

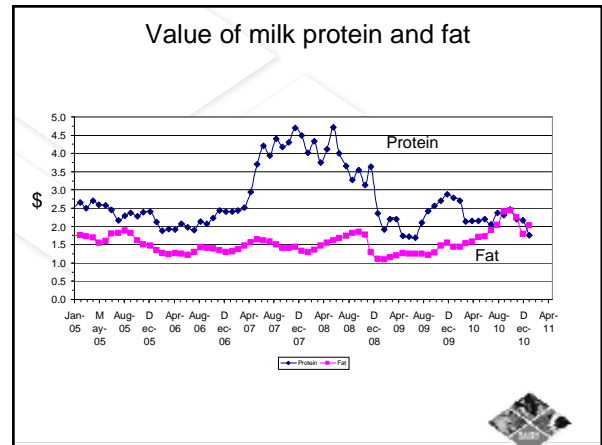
Milk Components Integrating Management and Nutrition

Bill Stone

Dairylea Cooperative Inc. DAIRYLEA COOPERATIVE INC.
P.O. BOX 4844 SYRACUSE, NEW YORK 13221-4844

	Factors	Pounds	Rates	Amounts
Butterfat	3.750%	102,035	2.02390 lb	206,504.58
Protein	3.170%	86,252	1.75900 lb	151,717.26
Other Solids	5.730%	155,906	.20020 lb	31,212.38
Total Component Value			14.51280 cwt	389,434.22
Price Differential (PPD)			2.68000	72,919.61
Producer Blend			16.99280 cwt	462,353.86
CO-OP Dues			-.07000	
Market Adjustment			+.10000	
1 PREMIUM SPECIAL			+.10000	
1100 QUALITY			+.40000	
Pay price cwt			17.52280	
Gross Payment				476,774.54
604 VOLUME PREMIUM				13,604.41
Total Gross Pay				490,378.95

We're paid primarily on pounds of fat and protein sold



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P.O. BOX 4844 SYRACUSE, NEW YORK 13221-4844

DEPOSIT DATE: 02/18/11 DEPOSIT AMOUNT: *213,349.53

*** NON NEGOTIABLE ***** AUTOMATIC DEPOSIT CONFIRMATION

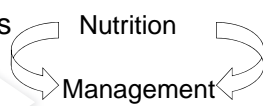
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Payment through 01/31/11

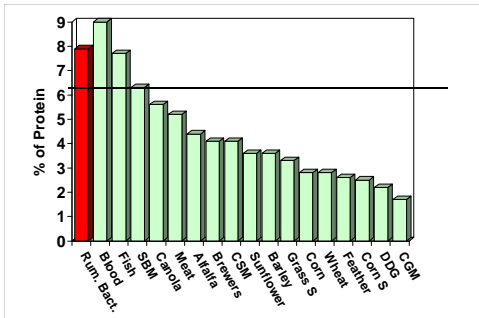
Deductions		COOP USES	
MEMB PROMOT-FEDERAL	1,500.44	NY'S DEPT OF AGRICULTURE & MARKET	2,720.88
MAILING	14,964.84	FUEL SURCHARGE	2,992.97
ADVANCE UK	56,310.00	ADVANCE UK	8,040.00
ADVANCE UK	56,640.00	ADVANCE UK	96,660.00
ADVANCE UK	3,753.44	DENTAL INS	16,190.00
COOP-OWNERS COMPENSATION		EQUITY	544.18
		89.00	EAGLE SUPPLY FEE
			616.37
Total Deductions	277,029.42	Net Payment	213,349.53

Milk Components Nutrition Management



- ◆ Getting the most out of the rumen
- ◆ Focusing on the transition cow
- ◆ Improving cow comfort to minimize nutrient waste
- ◆ A consistent operation
- ◆ Additives to increase component percentages

Comparison of lysine in rumen bacterial protein and feedstuffs



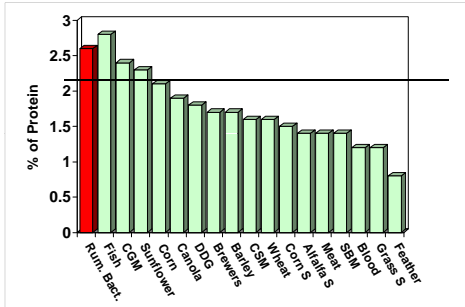
Courtesy: Dr. Chuck Schwab

Forage Goals – What are yours?

