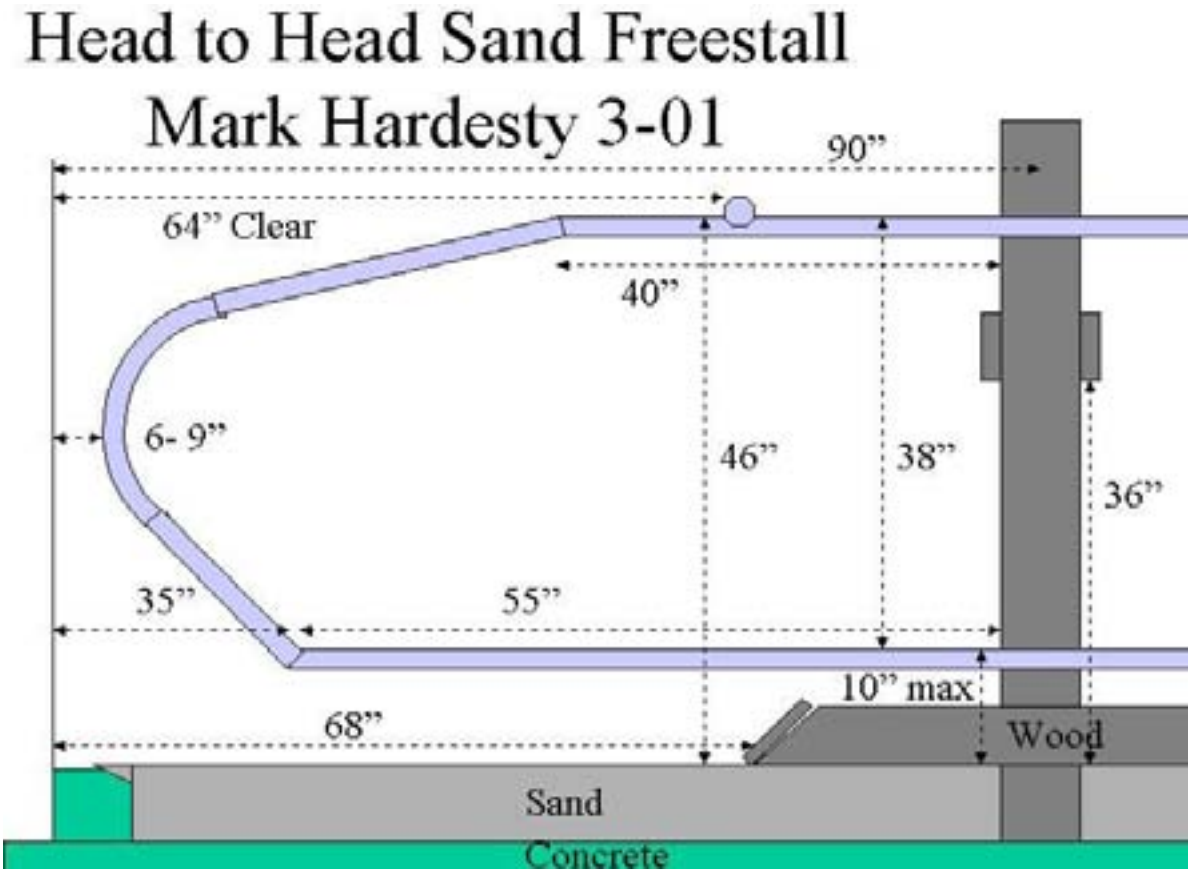
Stalls Should Fit Cows

Body Weight	Stall Width	Resting Length	Total Length	Neck Rail Height
800#	36”	52”	6’ 1”	37”
1000 #	40”	57”	6’ 9”	40”
1200 #	44”	61”	7’ 6”	43”
1400#	47”	66”	8’ 2”	45”
1500# Hol	48”	68”	8’6”	46”
1600#	51”	70”	8”10”	48”
1800#	54”	75”	9’ 6”	51”

Brown Swiss need 2” longer stalls at the same weight than Holsteins

Body weights should be actually measured to get a perspective of how big your cows really are. It is best to size stalls for the largest cows in the group. Sales tickets of cows that were sold for reproductive failure may be a good indicator of how large cows

get. Stall width is measured on the centers of freestall loop pipes, but cows do not have this space available. A better evaluation is can cows lay way over on their sides like they do on pasture or bedded pack. This is the most restful position. The second most restful position is lying with head tucked into the flank. Many barns have stalls too narrow for either of these most restful positions. Four hours after milking and returning to stalls, cows should be found in these most restful positions. If not, stalls are too narrow. There is some concern that stalls that are too wide allow small heifers to turn around. Jerseys in Holstein stalls do not turn around. Cows that are in stalls backwards are functions of stalls that are too short or do not allow for unobstructed rising.



Length of resting area is measured from the back of the curb to the point where the cow encounters the brisket barrier. This assumes that the bedding is level with the curb. When the bedding is lower than the curb, the resting area is reduced by the width of the curb. This results in cross lying much like stalls that are too short. Cross lying is a common reason that stall rear's are soiled and cows become entangled when rising. Neck rails are commonly directly over the brisket barrier or up to four inches toward the back of the stall. Neck rails that are too far back are the most common cause of cows going through the center of stalls. Aggressive cow handling is the second most common reason. The point of shoulder is the point of balance determining if

cows go forward, when touched behind the shoulder, or stop and back up, when touched in front of the shoulder. When cows rise and touch a neck rail behind the shoulder, they go forward getting injured in the stall mechanism. Positioning the bar correctly works better than any barrier constructed to prohibit this behavior. Brisket barriers are used to keep cows in position when resting. Cows have constant forward momentum even when resting and this keeps them from getting too far forward preventing injury and keeping the stall rear's cleaner. Brisket barriers higher than four inches become impediments to forward lunge when rising and should be removed. I prefer "soft" barriers like poly pillows or culverts to boards or cement. The area in front of the brisket barrier should be open and at resting height or lower to allow for forward lunge to plunge deeply.

Rising is easily accomplished if the area of lunge is unobstructed. Cows get up on their knees, which serve as a fulcrum. They lunge their heads forward as far as they can levering their hind quarters high enough that their rear legs can catch their weight and support it. One front leg then comes up, followed by the other front leg, which steps forward closing the stance. Impediments to forward lunge alter the rising sequence such that the rear legs must lift the rear quarters. This wears cows out and reduces the amount of time that they spend lying. If they have difficulty rising, they don't lay down. We favor open front stalls and floor mounted stalls over those on posts. Stalls on outside walls need to be at least nine feet long to allow for adequate forward lunge. Some barns have been built with stalls mounted on posts two feet back from the outside wall. We have built lunge areas on the ends of some barns.

Bedding is important to support and cushion the cow's body, maintain cleanliness, and to provide footing while rising. Sand does this better than any other bedding material. All economic evaluations give an almost $2 dollar per hundredweight cost of production advantage to sand bedded stalls compared to mattresses. This difference comes from decreased culling, less mastitis, fewer injuries, improved reproduction, and subsequent higher production. Mattresses are used due to ease of manure handling. We now have methods of handling sand laden manure that work and are relatively inexpensive. I prefer manure handling that is simple with few mechanical challenges. Flush or scrape to flume manure systems that then separate the manure through a sand settling lane are our current preferred systems. 85 to 90% of the sand can be reclaimed and when properly dewatered, it can be as good as new sand.

