ARIZONA AND NEW MEXICO
DAIRY NEWSLETTER

COOPERATIVE EXTENSION
The University of Arizona
New Mexico State University

MARCH 2005

THIS MONTH'S ARTICLE:

What is Acceptable Variation in the Nutrition Program and How Can It Be Managed?

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(Reprinted from the 20th Annual Southwest Nutrition & Management Conference Proceedings, February 24-25, 2005, Tempe, Arizona)

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The following videos are available for checkout from the New Mexico State University. To obtain a video, call Kathy Bustos at (505) 646-3226 or email kbustos@nmsu.edu. The video will be sent in the mail pending availability. There is only one copy of each video available, so we request that videos be returned within two weeks. Note that several of the videos contain an English and Spanish version.

1. *The Milking School*. Utah State University. Spanish and English. 1998. 30 minutes
2. F*itting and Showing Your Dairy Animal...A Winning Experience*. Department of Dairy Science, University of Wisconsin. 1996. 20 minutes
3. *Proper Milking Procedure*. University of Florida. Spanish and English. 1988. 12 minutes
4. *Milking Machine Maintenance*. University of Florida. Spanish and English. 1988. 16 minutes
5. *The Basics of Vacuum and Milking Systems*. DHIA Services. 1991. 53 minutes
6. *Understanding Dairy Cattle Behavior to Improve Handling and Production*. Livestock Conservation Institute. 1992. 23 minutes
7. *Managing Milking/Ordenar Lecheria*. Hoard's Dairyman. Spanish and English. 1999. 33 minutes
8. *Get Milk? Joining A Dairy Crew*. University of New Hampshire. 1999. 45 minutes
9. *What's the Best Milking Routine?* Dairy Management Institute. 1999. 60 minutes

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Stone, 2005. Proc. Southwest Nutr. Conf.: 1-10.

What is Acceptable Variation in the Nutrition Program and How Can It Be Managed?

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Summary

Ideally, groups of cows would consume exactly the diet and nutrients that were formulated for them. That level of accuracy never happens, however. One of our responsibilities as nutritional consultants is to formulate diets that reduce potential variability, and to provide guidance on the dairy to further limit variation. Benefits in production and cow health should be the reward that will be realized over time.

Introduction

Variation happens. Too much is definitely bad, leading to fluctuations in production (**Figure 1**) and spikes in health disorders (**Table 1**). Both dairies shown in Figure 1 milk around 600 cows. Herd A has much more consistent daily production than Herd B, with production usually varying by less than a pound. A BST production cycle is evident in Herd B, along with several 3-4 pound daily production swings. Notice how the DAs are grouped by date in Figure 2. Errors in load preparation are a prime consideration when problems like this occur. Ketosis, rumen acidosis and laminitis, and probably even hemorrhagic bowel syndrome can occur from excessive variation in the consumed ration.

Don't get complacent if the daily pounds shipped varies little in some of your large herds (greater than a few thousand cows). Herd production variation is lessened in larger herds due simply to the greater cow numbers. Dairies, especially larger ones, should also be evaluating production consistency in groups of cattle.

This paper will present areas in the nutrition and feeding program that can lead to excessive ration variation, suggest what degree of variation is acceptable, and describe ways to minimize variation. Potential causes of variation from the feeds, ration formulation, the feeder, and the cows will be discussed.

Managing Ration Variability Through Feed Analyses, Selection, and Mixes

As nutritional consultants, we want to provide feeding recommendations that have a high probability of supporting a desired level of milk production. Accurate intakes are part of the equation, and will be discussed shortly. The first step in reducing ration variability is to know the composition of the ration ingredients; this is the main reason that forages are analyzed. Tabular values are often used in ration formulation for concentrate feeds. This is completely acceptable, as long as the nutritionist is confident that the tabular values accurately describe the feeds. All feedstuffs are variable, some, such as distillers grains, bakery by-products, animal proteins and fats, are typically more variable than others (e.g. soybean and canola meals, dry corn) (St-Pierre, 2001; NRC, 2001). Ration variation is reduced, and milk production increased, when inherently more consistent ingredients