Table 1. Characteristics of quality silage

	Type of Silage		
	Alfalfa	Grass	Grass
✓ Neutral Detergent Fiber, %	38-42	48-52	37-42
✓ Dry matter, %	34-42	33-36	33-36
✓ Upright (stem) %	34-42	34-42	33-36
✓ Bag	34-42	38-48	33-36
✓ Other	Little or none at all; slightly along, plant up close		
✓ Lactic acid	Wet (< 50% DM) 0-4%, Wet (> 50% DM) 3-6%		
✓ Acetic acid	< 1.5%; only if at least 2:1 forage:concentrate (F: C)		
✓ Butyric acid	< 1%		
✓ Total VFA	< 10%		
✓ Particle length	2-4.5% of DM on top layer; > 25% on top layer		
✓ Res	< 200 ppm (quality measured by NDF)		

Comparison of methionine in rumen bacterial protein and feedstuffs



Courtesy: Dr. Chuck Schwab



12' disc bine

7' windrow; 7/12 = 57%, ideally windrow width would be > 90% of cutterbar width (~11')



8' merger

Forage Management Meeting

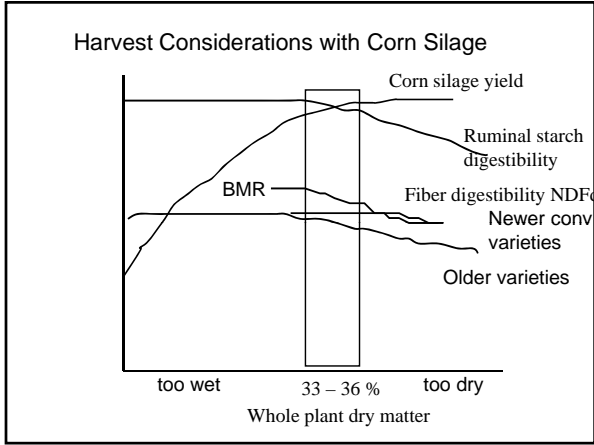
- Goals
- Predicting alfalfa and grass maturity, 1st cutting start date
- Fermentation basics
- Windrow width
- Dry matter at harvest
- Chop length
- Inoculants
- Packing Covering
- Cutting intervals
- Feed-out





Milk Components Nutrition Management

- ◆ Getting the most out of the rumen
- ◆ Focusing on the transition cow
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- ◆ A consistent operation
- ◆ Additives to increase component percentages

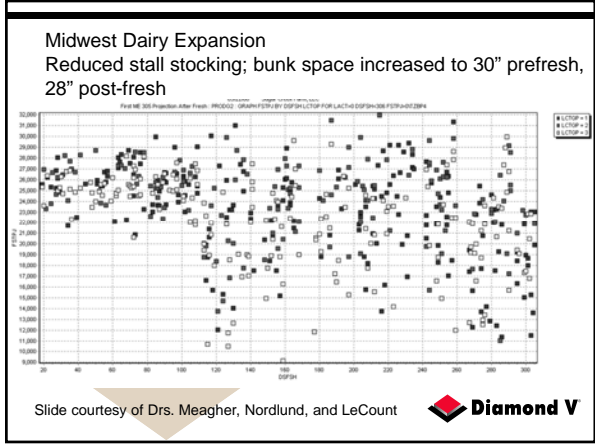


Milk Components Nutrition Management

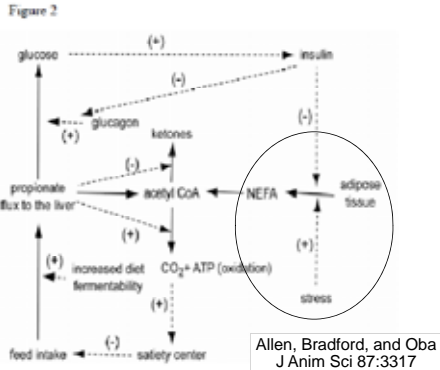
- ◆ Getting the most out of the rumen
- ◆ Focusing on the transition cow
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- ◆ Additives to increase component percentages