Eating is a time that comfort is important to improve dry matter intake, resulting in higher production. Cows eat at the same time. If they don't have space to eat at the time the other cows are eating, they will not compensate for it at other times. Timid cows are the ones that suffer most from overcrowding. Most overcrowding numbers are based on stalls, but feedspace may be more limiting. This is the most significant case against three row and six row barns. Twenty four inches of bunk space for lactating groups maximizes intake. It actually takes 30 inches for cows to stand shoulder to shoulder. Thirty inches is our recommendation for dry cows and fresh cows. It has made a tremendous difference in reducing metabolic diseases in fresh cows when this is achieved.

Walking surfaces are important to be as nonskid as possible. We prefer brick pattern stomps or grooved surfaces created when the floor is poured. The groove portion needs to be at least 1 ¼" wide so that hooves can get a grip, but the surface portion should support 60% of the hoof on the same level to decrease ligament twisting. Worn surfaces can be regrooved or scabbled to provide traction. Rubber is frequently used to provide cushioned walking surfaces and it can be grooved to provide traction.

Milking time can have improved comfort depending upon milking stall and holding pen design. Newer designs continue to be more cow friendly. Older facilities can commonly be improved, but require a case by case evaluation from a cow's perspective. Some equipment dealer's have experience with this, but every manufacturer of milking equipment has this expertise. The most common issue with cow comfort at milking time is the amount of time spent in the holding pen. Cows should spend no more than three hours per day away from their home pen. Pen size and milking parlor capacity should be considered during construction phases.

Hospital pens are often neglected when facilities are planned, but are needed in every dairy. Sick cows should be separate from fresh, milk withheld cows, but they rarely are due to the added labor needed to care for this group. The risk of transmitting some diseases is high, but in reality the diseases of concern like Salmonella and BVD need to be controlled through vaccination. Mycoplasm and Staph aureus mastitis are also concerns for transmission, but as long as the hospital has less cows in it than the parlor can milk in one turn and no cows are milked after the hospital, this may be the best grouping arrangement. I caution against making too small of hospital groups, especially bedded packs for lameness as cows tend to lose motivation to eat and the bedded pack group becomes the pre-compost group. For cows to thrive there need to be two waterers in this pen, no dead ends, 30 inches of bunk space and ten stalls for each nine cows in the pen. Reaching these housing parameters may be more important than the best monitoring and treatment protocols that can be devised.

Ventilation and cooling are the biggest challenges of cow comfort in Ohio. All of my work in facility design has been with naturally ventilated barns, but I have been involved in retrofitting some tunnel ventilated barns in attempts to make them work better. It is most effective to look at ventilation and cooling as separate topics. Ventilation is the exchange of fresh, usually cooler, dryer air from outside the barn with stale, moisture and gas laden, and usually warmer air inside the barn. Naturally ventilated barns use a principle of having openings in the barn side to allow fresh air to enter, travel into the cow space where it picks up gases, moisture and heat and rises out an open ridge. In the coldest of winter, we have one inch of opening at the eave per ten feet of building width rising to a ridge opening of two inches per ten feet of building width. As temperatures warm, we open curtains allowing more air to enter the barn until by 50 degrees, the barns are full open and we incorporate design features to minimize obstructions. We utilize 14 to 16 foot sidewalls in all freestalls built for mature cows, 10 to 12 foot sidewalls for calves and heifers, and prefer four row barns for mature cows. Lock ups or post and rail construction is a handling rather than housing

consideration. Lockups work very poorly in three row or six row barns. If ridge caps are used on open ridges, they need to be high. There is a ridge cap design that can facilitate air evacuation rather than limit it. Upstands or chimneys must be at least as high as the opening is wide to be effective and the increase effectiveness up to two times the height as the opening. We like to put at least a four inch rainstop on all of our open ridges to keep rain from blowing up the roof and into the open ridge.

Cooling is needed when cows are housed in temperatures above the thermal neutral zone, of 70 to 73 degrees depending upon relative humidity. Cooling is achieved by enhancing evaporative cooling that occurs when droplets of moisture leave the skin surface taking heat with them. We enhance evaporative cooling by increasing the air speed at the cow's surface to more than 4 mph and by adding intermittent water to the skin. Water droplets need to be large enough to penetrate the hair coat. Water is added intermittently to allow for evaporation. We should limit water application such that the udder does not become wet and only a small increase in water on the floor is experienced. Holding pens are the highest priority for cooling and sprinklers and fans run there continuously above 70 degrees. Drencher showers at the exit may also help. Some have experimented with drinking water availability in holding pens and milking parlors, but maintenance and cow flow issues have discontinued their use. The second priority of cooling is for dry cows and fresh cows, then the milking herd. We most commonly place fans over the feed alley and the freestalls with soakers at the feed alley. Fans and soakers need to be high enough to avoid equipment, but low enough to be effective. We use four foot fans every 32 feet or 56 inch fans every forty feet depending upon the construction of the barn. We angle fans downward such that the center line of the fan would touch the ground under the next fan. We place double fans over the head to head stalls, but usually do not put fans over the outside rows of three row and six row bans due to decreased effectiveness while competing with outside wind. We have used some horizontal fans and they may have potential. Many barns are not constructed in ways that allow horizontal fans to function well to cool the cows. Air movement in the feed alley is of little value. I have concerns that air speeds from some horizontal fans may not be sufficient to cool cows, but the argument of air movement surrounding the cow rather than being on one side is compelling.

Building orientation and construction methods can affect the internal temperature of barns. Barn built east and west can be as much as ten degrees cooler in summer than north south barns due to sun load that is taken into north south barns on the long east side in the morning and the long west side in the afternoon. We build our barns with ½ inch OSB board covered by 30# roofing felt to serve as a radiant heat barrier. This also makes barns stronger and requires less bird perching braces. The radiant heat barrier can lower the roof surface temperature inside the building by 10 degrees.

Tunnel ventilated barns have challenges with air quality. Cooling is almost adequate in the summer but air quality is poor during lower air movement times of the year. More fans are needed for cooling than commonly calculated due to the turbulence created by cows and stalls. Barns longer than 300 feet have difficulty with air quality.

Cross-ventilated barns show promise as they resolve many of the shortcomings of tunnel ventilated barns as long as they are not too large. We have none of these in our practice.

Compost barns have possibilities if the tilling is done as scheduled and the barns are not overstocked. These barns may be excellent choices for dry cows as there is not as much moisture coming from dry cows.

Facility investments provide increased returns or obstacles to production for almost a generation in the life of a family dairy. The responsibility to create the most effective facility to for cow comfort and well-being is tremendous. One of the least described, but functionally significant areas of cattle housing is how do cows, feed, manure and people flow through the barn. Having a cow familiar housing professional work with your builder to create the optimum chore routine that you are going to use daily can provide huge benefits.