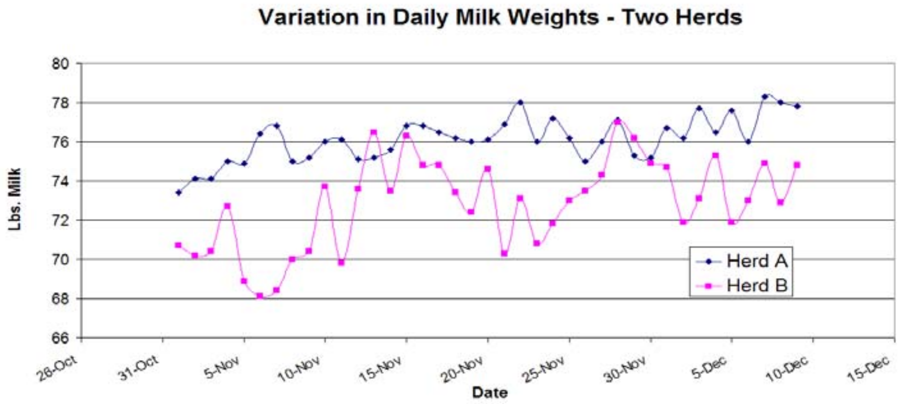

Figure 1. Daily average milk production from two dairies. There is much more daily variation evident in Herd B than in Herd A. A fourteen day BST cycle is also evident in Herd B.

Table 1. The occurrence of displaced abomasum's in a New York dairy, August 2003[1].

ID	Lact #	DIM @ DA	Event	Date of DA	Remark
2699	2	24	DA	8-4-03	Stitch
2683	2	10	DA	8-4-03	Surgery
2682	2	8	DA	8-4-03	Surgery
2293	2	355	DA	8-5-03	RDASurg
2121	3	210	DA	8-14-03	RDASurg
2364	3	38	DA	8-21-03	Rolled
2694	2	16	DA	8-25-03	Oper
2753	2	18	DA	8-25-03	Stitch
2364	3	42	DA	8-25-03	Stitch

[1]Dairy Comp305 command used to generate this report was Events ID Lact DIM\BIS.

Notice especially that the DAs are grouped by date. It may also be helpful to realize that most DAs occurred later than usual, with two in mid to late lactation cows, and that all DAs occurred in second and greater lactation cows.

are fed. Ration variation is further reduced by designing a ration with an increased number of feedstuffs, and by purchasing feed mixes from a feed manufacturer with a quality control system in place (**Table 2**).

St-Pierre (2001) provides an example of how these steps can reduce ration variability, using CP as an example. The variance contributed by a given feedstuff is the product of the measured variance in a nutrient of a given feedstuff times the square of the amount of the feedstuff fed. In the provided example (**Table 2**), using forage analyses compared to forage CP tabular values reduced the ration's CP variance score from 3606 to 723; this was due to a reduction in the forage's CP variance contribution from 3190 to 307. The ration was reformulated to further reduce the variance in CP, bringing it down to only 257. The decreased variance resulted from a change in the forage allocation (the alfalfa silage was reduced in half, corn silage increased and some hay was added), and the feeding of a greater number of more consistent concentrates. Grain mixes reduce ration variability in a nutrient via three mechanisms: a greater number of ingredients can be included; more consistent feeds may be fed; and the manufacturer can have quality control procedures in place. It is important to realize that doubling the amount of a feedstuff quadruples its contribution to the variance of the ration, as indicated by the following formula (St-Pierre, 2001):

$VAR(aX) = a^2 VAR(X)$, where "a" is the amount of an ingredient fed, and "X" is the variance of the nutrient in the feedstuff.

St-Pierre (2001) has estimated that the combined approach of forage analyses, consistent ingredients, and quality feed mixes resulted in $.27 more milk income per cow per day, in cows producing only approximately 60 lbs. of milk. Much higher returns are likely at higher levels of production. Additionally, rations can be balanced closer to an animal's requirements when these concepts are implemented. This has always been important for cost reasons; it becomes even more critical as nutrient excretion becomes more closely monitored.

Corn silage is typically more consistent than haylage in DM, fiber levels, and fermentation profiles. Ration consistency can be improved by increasing the amount of corn silage in the diet. A typical northeast dairy ration will often have approximately 60% of the forage base as corn silage, although this percentage can be considerably higher. Of course, it becomes even more critical that this ingredient is consistent and its properties known as it becomes a greater component of the diet.

Table 2. Expected mean crude protein level and variance in either a simple TMR without forage analyses, a simple TMR with forage analyses, and a TMR with forage analyses and a multi-component feed prepared by a feed manufacturer[1].