Conventional and BMR CS

	Conv		BMR	
% Moisture	65.4		59.3	
% Dry Matter	34.6		40.7	
% Crude Protein	2.9	8.5	3.4	8.5
% Available Protein	2.8	8.0	3.2	7.8
% ADICP	.1	.4	.3	.7
% Adjusted Crude Protein	2.9	8.5	3.4	8.5
Soluble Protein % CP		71		61
Degradable Protein % CP		80		69
% NDICP	.3	.9	.4	1.0
% Acid Detergent Fiber	7.5	21.6	9.9	24.2
% Neutral Detergent Fiber	13.5	38.9	16.1	39.5
% Lignin	.8	2.3	1.0	2.5
% NFC	16.1	46.6	18.8	46.1
% Starch	12.8	37.0	15.5	38.1
% WSC (Water Sol. Carbs.)	.8	2.4	1.1	2.8
% ESC (Simple Sugars)	.6	1.6	1.1	2.8
% Crude Fat	1.2	3.4	1.4	3.3
% Ash	1.16	3.36	1.45	3.57
% TDM	26	75	31	76
NEI, Mcal/Lb	.27	.79	.32	.79
IVTD 30hr, % of DM		82		82
NDFD 30hr, % of NDF		50		51
kd, %/hr		3.34		3.68



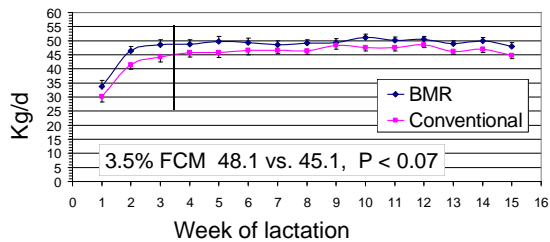
Hepatic Oxidation Theory – transition cows



Dry cows want to become fat!

- ♦ Dry cows like to eat! They can easily consume 40-80% more energy than they require
- ♦ When they do this, they put on fat – both internally (especially abdominal) and subcutaneously (BCS)
- ♦ Visceral (abdominal) fat is more rapidly mobilized post-freshening, leading to an increase in metabolic disorders

3.5% FCM of cows fed BMR or Conventional corn silage during the transition period



Dry cows will easily consume more energy than they require

NEL (Mcal/lb)	DMI (lb) for 15 Mcal	NEL (Mcal) at 27 lb DMI
0.60 (high straw)	25.0	16.2
0.64	23.4	17.3
0.68	22.0	18.4
0.72 (typical close-up)	20.8	19.4

Dry cows do not regulate “energy” intake on a short-term basis.

We have to be very careful NOT to put condition on dry cows

Drackley, 2008

Want to improve the performance of your transition cows?

- ♦ Feed a controlled energy dry and prefresh diet

Procedures

- 18 non-pregnant non-lactating Holstein cows fed one of two dry period treatments:
 - LE = low energy, high fiber
 - HE = moderate energy, overfed
- Cows fed for 56 d
- Cows slaughtered and dissected
 - Low E ~ 0.60 Mcal NEL/Lb.
 - High E ~ 0.70 Mcal NEL/Lb.