Low-Energy Diets For Dry Cows

James K. Drackley

TAKE HOME MESSAGES

- Low-energy diets during the early (far-off) dry period show promise in decreasing health problems in fresh cows.
- Addition of chopped straw to a TMR is a popular method to decrease ration energy density while allowing cows to eat all they want.
- Several factors may impact the success of this approach, and those factors are summarized in this article.

INTRODUCTION

Interest in low energy, high forage diets for cows during the dry period has been renewed in the last two to three years. Systems being implemented include high-straw, one-group total-mixed rations (TMR) for the entire dry period; lower inclusion rates of straw with other forages in one- or two-group systems; use of high-fiber by-product feeds to lower starch content; and a variety of other combinations and modifications. Our research group is extremely interested in the potential of these approaches to decrease calving-related health problems. Field application and testing of different approaches has provided insight as well, but there is much we need to learn yet. The objective of this article is to summarize the current research base and provide some recommendations based on field experiences.

RESEARCH ON TRANSITION PERIOD NUTRITION

For the last 10 to 15 years, research has focused on effects of nutritional management during the "close-up" or "pre-fresh" group to decrease incidence of health problems in fresh cows and to allow higher milk production at peak. Much of the emphasis has been on maximizing pre-calving energy intake by pushing for higher dry matter intakes (DMI) and increasing diet energy density through greater rates of concentrate feeding. A summary of research conducted on this approach worldwide provides a disappointing view of the potential for higher-energy close-up diets to improve subsequent DMI and milk production. Health outcomes across studies also provide little evidence for marked improvement. Field experiences have been varied; in some cases, changes in close-diets have resulted in apparent improvements in health or productivity, but in other cases results have been frustrating. When producers are struggling with transition-related health problems and the close-up management program is addressed, often more than just diet is changed. Management changes in housing, group size and movement, water availability, and post-fresh monitoring may be as important (or more important) in transition success as the diet itself.

Our research group has shared the frustration with inconsistent success of close-up diets. In looking at the scientific literature, one factor that is missing or impossible to interpret in many studies is how cows were handled and fed in the far-off dry period, before cows began to receive the close-up diets. We questioned whether far-off nutritional management could impact transition success. Based on the limited data available for cows, along with knowledge from other species, we speculated that prolonged over-consumption of energy relative to requirements during the early dry period would lead to poorer outcomes during the transition period, even in cows that were not overconditioned.

As reported elsewhere in this volume of the Illinois Dairy Report (see articles by H. M. Dann and N. B. Litherland), we recently completed a large experiment to test this idea. We found that cows allowed free access to a moderate-energy diet based on corn silage and alfalfa silage during the far-off dry peri-

od consumed an average of 160% of the National Research Council (NRC) recommendations for energy (NE L). It should be noted that this diet was not unusual in its energy density (~0.72 Mcal NE L/lb). Many farms that are using TMR based predominantly on corn silage and chopped alfalfa hay would have similar or even greater energy densities. Cows fed this diet had lower DMI after calving and had metabolic characteristics associated with greater susceptibility to ketosis, fatty liver, and other health problems compared with cows in which energy intake was limited during the far-off dry period by feed restriction or straw addition to the diet. Addition of a large amount of chopped wheat straw to the TMR allowed cows to consume the TMR for ad libitum intake, yet controlled energy intake to near NRC recommendations.

Our results were informative in several ways. First, the "best" situation in our experiment was feeding the low energy (high straw) diet during the far-off dry period coupled with ad libitum access to the close-up diet. We believe that many farms struggling with transition health problems might benefit from reducing the energy density of the far-off diet. Second, the "worst" scenarios were the groups that were allowed to over-consume energy in the far-off dry period, regardless of whether they were feed-restricted or allowed ad libitum consumption of the close-up diet. Results for cows that over-consumed energy during the entire dry period (far-off plus close-up) are not surprising relative to previously known effects of overfeeding. However, our results showing the poor outcome caused by overfeeding early followed by feed restriction during the close-up period may help to explain why poor close-up management (overcrowding, poor diets) leads to health problems in the field. Third, cows were in average body condition (3.0 to 3.3 on a 5-point scale) and would not be considered over-conditioned by any measure. Consequently, lower post-calving DMI and other indicators of metabolic imbalance were caused by prolonged consumption of the high-energy diet, not by cows being too fat. Finally, the two close-up period treatments applied (either ad libitum or restricted feeding of a typical close-up diet) had virtually no effects on any outcome variables that we measured. How cows were fed during the far-off period was more important.

HOW LOW-ENERGY DRY COW DIETS MIGHT WORK

Although we are still studying the biochemical and physiological mechanisms involved, we speculate that decreasing dietary energy density in the far-off dry period to near NRC recommendations (about 0.60 Mcal NE L per pound of DM) may help to decrease health problems in at least three ways. First, addition of straw to increase bulk and slowly digested fiber maintains rumen health and fill, and may help to prevent displaced abomasum around calving. Use of low-energy by-product feeds, such as oat hulls, would not have this benefit.

Second, excessive energy intake relative to requirements for a prolonged period seems to increase insulin resistance and other changes similar to those in obesity and Type II diabetes in humans and other animals. By lowering energy intake in the dry period, post-calving appetite may be improved, mobilization of body fat stores may be decreased, and fat accumulation in the liver may be decreased. These changes may prevent development of fatty liver and subclinical ketosis, which are known risk factors for other diseases.

Finally, evidence has accumulated that higher-energy diets may allow greater energy intakes during much of the dry period but result in greater decreases in DMI during the last week before calving. Data from our laboratory and from the University of Wisconsin indicate that the change in DMI before calving may be more important than the absolute DMI before calving in predicting how well cows eat after calving and how much fat is accumulated in the liver. In other words, it may be better to have a slightly

lower DMI that is held more constant than a very high DMI that falls off more sharply before calving.

APPLICATION OF LOW-ENERGY DIETS

For producers struggling with fresh cow problems, one area to address may be to decrease the energy density of the far-off dry cow diet. Target energy density should be in the range of 0.57 to 0.61 Mcal NE L/lb DM. One of the most popular and effective methods to lower dry cow ration energy density, or at least the one that generates the most questions, is the addition of chopped straw. We have also used oat hulls as a palatable low-energy ingredient, but supply is variable and unpredictable.

Here are some factors that we consider important as nutritionists and producers consider implementation of high-straw diets for dry cows. Because of the limited data available, many of these are based on the author's experiences and observations from the field.

• Although it appears that decreasing ration energy density of far-off dry cow diets may be beneficial, note that we are NOT advocating a return to the dry cow systems of old based on benign neglect and free-choice poor-quality roughage in round bales. We are advocating provision of a low-energy, well-balanced TMR that provides adequate metabolizable protein, minerals, and vitamins but that does not supply excessive energy. These conditions will be hard to control if a TMR cannot be fed. Consumption of individual forages, straw, and concentrates will be variable and unpredictable among cows.

• To adequately lower energy density in far-off dry cow diets based on corn silage and either alfalfa silage or hay may require addition of 20 to 30% of the DM as chopped straw. In our recent experiment straw was incorporated at 26% of the DM, with a resulting energy density of 0.59 Mcal NE L/lb DM. In practice this may translate to 5 to 10 lb/day of chopped straw daily.