	Rations formulated with concentrate tabular values and								
	tabular forage values			forage analyses			multi-component feed and forage analyses		
Ration Ingredient	Lbs DM	Lbs CP	Variance	Lbs DM	Lbs CP	Variance	Lbs DM	Lbs CP	Variance
Alfalfa silage	16.8	3.36	2964	16.8	3.36	282	8.1	1.6	64.8
Corn silage	11.2	1.00	226	11.2	1.00	25	16.1	1.4	46.6
Alfalfa hay							2.7	0.5	6.0
Corn meal	12.9	1.26	67	12.9	1.26	67	6.5	0.6	16.7
Wheat midds							4.0	0.8	19.2
Ground barley							3.2	0.4	8.0
DDG	6.8	2.06	324	6.8	2.06	324	3.0	0.9	63.0
CGF							3.0	0.7	15.3
SBM-48	3.6	1.95	25	3.6	1.95	25	2.7	1.4	13.1
Soyhulls							1.0	0.1	1.0
Canola meal							1.0	0.4	2.5
Mins/vits	.9	0	0	.9[2]	0	0	.9[2]	0	0
Total	52.2	9.63	3606	52.2	9.63	723	52.7	9.27	257

[1]St-Pierre, 2002
[2]Estimated.

Farms purchasing commodities should evaluate each load prior to or immediately following unloading for any signs of mold, contaminants, and unanticipated color, temperature, odor, and DM. Areas of concern should be addressed and the load potentially rejected.

The Critical First Step in Minimizing Ration Variability (Yawn…): Collecting a Sample for Analysis

It sounds boring and extremely basic, but collecting the sample for analysis is the first critical step in minimizing nutritional variation. The size of most bunker silos necessitates that the dairy, not the nutritional consultant, must collect forage samples for laboratory analyses. Feeders or sample collectors need to be properly trained in the appropriate manner of sample collection. They need to realize that the sample they collect needs to accurately represent what is going to be fed.

The process of collecting a sample of silage for analysis is simple. However, the sampler must remember that the objective is to collect a sample that accurately represents the silage being fed. If silage along the top and sides of the silo is fed separately, then it should be sampled separately. It would be entirely inappropriate to collect grab samples as high as one could reach, and then not bother to sample the upper half of the silo. Likewise, if the sampler was using a loader to vertically scrape the silage to collect the sample, and a large amount of silage from the upper region collapsed into the collection pile, then the sample would most likely contain a higher proportion of silage from the upper regions of the silo. Variation within a silo must be considered during the collection of a sample for DM or a more complete analysis. Due to the manner in which bunker silos are typically filled, one would expect much more variation from top to bottom than from side to side. Obviously, this would not be the case if it was not filled in even layers across the width of the silo, or if water was entering one side of the silo. A representative pile of feed can be obtained with a backhoe or silage defacer by digging a trench near the midsection of the silo, or by scraping across the entire face with the loader bucket. A loader bucket does not work as well in digging a vertical "trench" in one area of the silo because it is very difficult to remove a uniform depth across the height of the silo. The large pile of collected feed now needs to be mixed. Although this could be done by hand with a silage fork, the mixer wagon is much easier, and is better at breaking up clumps of haylage. However, many mixer wagons will contain a few hundred pounds of residual feed. The contaminating feed can be diluted by adding a loader bucket of the forage to be tested, briefly mixing, and then discharging. The collected forage can now be added to the mixer wagon, mixed for a few minutes, and then discharged. The pile should then be sub sampled throughout with a silage fork or by using a two-handed scooping motion. The sub sample is remixed by hand or with the silage fork, carefully inverting the pile as it is mixed, spreading the sample across the dry bunker floor so that it is about 2-4" deep. Finally, a single-handed scooping motion is used to collect feed from throughout this pile for the sample that will be submitted for DM or laboratory analysis. Care should be taken to grab all silage particles within the area "scooped" with your hand, otherwise fines can be left behind.

The recommended frequency of testing for DM and laboratory analysis really varies with the dairy. As a minimum, ensiled forages should be tested weekly for DM and monthly with a more complete laboratory analysis. More frequent analyses should be run if DM and fiber results vary by more than five percent (e.g. 30% to 31.5%). Many dairies that premix their forages prior to feeding will run daily DM.

When is Reformulation Necessary?

Despite everyone's best efforts, there will be some variation in sample collection and laboratory procedures. To get some idea of the size of this variation, validation data from a bunker silo survey (Stone, 2003 and 2004) was used to estimate the expected sampling deviation, while two commercial laboratories provided the variability typically seen with their lab standards. Means and standard deviations for DM and NDF in 18 alfalfa haylage and corn silage samples (six from the upper, middle, and lower thirds of each bunker silo) were used to estimate the variation from sample collection. The laboratory standards were the same dried, ground forages used over an extended time in each laboratory (**Table 3**).

Table 3. Variation from sampling and laboratory procedures.