Drackley, 2008

Nikkah et al., 2008

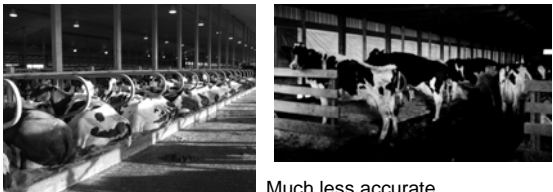
I Adipose tissue depots in non-lactating non-pregnant cows after 57 d on diets

Variable	LE	HE	SEM
Initial BCS	3.00	3.08	0.25
Final BCS	3.55	3.62	0.11
Post-blood BW, kg	710	722	33
Adipose tissue site			
Omental, kg	17.5	28.1**	1.3
Mestenteric, kg	12.1	22.0**	2.4
Perirenal, kg	6.0	9.9*	1.2

n = 9 per diet
 ** *P* < 0.01
 * *P* < 0.05

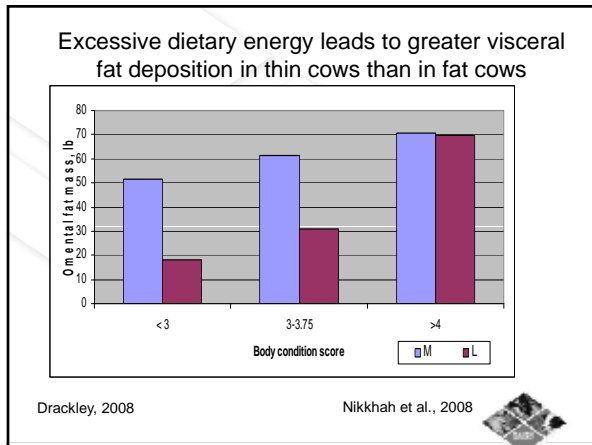
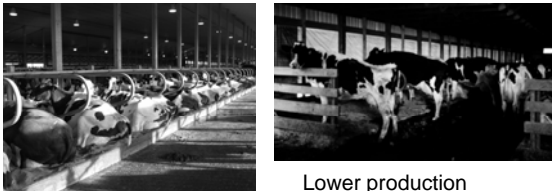
Nikkhah et al., 2008

CPM Model predictions for dry matter intake, energy and protein allowable milk



Very close

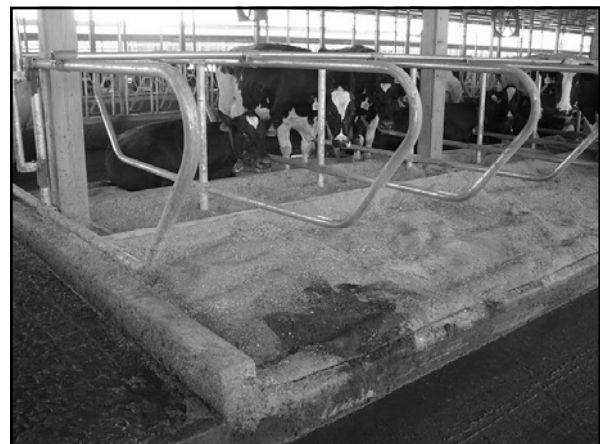
Much less accurate
 Extra nutrients for maintenance
 altered meal patterns,
 poorer ruminal digestion, ...

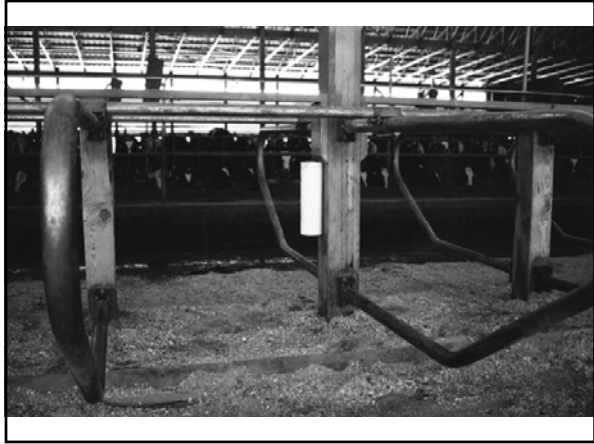
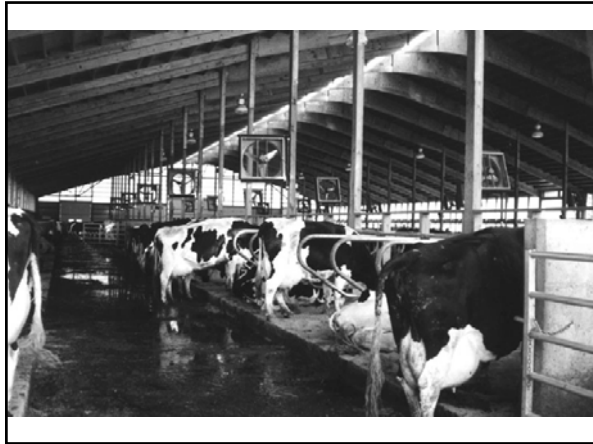