• Straw must be chopped to a small and uniform particle length to be well-incorporated into the diet and not sorted by cows. Particle size should be about 2" or less – think of it as being able to fit crosswise inside a cow's mouth! In our experience, the chopped straw separated into about one-third each on the two screens and pan of the Penn State particle size separator. Most TMR mixers will not adequately decrease straw to this particle size, and will not handle the amount of straw that may be needed in the mix. Thus, for optimal results straw likely will need to be pre-chopped in a forage harvester or tub grinder.

• Based on our data, cows need at least one week to 10 days to fully adapt to these bulky diets. Total DMI may decrease substantially during this adaptation time before increasing again. Consequently, do not introduce a large amount of straw in the close-up diet without it being in the far-off dry cow diet. If cows are placed on a high straw diet in the close-up period, they may face a declining plane of nutrition leading to calving, particularly those cows with a shorter time in the close-up group. Recent data indicate that this declining DMI may by more likely to result in poor DMI after calving and increased susceptibility to health problems.

• Questions abound on whether low-quality hay can substitute for straw and provide the same benefits. At this point we are aware of no data to answer this question. However, what is known about digestion characteristics of straw compared with those of grass or alfalfa hay, plus field experience, suggest that straw has different properties from grass or legume hay. The flat, hollow stem and characteristics of the plant cell walls may make straw more conducive to mat formation in the rumen, and to remain in the rumen longer. Such characteristics may be desirable to maintain rumen fill, improve the

filtering functions of the fiber mat (which in turn improves digestive efficiency), and prevent displaced abomasums. Straw also seems to be more consistent and uniform than hay. If lowering the energy density is the main goal and ration particle size is otherwise adequate, then low-quality hay may work as long as it is chopped to the same or smaller particle size as the straw and incorporated into a TMR.

• No data are available that compare straw from different cereals. Field experiences seem to favor wheat straw, with barley second. Oat straw may work adequately but the supply is much more limited in the US. Straw quality likely is important; straw should be clean, dry, and free from mold.

• Some producers add water to the TMR when adding straw. In our experiment we did not add water and the TMR averaged about 60% DM. Producers may need to experiment with water addition to see if it improves TMR consistency, decreases sorting, or increases DMI.

• The greater demand for straw in dairy rations has driven up the price of straw in many areas. Based on its nutritive value alone, straw may seem overpriced; however, based on its value as an effective fiber source and possible positive associative effects in the ration, Ohio State University researchers have estimated that straw may be worth as much as $150 per ton. If change to a low-energy dry cow diet decreases fresh cow problems, the value of straw would be even more.

• Our research involved the high straw diet only in the far-off dry period; cows then went to a close-up diet in which chopped alfalfa hay and other ingredients replaced the straw. Likewise, the fresh cow diet did not contain straw. Many producers have successfully implemented the high-straw diet all the way through the dry period, and maintained 1 to 2 lb of straw in the fresh cow or lactation diet. Straw can be lower in potassium than legume forages but potassium will accumulate if the soil becomes enriched with potassium. Whether anionic salts need to be added to the close-up diet to control hypocalcemia will depend on forages available.

• Diet is only a part of transition success, and a switch to a low-energy dry cow diet will not be the answer if other aspects of far-off and close-up management are lacking. For example, recent observational research at the University of Wisconsin has suggested that moving cows into maternity pens between 3 and 9 days before calving is associated with a greater number of health problems and more cows leaving the herd before 60 days in milk than cows that are either moved to pens right before calving or more than 10 days before calving. Changes in environment are stressful for cows. Overcrowding also is a major problem on many farms; some field research suggests that close-up pen stocking density should be no more than 80% of available stalls.

Much needs to be learned through research and experience about use of high straw or other low-energy diets during the dry period. Ongoing research in our laboratory may help to answer some of those questions, and we look forward to hearing experiences from the field as well.

Controlled Energy Diets for Dry Cows: Not Your Traditional Close-up Rations

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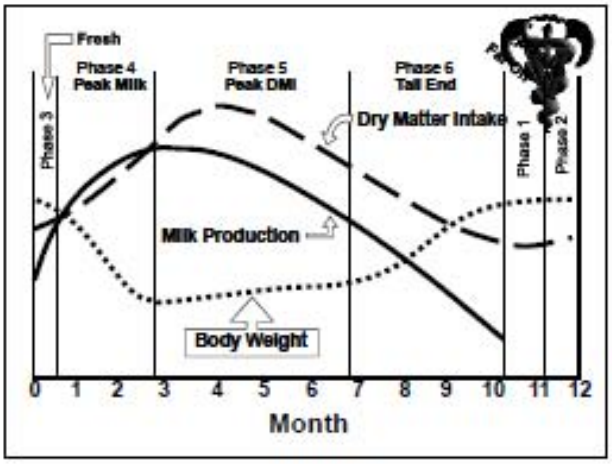
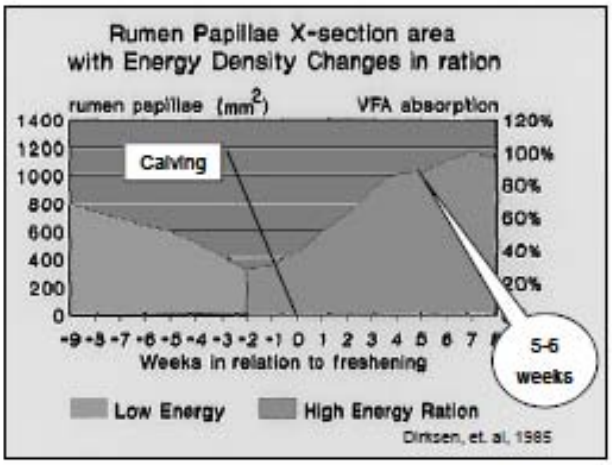
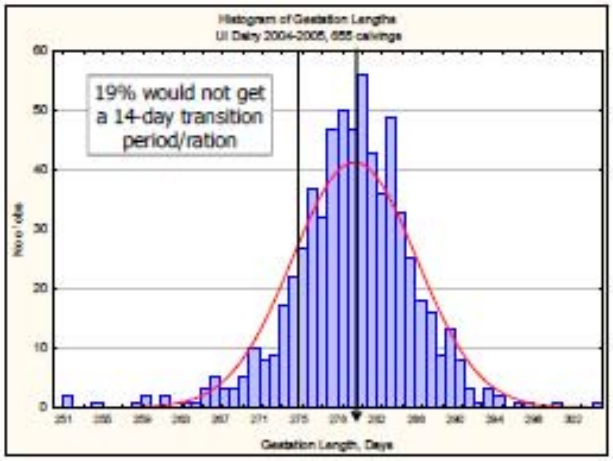
Associate Professor
Dairy Extension Veterinarian
University of Illinois



When to start?