	DM		NDF[1]	
Sampling variation[2]	Mean	SD	Mean	SD
Haylage – upper third	29.8	.6	44	.9
Haylage – middle third	30.6	.2	41.8	1.0
Haylage – lower third	31.9	.6	37	.9
Corn silage – upper third	31.2	.2	38.8	2.0
Corn silage – middle third	31.5	.4	36.2	1.6
Corn silage – lower third	33.4	.3	34.1	1.5
Laboratory variation[3]	Laboratory #1		Laboratory #2	
Alfalfa hay	Mean	SD	Mean	SD
CP, % DM	18.8	.22	21.5	.22
NDF, % DM	38.2	1.2	40.7	.6
NDFD 48 h, % DM	41.6	4.3[4]	46.4	1.5[4]

[1]Laboratory analyses were performed by laboratory #1.
[2]Six samples (36 total) were collected from silage that had been obtained from the upper, middle, and lower thirds of a haylage and corn silage bunker silo. These results were used to estimate the variation expected from sampling.
[3]Two commercial laboratories provided variation seen in their lab standards.
[4]The SD for NDFD was estimated to be the sum of the standard deviations from NDFD and NDF measurements.

Dry matter results were the most consistent, with standard deviations averaging less than half a point. These consistent results were obtained when samples 2-3 l in size were submitted to a commercial laboratory for analysis, and the entire sample dried. Although DM results obtained from both Koster testers and microwave ovens have been consistent with a laboratory standard (Oetzel et al., 1993), the relatively small sample size and the quality of the scales used on most farms would be expected to increase the SD of on-farm measurements.

Figure 3 contains daily DM from two haylage and one corn silage bunker silo. All forages were premixed in the mixer wagon and the sample for analysis obtained from the discharged feed. On-farm DM measurements were obtained with a Koster tester. Laboratory DM measurements (larger solid shapes) were also included. First of all, there is more DM variability in the haylages than in corn silage. This result is consistent with our bunker silo survey, where haylage DM varied on average by approximately 20 percent between different sections of the silo, while corn silage varied only by about 10%. Laboratory and on-farm DM measurements for corn silage were essentially identical; they were very close for all measurements with the third cutting with the exception of the October 12 measurement. Laboratory DM measurements were consistently lower in the first cutting for the first four measurements, while the Dec. 17 result was inexplicably higher than the on-farm number. Ideally, split samples would be taken and measured on-farm and sent to the lab. These lab samples were taken from the premixed silage pile by another farm employee, and were not split. If a systematic bias was found between laboratory and on-farm DM measurements, as what appears to be happening with the first cutting, then the farm derived DM could be proportionately adjusted.

When should DM be adjusted? First of all, a change in forage DM can really start to change the ration, and the amount of feed delivered to the cow. For example, in a 55% forage diet with a 54.5 pound intake, each percentage point decrease in forage DM results in .9 pounds less feed delivered to the cow. Soon cows are out of feed ("the cows ate really well today"), or they have really backed off on intakes (not really, just drier forages), and they are consuming a diet very different than what was intended. Thus, DM should be adjusted with the following thoughts in mind:

- Does the new DM result make sense (lots of rain, cows have been out of feed earlier, loader buckets weigh more or less than usual, etc.)? If it does, then make the change.
- If the change varies by more than 3 points it should be rechecked that day and at least for the next few days.
- Change DM if a new trend has been established (same result ± 1 percentage point for 3 days) and the new result differs by more than one percentage point from the current DM.
- Many dairies test DM daily so that the procedure is part of the daily routine, and then follow a decision process similar to that described in determining if the feeding DM should be adjusted.

Measurements for NDF varied more, particularly for corn silage. The laboratory NDF SD also varied. Considering sampling and laboratory deviations, changes in NDF are likely to be real and have a significant effect on animal performance when the new result differs by more than approximately 1.5 percentage points in quality forage. Laboratory variation surrounding CP measurements is trivial, with the difference likely to be real if the result varied by about .5 percentage points in good alfalfa hay.

The variation in NDF digestibility varied considerably between labs, with laboratory #1 having a SD of 4.3, and laboratory #2 only 1.5. Using the 55% forage diet mentioned above, a 4 point decrease in 48 h forage NDF digestibility (e.g. 46 to 42%) was predicted by the CNCPS to decrease ME and MP allowable milk by 1.3 and 2 pounds, respectively. One point to take home from this is the importance of knowing the degree of variability surrounding a measurement made by your lab.