Comfortable, healthy cows
 producing a lot of milk

Lower production
 Less healthy cows
 Lower income over
 feed costs

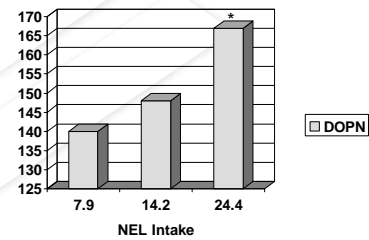
- The Foundation for High Milk Production
- Cow comfort
 - Forage Quality
 - Consistency
 - Transition cows





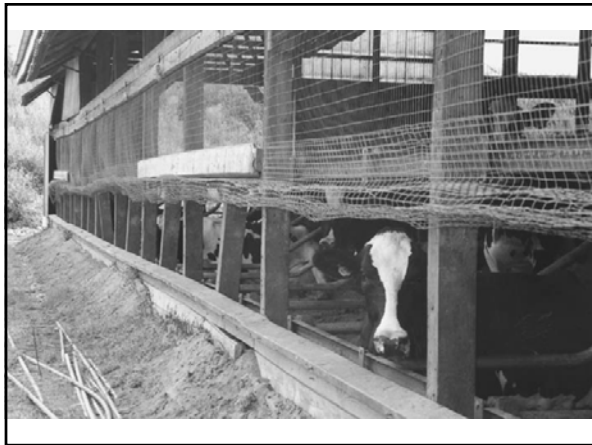


NEL intake 4 wks precalving vs. DOPN



Meta-analysis of 6 experiments (304 cows) evaluating prepartum energy intake and reproductive performance (Cardoso et al., 2010)

Drackley, 2010



Key points

- ◆ Modest overfeeding during the dry period could lead to >75% increase in visceral adipose tissue that will drain directly into the liver. With no detectable change in BCS.
- ◆ Excessive energy leads to greater visceral fat increase in thin cows then in fat cows.
- ◆ Abdominal adipose tissue from cows overfed during the dry period may be mobilized more rapidly than subcutaneous (BCS) deposits



Diagonal lying ... messy stalls



Want your cows to lose less condition?

- ◆ Reduce stress levels in transition cows
 - “Stress” can reduce intake and increase fat mobilization
 - Don’t overcrowd stalls, packs, or the bunk
 - No more than one transition cow per stall
 - Life can get a lot easier if density is at 80%
 - How many animals are calving next month? Is there adequate space? One dry cow group?
 - Can pen moves be reduced?
 - Is heat stress abatement adequate
 - Don’t completely discontinue your foot bath program because it’s winter



MILK COMPONENTS – INTEGRATING NUTRITION AND MANAGEMENT

Bill Stone
Diamond V, Technical Support and Field Research
Auburn, NY

INTRODUCTION

The primary drivers of income for most dairies in the Northeast are the pounds of milk protein and fat sold by the dairy. The main way to increase the pounds of components a dairy sells is to increase the production of milk with normal or average component levels. The next approach is to increase the component levels of the milk. I am going to primarily focus on major factors influencing production, and discuss how the Northeast as a region fares in these areas. I would like for you to think how your dairy, or your clients' dairies, ranks in each of these production influencing areas.

Dairies that routinely sell high amounts of components (high production) feed high-quality forages to comfortable cows in a consistent dairy environment.