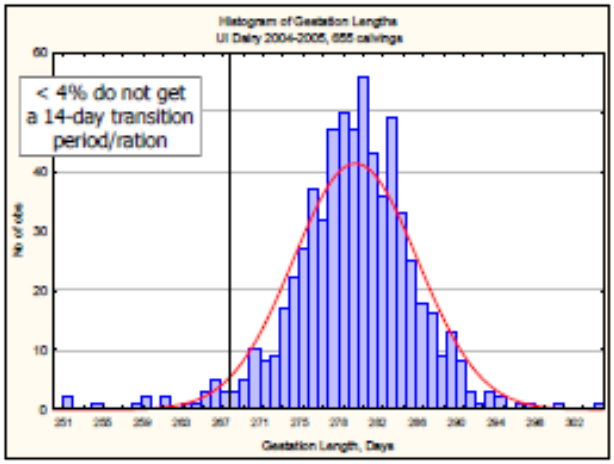
- Standard Approach
  - 2 to 3 weeks before due date
- What about first calf heifers?
  - Longer transition than cows?
- Feeding in far off program may have more impact on a smooth transition than feeding program in closeup (Drackely)

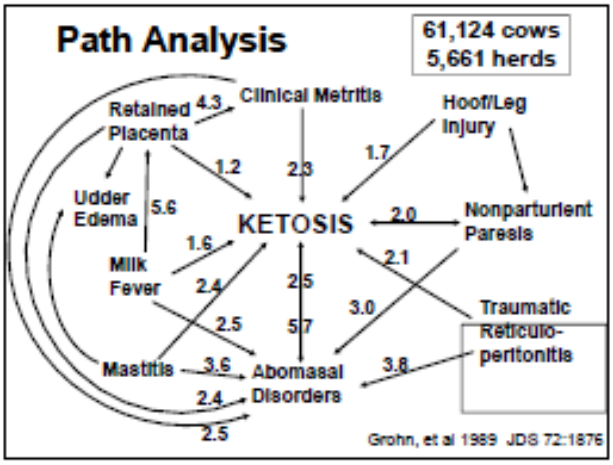




UI Dairy Transition Program

- Cows dry off at 49-56 days until due
- Cows are dry treated and teat sealed
- Dry cows are moved to Far Off lot/pen
  - Ration is low energy and protein
- Cows move to Close Up lot/pen
  - At 21 to 28 days until due
- Springers move to Close Up lot/pen
  - At 28 to 35 days until due





Economic Consequences of Metabolic Disorders

- Milk Fever $334
- Retained Placenta $285
- Ketosis $145
- Displaced Abomasum $340

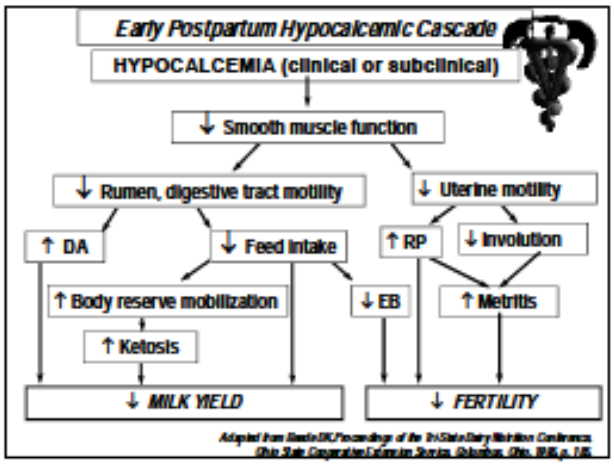
Health Goals of the Transition Ration

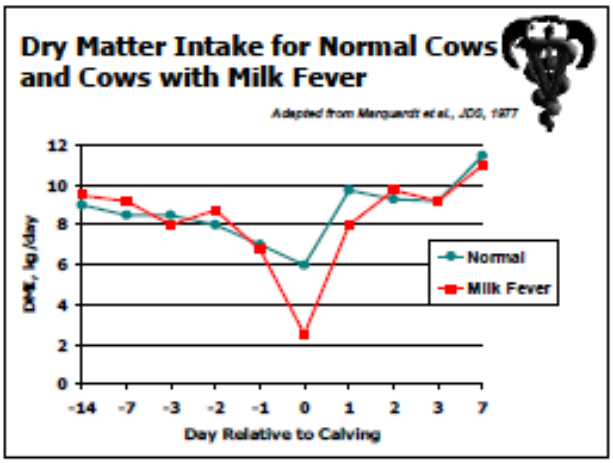
1. Prevent Milk Fever and Subclinical Hypocalcemia

2. Minimize Negative Energy Balance

3. Acclimate Rumen to Concentrates

4. Minimize Immunosuppression





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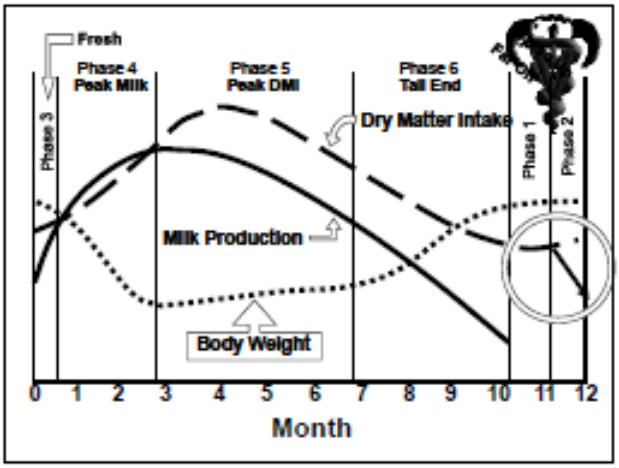
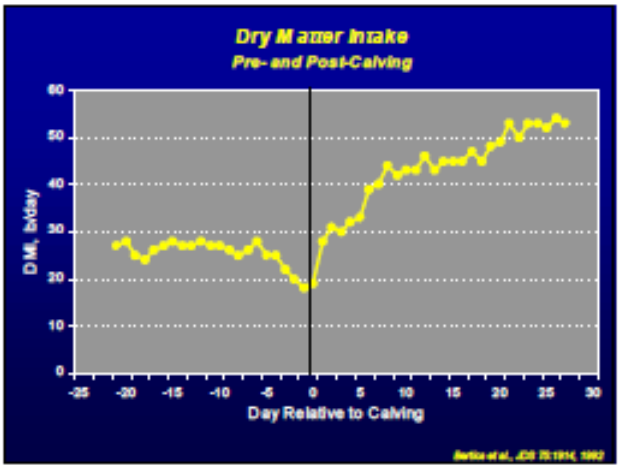
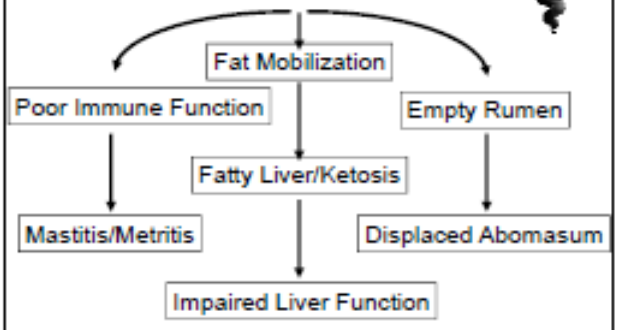
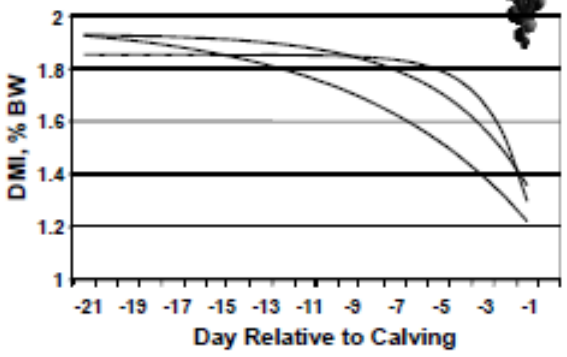