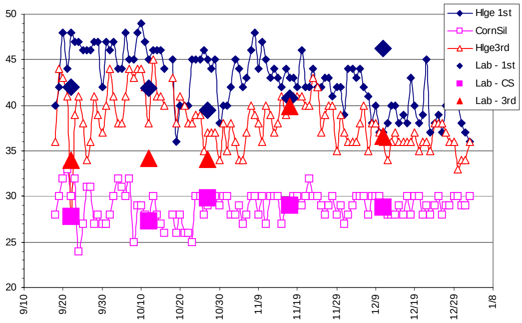

Figure 3. Dry matters of haylage (1st cutting), corn silage, and haylage (3rd cutting) determined daily on a dairy via a Koster tester, or in the laboratory (large shapes).

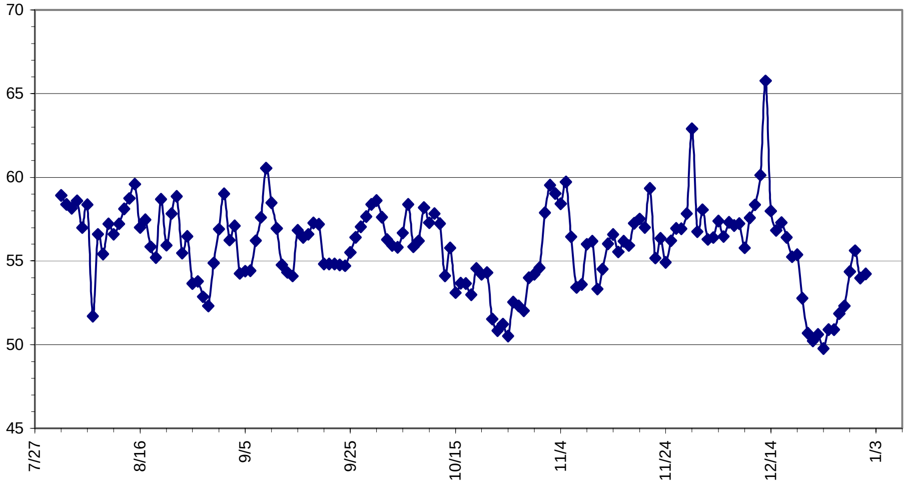

Figure 4. Daily DMI (pounds) in a group of 80 Holsteins.

Figure 4 contains daily DMI for a group of 80 Holstein cattle. Forage DM were determined weekly before 9-20, and daily thereafter. All forage was briefly premixed in the mixer wagon, unloaded, and then used in load preparation. Some of the apparent spikes in DMI (e.g. 11-21, 11-29, and 12-13) occur on approximate increments of seven, and are probably related to weekly animal movements. The decreases in intakes occurring around 10-20 and 12-20 were correlated with an increase in new corn silage and an outbreak of winter dysentery, respectively. Actual intakes can and should be within five percent of predicted intakes (based on experiences with CNCPS), or some on-farm investigating and possibly a ration adjustment may be needed.

The Feeder – An Integral Part of Minimizing Ration Variability

Obviously, the performance of the feeder is an integral component in the accurate preparation of a load of feed. The nutritional consultant, along with the dairy owner or manager, needs to closely work with this individual. The feeder must understand how many seemingly small things can have a huge influence on animal performance. Specifically, feeders should have an understanding of the following areas:

- The importance of their performance to the success of the dairy.
- The importance of proper sampling for DM and laboratory analysis.
- Dry matter – what it is, why it is important, and how it should be calculated. Bucholtz (1999) reported that most feeders attending MSU Feeder Schools were uncomfortable with arithmetic, and had a poor understanding of the DM concept.
- Variability in bunker silos, and how this influences silage collection for load preparation. Ideally silage is premixed or removed with a face shaver to minimize variation across the bunker.
- An accurately prepared load of feed is important; let’s shoot for a 1% deviation from expected amounts of ingredients.
- Face management – use methods to keep the silage face straight, with minimal disturbance of packed silage, to minimize oxygen infiltration of the silage. Keep the amount of loose feed left at the end of feeding to a minimum.

- Spoiled silage – poor quality silage that may be located along the top and sides of the silo should be removed so that it does not impair intakes, animal performance, or health.
- The potential effect on animal performance of layers of feed within the bunker that are of poor quality or went through a bad fermentation. For example, haylage that underwent a clostridial fermentation can result in an increase in ketosis and indigestion, and a decrease in production (Lingaas and Tveit, 1992).
- Proper ingredient sequencing in load preparation and appropriate mix time. Guidelines should be established for when the mixer wagon should be started, the length of time and speed that it should run, and minimum and maximum load sizes. Feeders need to be aware that mixer wagons can rapidly reduce ration particle size (Heinrichs et al., 1999).
- Guidelines should be in place for when specific groups should be fed, the desired amount of orts, and the procedure used to adjust for changing DMI.
- Mixer wagon maintenance.