FORAGE QUALITY

Palatable, highly digestible forages have always played an important role in production, but the priority becomes even greater in light of record high, income draining grain and protein prices. Get together with your crop's crew, custom operators, and any others involved with your forage program well before the start of this year's harvest. What has your dairy's performance been in each of the management areas influencing forage quality in Table 1? Develop strict goals (example goals in Table 2) for your forage program, and put together a team program to meet these goals.

Forage Research Updates and Considerations

The Northeast has led the way in increasing alfalfa and grass dry-down rates for silage by decreasing haylage windrow density. This technique often allows for the harvest of prime forage even with short weather harvest intervals. Usually density is reduced by spreading the windrow out, sometimes to 100% of cutterbar width. Often this necessitates the purchase of a wide, continuous merger. Other dairies have reduced windrow density by actually purchasing a smaller haybine, and then spreading the windrow as wide as will still fit with their current merger.

Starch, energy, and yield all increase as corn is moving from 30 to 40% whole crop dry matter. Historically, fiber digestibility decreased with advancing dry matter. However, that does not occur with today's conventional corn silage hybrids (Der Bedrosian et al., 2010). Corn silage harvested in the upper 30's, and

for sure 40% dry matter, however, can be more difficult to pack and often doesn't ferment appropriately. Thus, a good compromise between starch yield and an optimum fermentation is to harvest from about 33 – 36% dry matter. In this same study, NDF digestibility of BMR corn silage dropped five percentage points as dry matter increased from 32 to 41%. Until more research is done investigating the relationship between crop dry matter and digestibility, I would recommend harvesting it in the 31 to 34% dry matter range.

Table 1. Topics to cover in a forage management meeting

- Goals
- Predicting alfalfa and grass maturity
 - o 1st cutting start date
 - o Harvest intervals
- Fermentation basics
- The effect of windrow width and conditioners on drying rate
- Dry matter at harvest
- Chop length and how it should vary with crop DM and forage feeding levels
- Inoculants and preservatives
- Packing and silage density; UW density calculator
- Covering and types of covers available
- Feed out

Table 2. Develop your own forage goals

Forage Goals – What are yours?

Table 1. Characteristics of quality silage

	<u>Type of Silage</u>		
	<u>Alfalfa</u>	<u>Grass</u>	<u>Corn</u>
✓ Neutral Detergent Fiber, %	38-42	48-55	37-42
✓ Dry matter, %			
Bunker	34-40	32-38	33-36
Upright (stave)	34-42	34-45	33-36
Bag	34-45	30-40	33-36
✓ Odor	Little or none at a distance; slightly sharp, pleasant up close		
Lactic acid	Wet (< 35% DM) 6-8%, Wilted (>40% DM) 3-4%		
Acetic acid	< 1-2%; ratio of at least 2.5:1 lactic:acetic (* <i>L. buch.</i>)		
Butyric acid	< .1%		
Total VFA	< 10%		
✓ Particle length	8-15% of TMR on top screen; >~55% on top two		
✓ Iron	< 200 ppm (varies somewhat by region)		

There have been several studies demonstrating that ruminal starch digestibility of corn silage increases with time in the silo, with most of the increase occurring within a few months of ensiling. The starch (kernels) from drier corn silage will increase in ruminal fermentability more slowly, and likely will never become as ruminally available as less mature kernels. Processers should be set tighter and kernels broken into smaller pieces as crop dry matter increases.

Finally, revisit the NDF goals your dairy has for both haylage and corn silage. Neutral detergent fiber measures the insoluble cell wall components, and is related to the amount of feed a cow can consume. Increasing amounts of forage can be fed, and less grain purchased, as forage NDF levels decrease. Thus, consider harvesting techniques (earlier start to first cutting, reduced interval between cuttings, increased cutting height for conventional corn silage) to reduce forage NDF levels if you will have adequate forage inventories.