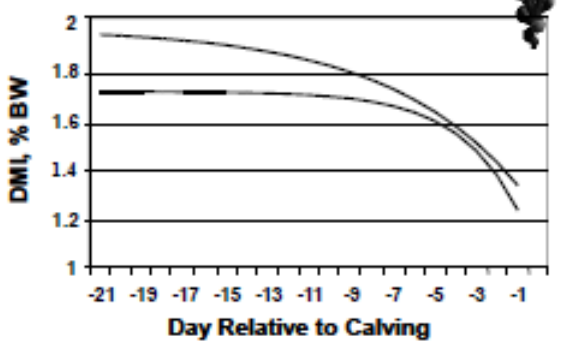
Low Dry Matter (Energy) Intake



Thin vs Moderate vs Obese



Heifer vs Cow



Average DMI Intakes (lb/d)

Days Pre-calving	1450 lb Cow	1320 lb Heifer
Day 21	28.2	22.4
Day 1	19.4	16.3
Ave for 21d	25.5	21.6

Difference between ages

	1st Lact	2+ Lact	
Meals, #/d	11.3	10.8	ND
Length, min	26	31	+20%
Rate, lb/min	0.14	0.16	+14%
Meal size, lb DM	4.0	5.5	+38%
Eating time, min/d	284	314	+10%

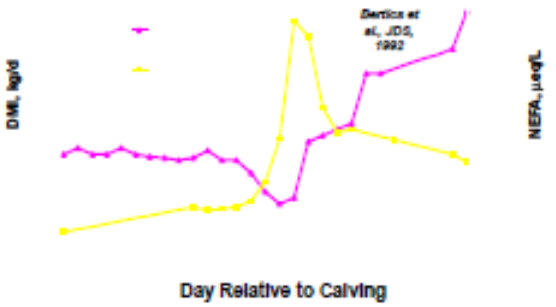
What is Ketosis?

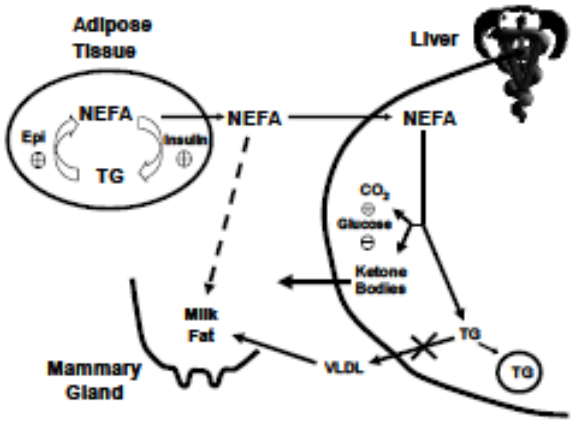
- Increased ketone bodies in blood
  - Beta-hydroxybutyrate
  - Acetoacetate
  - Acetone
- Produced from breakdown of body fat
- Blood glucose is low
- Clinical sign of excessive fat mobilization
  - "Not a disease in and of itself"

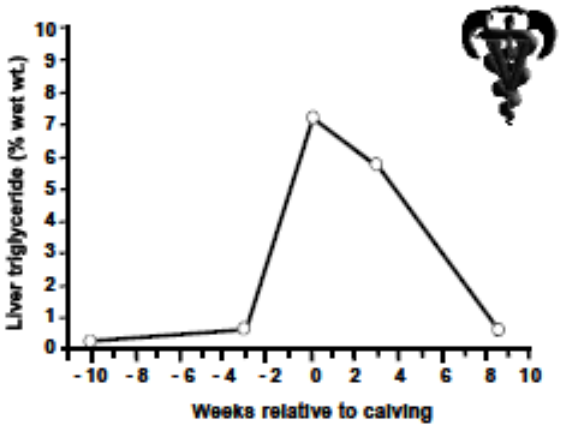
Prevent Excessive Body Fat Mobilization

- Concentration of nonesterified fatty acids (NEFA) highly related
- Normal value during first 2 weeks after calving is 250 - 500 *u*M
- Values > 700 *u*M after first week indicate problem

Dry Matter Intake and NEFA Levels in Holstein Cows







Grum (1994)

Consequences of Fatty Liver

- Compromised liver function
- Decreased performance
- Decreased reproductive efficiency
- Difficult recovery from other disorders or diseases

Controlled Energy Diets for Dry Cows

James K. Drackley, PhD

Department of Animal Sciences
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Urbana, IL

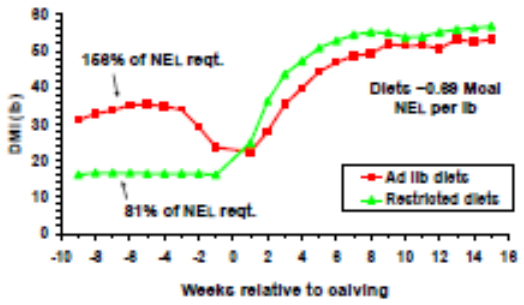
Take-home message #2

- **Low-energy, high-forage close-up diets**
  - High-bulk diets are **NOT** a strategy for pre-fresh/close-up groups only!
  - Dry matter intake will drop until cows adjust; requires 5 to 10 days
- **Must be a dry period strategy, not a close-up or pre-fresh strategy only!**

Controlled-energy dry cow diets: "Back to the future"

- Ration energy density closer to NRC National Research Council (NRC, 2001) recommendations **(~0.60 Mcal/lb DM)**
- Need a *balanced diet* (preferably TMR), lower in energy but adequate in other nutrients, that contains lactation ration ingredients
- *Chopped straw* works ideally to dilute energy of corn silage and other lactation ration ingredients
- Other ingredients (mature hay, oat hulls, corn stalks, stalklage, soybean straw, etc) *can* be used

Cows fed even moderate-energy diets during the dry period easily over-consume energy relative to requirements



Douglas et al., 2006

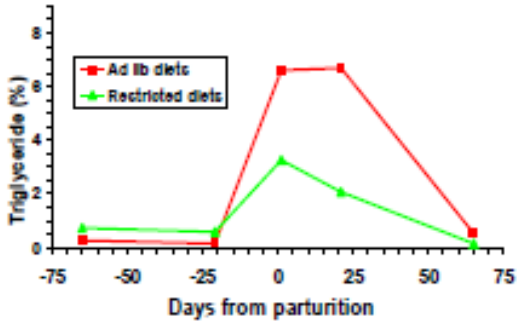
Why might too much energy in the dry period be bad?