Being a feeder is a difficult, highly important position on a large dairy. Effort should be made to make it easier for a feeder to achieve the results desired of them. Ingredient mixes should be purchased or made on the dairy. This greatly minimizes the number of separate ingredients that must be added to each load, and increases the feeder's speed and accuracy. Load sheets should be printed in a font size that is easy to see, and with multiple forage DM increments and animal numbers. Scale displays should be easily visible from the loading tractor, and should have a remote that allows the scale to be zeroed after the addition of each ingredient.

We (Stone et al., 2003) evaluated variability within bunker silos and presented the results at this conference last year. The upshot is that there is a lot of variation within bunker silos, with haylage bunker silos varying more than corn silage bunkers. For example, dry matters varied by 20% and 10% in haylage and corn silage bunkers, respectively, between the wettest and driest upper, middle, and lower thirds of the silo. This could result in considerable variation in the load of feed if the feeder obtained the forage from a region rather than from the entire height or face of the silo. Premixing of forages and silage defacers can really help to minimize this problem. Some feeding practices, such as splitting loads of feed between groups and thus requiring that multiple loads of feed are fed to each group, also lessen the risk of variation from load preparation.

Several of the commercially available computerized feed management software systems (EZfeedÔ, www.dhiprovo.com; Feed SupervisorÒ, www.feedsupervisor.com; Feed WatchÔ, www.vas.com; TMR TrackerÒ, www.digi-star.com) perform all of these functions, and more (Bucholtz, 2002). The systems can improve a feeder's accuracy and efficiency both through making their responsibilities easier to accomplish, and through making the feeder more responsible since (s)he can now be monitored. Dry matters and rations can be updated by the feeder in the bunk, or by someone else at the dairy office. The change in ingredient dry matter is updated in all rations. The systems typically come with a highly visible scale display. The systems can also record the accuracy with which each ingredient was added to a load, the time between ingredients, the time needed to prepare the entire load, and the total mixing time. Providing dry matters and cow numbers are correct, and that feed isn't moved between groups when one becomes low on feed, an accurate assessment of dry matter intake can be obtained. Additionally, the software systems help in inventory management and to reduce shrink.

We are all aware that dairy cows like consistency. The feeding program can be made more consistent, and generally more successful, by feeding cows on a set schedule (e.g. when they are being milked). This can pose a problem if there is still a large amount of feed remaining. One possible solution is to try to have a fairly large ort (e.g. 5 – 8%), and then include orts as a ration ingredient and re-feed it to the cows. I first heard of this approach from Dr. Don Niles of Casco, Wisconsin. The ort should be evaluated to ensure that it is very similar to the TMR; steps should be taken to minimize sorting if it isn't. Orts from each group are discarded or fed to a non-lactating group on a regular basis, generally twice a week. Orts are discarded on a daily basis, and the amount reduced, if daily spoilage is an issue. Feed preservatives, such as inoculating with *Lactobacillus buchneri* at ensiling or adding a propionate based preservative at feeding, can also improve the success of this approach.

Cow and Bunk Management Effects Influencing the Consumed Ration

Cow sorting can lead to multiple "rations" being consumed by animals fed the same ration. Signs of sorting include "holes" eaten into the offered TMR that contain more forage and less grain than the remaining feed; a ration that looks and analyzes differently throughout the day; and variation in manure pile consistency, particle size, and grain amount. The Penn State particle separator (Lammers et al., 1996) is a useful tool to evaluate the uniformity of ration consumption throughout the day. However, sorting may still be occurring in individual cows even if measurements from the orts are similar to the fed ration.

Manure evaluation at this time is quite subjective (Hall, 2002). Manure can be screened with any device containing a screen size that is approximately 1/16". I use a wooden box approximately 16" (40 cm) square, 3" (7.6 cm) deep, with 1/16" (.16 cm) wire screening stapled to the bottom. Approximately 1.5 cups of manure can be collected from multiple representative cow piles throughout a group, placed on the screen, and then gently washed with a spray of water. Results should be quite consistent across manure piles; if not, sorting may be an issue.

Sorting of the ration by the cow can result in the consumption of variable rations. Typically long particles are selected against, resulting in some meals having a greater grain content than intended (Leonardi et al., 2000 and 2001; Martin, 2000). It is logical that sorting could easily result in subacute ruminal acidosis, and may also increase the risk of hemorrhagic bowel syndrome.