TRANSITION COWS

The performance of a cow during the transition period influences her production for the entire lactation. Arguably the area advancing the most in our industry over the past decade has been the nutrition (precalving) and management of the transition cow. The nutritional changes have largely been due to the realization that over-feeding the dry cow does not benefit the animal, and in fact predisposes the cow to an increased risk of metabolic disorders. Recently Nikkhah et al. (2009) fed non-lactating, non-pregnant cows either low or moderate energy diets for a 56 d time period. At the conclusion of the trial animals were necropsied and the abdominal fat stores dissected and weighed. Cows less than BCS 3.75 fed the additional energy accumulated significantly more (about 35 pounds each) adipose in their abdomen than those fed the low energy diets. Abdominal fat is more likely to be mobilized and impair liver function than subcutaneous fat. This is one, and perhaps the primary, benefit of feeding dry cows closer to their maintenance needs – they don't accumulate as much abdominal, visceral fat. Northeast dairies have widely adapted this nutritional strategy. Probably the greatest challenge is getting the lower energy forage (straw or grass hay) chopped short enough to minimize sorting. The field chopper, and grinders made by Roto-Grind and Hay-Buster, can effectively process these forages.

Dr. Nordlund of the University of Wisconsin has utilized the Transition Cow Index to statistically evaluate the effect that different facility and management factors have on fresh cow performance. The factors that proved significant were:

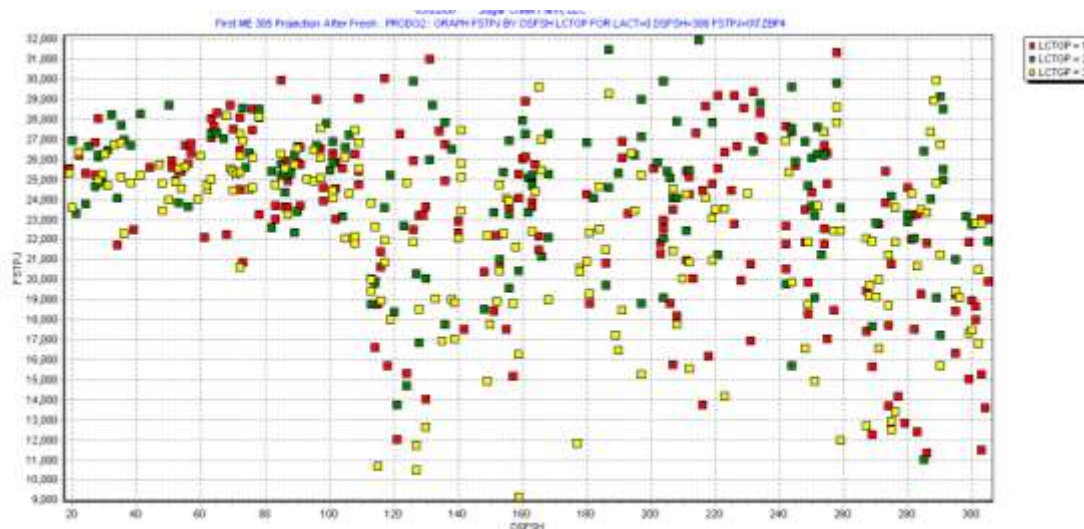
1. Provision of sufficient bunk space so that all animals can eat at the same time. This can be accomplished by providing 30" of bunk space for both pre- and post-fresh cows.

2. Minimize the number of pen moves throughout the transition. Stays of 3 – 9 days, particularly during the immediate prefresh period with daily entry of animals into the pen, were found to be particularly harmful.
3. Provision of a loose, deep bedded surface for standing and resting
4. Proper sizing of stalls and packs to facilitate the motions of lying and rising for large, mature cows.
5. Effective screening programs for cows that may need increased attention.

The complete paper is available at the following link:
<http://www.das.psu.edu/research-extension/dairy/nutrition/pdf/nordlund-physical-environment-transition-cow-success-2010.pdf>

Some of these recommendations will benefit all cows in the group (e.g. loose, deep bedding), while others will primarily benefit more submissive animals (additional bunk, stall and pack space) or larger, older animals (properly sized stalls). Figure 1 is from a dairy that improved bunk and stall space for transition cows. The figure contains projected 305ME milk levels for cows before and after these changes were implemented. The “failures”, most likely submissive animals that were not consuming enough feed and were stressed more than their more dominant herd mates, completely disappear. Interestingly, the successful cows, presumably the more dominant animals, performed essentially the same before and after the change.