- Cows respond metabolically as if they were too fat, even if they don't appear to be (insulin resistance)
- Lower dry matter intake (DMI), more body fat loss, fatty liver, ketosis…

High-energy diets predispose cows to health problems

- May not be a problem in well-managed herds
- But, if intake is interrupted (stressors, disease, poor management, etc.) then overfed cows are more likely to develop subclinical ketosis, fatty liver, and other health problems

Excess dietary energy prepartum leads to greater liver fat after calving



Douglas et al., 2006

Comparison of ingredient NE_L to target diet NE_L (0.59 – 0.63 Mcal/lb DM)

Feed	NE_L (Mcal/lb DM)
Corn silage	0.74
Barley silage	0.64
Mature grass hay	0.60
Wheat hay, headed	0.52
Wheat straw	0.43
Soybean hulls	0.74
Cottonseed hulls	0.26

Values from NRC, 2001

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Values from NRC, 2001

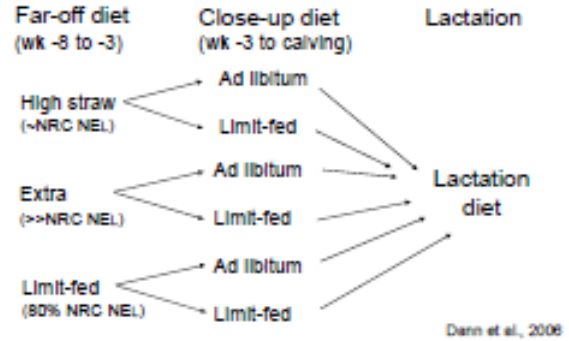
Corn silage and wheat straw are complementary

- Equal amounts of DM from corn silage (0.74 Mcal/lb) and wheat straw (0.43 Mcal/lb) results in a mixture of 0.58 Mcal/lb
- Coupled with some alfalfa hay or silage and concentrate = total diet of 0.60 to 0.63 Mcal/lb

What about other low-energy ingredients?

- Diluting energy density and controlling energy intake is the goal
- Other ingredients can be used to lower energy density (grass hay, poor quality alfalfa, cottonseed hulls, oat hulls, corn stover, etc)
- May need to feed more to get same limit on intake (other roughages), or cows may increase intake of diet with small particle size ingredients (faster digestion and passage)

Controlled Energy in Conventional Two-Group Systems: Experimental Design



Dann et al., 2006

Composition (% DM basis) of diets

Ingredient	Straw	Extra	CU	Lact
Corn silage	21.1	25.5	24.5	28.1
Alfalfa silage	41.7	26.2	25.1	20.1
Alfalfa hay	—	14.0	13.4	—
Wheat straw	26.2	—	—	—
Cottonseed	—	4.4	4.2	9.7
Corn grain	7.2	17.2	16.3	25.7
Soy hulls	—	10.2	9.7	1.5
Soybean meal	3.0	—	—	5.2
Expeller SBM	—	1.7	1.6	5.9
Minerals, vitamins	0.8	0.7	5.2	3.8

Dann et al., 2006

Far-off diet, but not close-up diet, affected cows during first 10 days in milk

	Far-off Dry Period Diet		
Variable	Straw	Overfed	Limit-fed
DMI, % BW	2.5	2.2	2.5
Energy Balance, % of reqt.	88	80	93
NEFA, μ*M*	787	792	627
BHBA, mg/dL	8.1	9.1	6.6
Milk, lb	65.3	57.2	58.1

n = 24

Dann et al., 2006

Take-Home Message

- In two-group systems, avoiding overfeeding in far-off dry period may be more important to transition success than close-up strategy.
- Far-off nutrition may influence responses to close-up programs.

We can easily obtain DMI needed to meet daily energy requirements before calving

NEL (Mcal/lb)	DMI (lb) for 15 Mcal	NEL (Mcal) at 27 lb DMI
0.59 (high straw)	25.4	15.9
0.64	23.4	17.3
0.68	22.0	18.4
0.73 (typical close-up)	20.5	19.7

Achieving *uniform* sufficient intakes is subject to feeding management!

Drackley 2007

One-diet programs:
Ingredient composition of test diets (%DM)

Ingredient	High straw	High energy
Corn silage	35.5	35.8
Alfalfa silage	---	13.3
Alfalfa hay	17.2	9.5
Wheat straw	31.8	---
Whole cottonseed	---	5.1
Concentrate 1	15.5	---
Concentrate 2	---	36.3

(Water @ ~4 lb/cow)

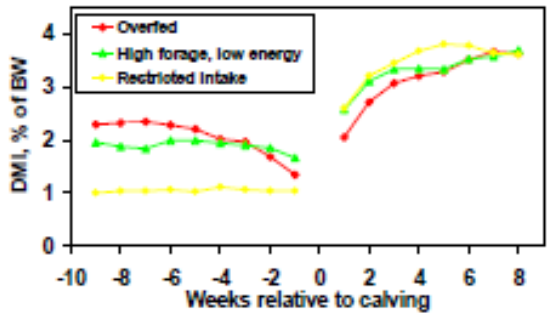
Janovick Guretzky and Drackley, 2006

Composition of concentrates (% total DM)

	High straw		Moderate energy	
Ingredient	Far-off	Close-up	Far-off	Close-up
Corn, ground	3.6	3.5	17.9	17.6
SBM, 48%	5.1	5.9	6.6	5.0
SoyPlus	4.1	4.1	---	1.0
Soy hulls	---	---	10.4	7.9
Trace min/vit	0.3	0.3	0.3	0.3
Urea	0.9	0.7	0.2	0.1
Dical P	0.1	0.2	0.1	0.2
Limestone	0.8	0.8	---	1.5
Magnesium oxide	---	0.2	---	0.1
Salt	0.3	0.2	0.3	0.3
Magnesium sulfate	0.3	0.8	0.2	0.9
Anionic salts	---	1.2	----	1.3
Vit ADE	0.4	0.3	0.3	0.3