Sorting can be minimized by avoiding excessive amounts of long material in the TMR. Added hay or straw should not be longer than 1 – 2" (Shaver, 2002). Wetter rations help the various feeds to stick together, thus making it more difficult to sort. Water, or wet feeds such as wet brewers grain or whey, can be added to reduce ration DM to less than ~ 50%, or to a level that acts to reduce the sorting problem (Shaver, 2002). Palatable feeds are less likely to be sorted than unpalatable feeds (Leonardi and Armentano, 2000). The use of TMR preservatives (e.g. propionic and/or acetic acid) and *Lactobacillus buchneri* inoculation of forages at ensiling can improve the aerobic stability of the TMR (Kung et al., 2003). And finally, the addition of molasses has been reported to reduce sorting, particularly when added to the TMR (greatest reduction) or forage (Shaver, 2002).

Bunks should be managed so that adequate feed is available along the entire length of the bunk at all times. Feed needs to be pushed up frequently enough so that this is achieved; usually 8-10 times per day is necessary.

Summary

Many areas influence the consumed ration, including feed selection, diet formulation, the attitude and ability of the feeder and the equipment available for the feeder's use, and the cow. Decide on the degree of variation that you and your clients are willing to accept, and implement management procedures to meet your consistency goals. Improvements in production consistency and cow health are two benefits that should result from these efforts.

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HIGH COW REPORT
FEBRUARY 2005

MILK

Arizona Owner	Barn#	Age	Milk	New Mexico Owner	Barn #	Age	Milk
* Treger Holsteins, Inc.	6346	05-05	42,860	* Tallmon Dairy	405	05-05	38,760
* Stotz Dairy	15814	04-06	40,260	* Providence Dairy	4971	04-01	37,250
* Mike Pylman	5342	06-00	38,970	* Hide Away Dairy	4127	06-06	36,730
* Treger Holsteins, Inc.	690	04-06	38,050	McCatharn Dairy	1212	07-06	36,226
* Triple G Dairy Inc	3266	06-05	36,970	S.A.S. Dairy	75	04-02	35,818
* Dairyland Milk Company	9483	04-07	35,810	* Providence Dairy	8254	-----	35,670
* Withrow Dairy	6821	02-08	35,240	S.A.S. Dairy	4621	05-07	35,453
* Dairyland Milk Company	7801	04-11	35,020	* Providence Dairy	8572	04-08	35,430
* Triple G Dairy Inc	698	06-06	35,010	* Do Rene Dairy	3078	07-06	34,650
* Triple G Dairy Inc	3517	05-07	34,860	* Do Rene Dairy	800	06-06	34,590

FAT

* Mike Pylman	7077	04-07	1,536	* Hide Away Dairy	3937	06-06	1,440
* Stotz Dairy	19467	06-10	1,523	* Tallmon Dairy	405	05-05	1,281
* Mike Pylman	1089	06-06	1,500	* New Direction Dairy	740	-----	1,271
* Treger Holsteins, Inc.	6346	05-05	1,473	* Butterfield Dairy	711	04-01	1,213
* Mike Pylman	1324	07-11	1,446	* Hide Away Dairy	4256	06-06	1,190
* Mike Pylman	5912	05-02	1,421	* New Direction Dairy	253	-----	1,183
* Stotz Dairy	19555	06-10	1,385	* Hide Away Dairy	4993	05-06	1,182
* Mike Pylman	7101	04-06	1,379	* Do Rene Dairy	4385	08-06	1,178
* Triple G Dairy Inc	3266	06-05	1,365	Caballo Dairy	4167	07-03	1,177
* Stotz Dairy	15814	04-06	1,365	* Hide Away Dairy	2931	07-06	1,176
				* Hide Away Dairy	4824	05-06	1,176

PROTEIN

* Treger Holsteins, Inc.	6346	05-05	1,220	* Tallmon Dairy	405	05-05	1,236
* Stotz Dairy	15814	04-06	1,145	* Providence Dairy	4971	04-01	1,146
* Triple G Dairy Inc	3266	06-05	1,111	S.A.S. Dairy	75	04-02	1,110
* Treger Holsteins, Inc.	690	04-06	1,085	* Hide Away Dairy	4127	06-06	1,083
* Mike Pylman	5963	05-02	1,068	* New Direction Dairy	740	-----	1,065
* Triple G Dairy Inc	3517	05-07	1,062	S.A.S. Dairy	4621	05-07	1,059
* Triple G Dairy Inc	698	06-06	1,051	* Providence Dairy	2985	07-09	1,058
* Mike Pylman	5922	05-01	1,043	* Providence Dairy	936	02-11	1,055
* Triple G Dairy Inc	3873	03-04	1,038	* Providence Dairy	9297	04-02	1,037
* Mike Pylman	5912	05-02	1,038	* Providence Dairy	832	03-00	1,027