Figure 1. Fresh cow performance on a Midwestern dairy following a reduction in stocking density, and an increase in bunk space to 30” in the pre-fresh period and 28” in the post-fresh period.



Slide courtesy of Drs. Meagher, Nordlund, and LeCount.

The vast majority of our Northeast facilities are not designed to meet all of these recommendations. Leaner cows, and the controlled energy dry cow

approach, will help to reduce fat mobilization at freshening and the corresponding rise in health disorders. Of course, the transition guidelines should be considered as facilities are updated. Until then, we can often make adjustments to the facilities themselves or the way they are managed to come much closer to the guidelines. For example, cows are often moved to the prefresh group to receive a different ration. Usually the size of the prefresh pen is fixed, and it can easily become over-crowded if animals are only moved via due date. A “one group” dry/prefresh ration can be fed which can allow for cows to stay in the dry far group for a longer time period, alleviating over-crowding in the prefresh pen. Hopefully the dry far pen is adequately sized in this situation. Another example of proactive management is to monitor upcoming freshening numbers. Herd managers and consultants should be watching for slugs of freshenings that will be occurring, and devising approaches to minimize over-crowding when they do occur.

COW COMFORT

It takes more energy for a cow to stand than to lie down – energy that could have been used for milk. Additionally, standing cows ruminate less than comfortably lying cows, potentially reducing ruminal pH and ruminal digestive efficiencies. Finally, standing increases laminitis and its resultant lameness. This is particularly true in transition cows, where hormones associated with parturition loosen not only pelvic ligaments, allowing for calving, but also ligaments that support the bones within the hoof (Tarlton et al., 2002). Increased standing time during this period of increased ligament laxity increases the prevalence of sole ulcers and lameness. Lamé cows, of course, produce less milk and components than cows with healthy feet, all of which will be more completely addressed by Dr. Shearer.

Many Northeast facilities are older and were constructed either with a greater concern for hygiene than comfort, or cow comfort simply wasn't addressed as much then as it is today. The situation was made worse by the relatively low use of sand in these stalls. Producers have worked to address these problems by either the construction of newer, more cow-friendly facilities, or by renovations of existing facilities. Some examples of renovations include extending the length of the outer row of stalls by moving the curtains closer to the edge of the eve, and thus increasing lunging room; downgrading the brisket board to a subtle brisket locator, moved ahead in the stall to allow for additional lying space; increasing neck rail height; removing horizontal obstructions to lunge space, and increasing the softness and conformity of the stall surface. Although this traditionally has been done with sand, there are a number of producers that are successfully using separated post-digested solids.

Heat Stress Relief

The summer of 2010 was a grim reminder that we can have plenty of heat stress in the Northeast. Dr. Bailey will be covering this topic, but I wanted to include a few points that are very relevant to a lot of NE facilities. Water consumption can more than double during the summer as compared to the winter. Florida research indicates that, if space is available, cows may consume up to 60% of their daily water consumption following milking. Many of our barns have inadequate water space, particularly during the hot weather. The upshot here is to provide additional water space upon exiting from the parlor, ideally enough so that all cows can easily get a drink as they return to their pens. Additionally, someone on the dairy should be given the task of cleaning and maintaining fans and sprinkling systems.

CONSISTENT DAIRY ENVIRONMENT

Dairy consistency starts with upper management. The importance of consistency to the cow should be instilled into all dairy employees, and it needs to be a central theme as they perform their daily routines. This is particularly true with individuals feeding, milking, bedding, moving and working with the cows.

SUMMARY

Yield of milk components is primarily driven by production. Evaluate your dairy's performance in delivering quality forages, cow comfort, the transition arena, and a consistent environment, and look for practices that can be economically improved.