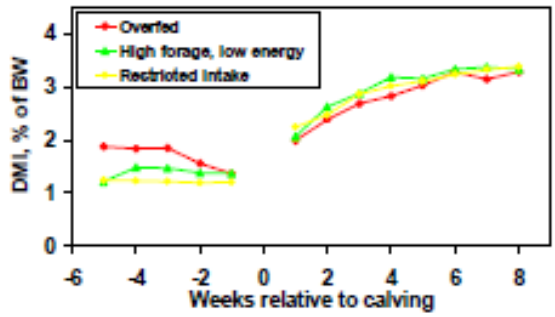
Janovick Guretzky and Drackley, 2006

Weekly DMI for COWS fed different amounts of energy during the dry period



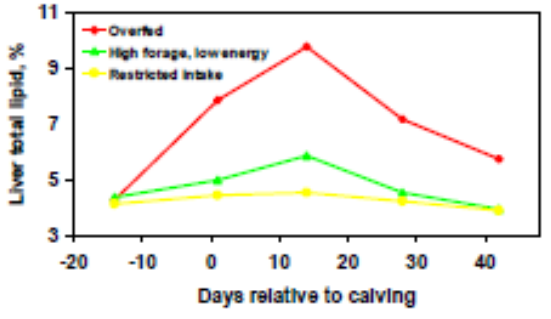
Janovick Guretzky and Drackley, 2006

Weekly DMI for HEIFERS fed different amounts of energy during the dry period



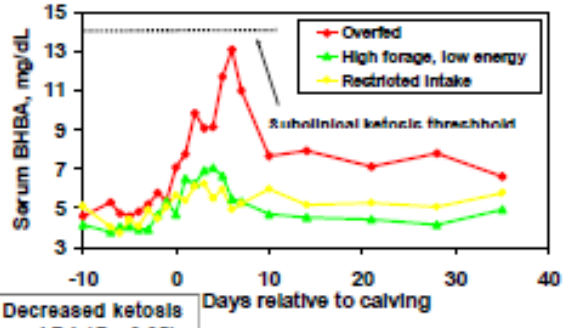
Janovick Guretzky and Drackley, 2006

Controlled energy dry cow diets decreased liver fat accumulation in cows



Janovick Guretzky and Drackley, 2006

Controlled energy dry cow diets decreased serum BHBA in cows



Decreased ketosis and DA ($P < 0.05$)

Janovick Guretzky and Drackley, 2006

Why do it? Benefits of high-straw, low-energy diets

- Drastically decreases DA
- Marked reduction in other metabolic disorders and smoother transitions
  - We would expect positive effect on reproduction, body condition, and hoof health
- May simplify dry cow management and ration formulation

What about subsequent milk yield?

- Few controlled data yet
- Our data and field experience suggest slightly lower and later peak milk, but greater persistancy
- Total lactation yields therefore may be essentially the same

Why might these low-energy diets work?

- Improve rumen fill (prevent DA), fiber mat, and efficiency of fermentation = "healthy rumen"
- Stabilize dry matter intake and prevent large drops in DMI before calving
- Prevent "fat cow"-type responses to excessive energy consumption
- Provide adaptation to lactation ration ingredients
- Help maintain low potassium

What should these diets look like? Drackley's recommendations

- NE_L: ~ 0.59 – 0.60 Mcal/lb DM, to limit intake to ~15 – 16 Mcal/d
- CP: 12 – 14%
- Metabolizable protein (MP): > 1000 g/d
- Starch: 12 – 16%
- NDF from forage: ~0.7 – 0.8% of BW or 10 – 11 lb per head daily
- Minerals and vitamins: according to "standard" guidelines

Drackley's recommendations (cont'd.)

- Mg: 0.4% of DM
- Ca: 0.6% of DM
- P: 0.25% of DM
- K: as low as possible!
- Anionic salts: if you like; try to decrease DCAD to at least 0 to –5 mEq/100 g
- Vitamin E: minimum 2,000 IU/day
- Vitamin A: 100,000 IU/day

NE_L values are only correct for the diet that cow *actually consumes*

- Calculations from NRC (2001) or CNCPS models will always be the most accurate
- Values based on Van Soest discounted energy will underestimate actual energy value
- Values based on maintenance intake for dry cows may overestimate actual energy
- Use of NE_m may be best with individual feeds

Making these diets work

- For TMR, straw ***must*** be chopped short enough to prevent sorting.
  - 2" or less (Our study: 1/3, 1/3, 1/3 on Penn State box)
  - Pre-chop (tub grinder or forage harvester)
  - Some reel mixers with knives (e.g., Keenan)
- Free-choice low-energy forage with limit-fed balanced partial mix is a ***poor*** second choice (ensure bunk space and delivery).

Avoid underfeeding too...

- Avoid severe *underfeeding* or limit feeding (<70% of requirements)
  - Too much poor-quality grass or legume hay, insufficient supplementation
  - Overcrowded pens, timid cows, insufficient bunk space, insufficient water…
- If feeding management is limiting, high-straw diets ARE NOT the answer!
  - And in fact may be a disaster!

Mixing and delivery are critical

- Uniform mixing (straw chopped but other ingredients not pulverized; concentrates distributed properly)
- Last feed out should be same as first feed out (check particle size or chemical composition at ends of feed line)
- Cows must be able to access feed all day (push-up, adequate bunk space)

Low energy ≠ poor quality!

- Straw must be clean, mold-free, not weather-damaged
- Value in ration is not represented by "relative feed value" or other measures based on CP, ADF, NDF

What about the fresh-cow group?

- Optimal dry period diets dilute lactation diet ingredients with straw (provides rumen adaptation)
- Straw leaves rumen slowly; results in "auto-adaptation" when lactation ration is introduced after calving
- Include small amount (~0.5 to 2 lb) of chopped straw in fresh-cow / lactation groups

Summary and take-home

- High-straw, low-energy diets should greatly decrease transition health problems
- Diets are NOT to be used as only a close-up strategy
- In two-group systems, decreasing energy value in far-off is more important
- Diets must be mixed and fed properly (no sorting) and feeding management is important (push-up, adequate bunk space)

Thanks, Doc See You!
Mark E. Hardesty, DVM, MS

I can run my farm calls and herdchecks as rapidly as any doctor in our practice, but they usually take longer because we take time for questions. The questions are often the most important accomplishment on that call. Many of these clients, I have worked with for twenty years, but we still have things to discuss. To maximize the effectiveness of the most highly trained advisor that comes onto your farm, we need to take time to discuss the challenges of the dairy business. You may think that your veterinarian does not have enough time to do this, but in reality, this is the stuff that makes dairy practice worthwhile. More importantly, these discussions bring out the information that dairies need to be successful in the industry today. Start by carving out 15 minutes worth of discussion and move toward having your vet add an additional 30 minutes to your scheduled time to address important issues. Some examples to bring up for discussion include:

Vaccination Program - You must write it down or you don't have a program

Dairy Quality Assurance – We must produce quality milk to stay in this business.

Treatment Protocols - Are we as effective as we can be? Can we use less drugs?

Forage Needs - Budgeting and Planning – Running out of feed is a serious challenge.

Circles of Life - Why do we do it that way? "Because we always have" is not the right answer.

- Newborn to Calving
- Fresh to Fresh
- Weekly Routine
- A day on the dairy

Reproductive program
Heifer reproductive program – A day open on a heifer may be more costly than cows.

Rations & Feed Mixing and Delivery – Nutrition is the foundation of health

Milking Evaluation equipment and technique – Mastitis is still the most costly disease.

Records – If we can't measure it, we can't manage it.
Monitoring

- Milk Production
- SCC & Clinical cases
- Milk Quality and components
- Pregnancy Rate
- Culling & Deads - How much & When

Lameness
Metabolic disease incidence
Evaluation and Prioritization

Facility Design – Facilities determine how we do our work for decades.
Staff Training – Everything needs to be done by someone. Do they know how?
Financial Benchmarking – Production numbers become irrelevant if we can't make money.
Succession Planning – Nobody does anything forever. Who will follow you?

These issues do not need to be discussed at each visit, but they do need to be discussed. I suggest taking one per month and deciding which need to be discussed quarterly, semiannually, and annually. This should automatically create a schedule that takes two to three years to complete.

NOTES