*all or part of lactation is 3X or 4X milking

ARIZONA - TOP 50% FOR F.C.M.[b]
FEBRUARY 2005

OWNERS NAME	Number of Cows	MILK	FAT	3.5 FCM	CI
* Stotz Dairy West	2,125	26,196	951	26,743	15.5
* Triple G Dairy, Inc.	4,560	25,385	951	26,392	13.8
* Joharra Dairy	1,047	25,389	902	25,600	14.2
* Red River Dairy	4,570	24,389	874	24,713	13.6
* Mike Pylman	4,288	23,830	859	24,228	14.6
* Del Rio Holsteins	1,107	23,708	851	24,046	13.0
* Stotz Dairy East	1,117	23,739	838	23,849	16.0
* Arizona Dairy Company	5,914	23,439	822	23,460	14.0
* Shamrock Farm	8,484	23,378	799	23,060	13.6
* Zimmerman Dairy	1,137	22,602	817	23,017	15.2
* Danzeisen Dairy, Inc.	1,344	22,319	810	22,781	15.5
* DC Dairy, LLC	1,049	22,251	806	22,687	13.6
* Butler Dairy	628	23,329	771	22,585	14.5
* Dairyland Milk Co.	3,116	22,624	788	22,556	14.1
* Withrow Dairy	5,130	23,265	748	22,185	13.4
* Goldman Dairy	2,209	21,929	777	22,077	14.0
* Saddle Mountain Dairy	2,828	22,954	747	22,034	14.0
Lunts Dairy	576	21,506	784	22,008	13.5
* RG Dairy, LLC	1,342	21,803	771	21,926	13.9
Paul Rovey Dairy	272	21,404	774	21,802	13.7
* Parker Dairy	4,218	21,318	773	21,748	15.0
* Hillcrest Dairy	2,200	21,688	752	21,568	14.4
* Dutch View Dairy	1,589	21,159	743	21,193	13.9
* Jerry Ethington	637	20,342	722	20,500	14.5
* Treger Holsteins, Inc.	1,922	19,261	703	19,724	14.8

NEW MEXICO - TOP 50% FOR F.C.M.[b]
FEBUARY 2005

OWNERS NAME	Number of Cows	MILK	FAT	3.5 FCM	CI
* Pareo Dairy #1	1,470	26,467	949	26,833	14.0
* Tallmon Dairy	488	25,809	885	25,511	14.9
Ken Miller	400	24,998	865	24,836	13.9
* Pareo Dairy #2	2,948	24,009	888	24,781	13.4
Providence Dairy	2,863	26,400	824	24,777	13.5
* Macatharn	1,004	24,289	847	24,238	13.6
* New Direction Dairy 2	1,907	23,121	852	23,814	14.6
* Do-Rene	2,360	23,971	797	23,289	13.8
Milagro	3,288	23,229	794	22,920	13.4
Vaz Dairy	1,716	22,740	805	22,887	14.2
* Goff Dairy 1	4,210	22,353	790	22,476	14.7
Baca Linda Dairy	1,241	22,476	781	22,383	13.4
Butterfield Dairy	1,666	22,057	783	22,235	13.8

* all or part of lactation is 3X or 4X milking

[b] average milk and fat figure may be different from monthly herd summary; figures used are last day/month

ARIZONA AND NEW MEXICO HERD IMPROVEMENT SUMMARY FOR OFFICIAL HERDS TESTED FEBUARY 2005

		ARIZONA	NEW MEXICO
1.	Number of Herds	49	23
2.	Total Cows in Herd	76,606	33,563
3.	Average Herd Size	1,563	1,459
4.	Percent in Milk	88	87
5.	Average Days in Milk	195	201
6.	Average Milk – All Cows Per Day	63.2	61.7
7.	Average Percent Fat – All Cows	3.6	3.5
8.	Total Cows in Milk	75,740	29,189
9.	Average Daily Milk for Milking Cows	71.1	70.5
10.	Average Days in Milk 1st Breeding	84	73
11.	Average Days Open	154	145
12.	Average Calving Interval	13.9	14.0
13.	Percent Somatic Cell – Low	87	79
14.	Percent Somatic Cell – Medium	8	13
15.	Percent Somatic Cell – High	5	5
16.	Average Previous Days Dry	61	66
17.	Percent Cows Leaving Herd	30	34
		STATE AVERAGES	
	Milk	21,972	22,517
	Percent butterfat	3.63	3.53
	Percent protein	2.93	3.10
	Pounds butterfat	794	796
	Pounds protein	643	694

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