ARIZONA AND NEW MEXICO DAIRY NEWSLETTER

COOPERATIVE EXTENSION
The University of Arizona
New Mexico State University

MARCH, 2004

This month's article:

What's This? Minimizing the Variation Between Formulated and Consumed Rations

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Reprinted from the Southwest Nutrition and Management Conference Proceedings, February 26 & 27, 2004

New Mexico State University Extension Dairy Website: http://www/nmsu.edu/~dairy

The following videos are available for checkout from New Mexico State University. To obtain a video call Kathy Bustos, (505) 646-3326 or kbustos@nmsu.edu and 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 four of the videos contain an English and Spanish version.

1. The Milking School. Utah State University. Spanish and English. 30 minutes
2. Fitting and Showing Your Dairy Animal....A Winning Experience. Department of Dairy Science, University of Wisconsin. 20 minutes
3. Proper Milking Procedure. University of Florida. Spanish and English. 12 minutes
4. Milking Machine Maintenance. University of Florida. Spanish and English. 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
7. Managing Milking/Ordenar Lecheria. Spanish and English. 1999. 33 minutes
8. Get Milk! Joining A Dairy Crew. University of New Hampshire, 1999. 45 minutes

Need to Calculate Production Costs?

University of Wisconsin dairy farm management specialist, Gary Frank, has developed a Excel spreadsheet to calculate variable cost of production and total cost of production. To access the spreadsheet, go to http://www.wisc.edu/dairy-profit, click on Decision Making Tools, then go to costcwt.xls.

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What's This? Minimizing the Variation Between Formulated and Consumed Rations

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Abstract

Much progress has been made in the development of dairy nutrition models that characterize the cow, her environment, the feeds she is fed, and their interactions. However, that well-formulated diet also needs to be prepared and consumed, hopefully in a manner that allows these two potentially different entities to mirror each other. Variation between formulated and consumed diets can result from discrepancies caused by the feeds, the feeder, and the cow. Nutritionists can minimize feedstuff variation by having accurate concentrate and forage analyses, by using concentrates that are inherently more consistent, and by increasing the number of feeds in the ration. The degree of variability within bunker silos can be extreme. Feeders need to be aware of this, and should obtain representative loader buckets of forage when preparing a load of feed. Feeding programs should be simplified, and feeders monitored, to enhance accuracy. Feed mixer wagons need to be operated consistently and appropriately. Finally, cow sorting should be assessed and minimized.

Introduction

Nutritionists typically expend a lot of effort and time formulating rations for their clients. The same amount of nutritional expertise goes into the development of each of these rations, but their apparent success and consistency can vary tremendously from dairy to dairy (Figure 1). Although there are obviously a great number of farm management variables (stall comfort and hygiene, water availability, ventilation, parlor management, forage quality, etc.) that influence production, there are also many areas in feeding management that strongly influence the success of the formulated ration (Barmore, 2002). A problem in feeding management is highly suspect when there are spikes in dietary-related health problems, like displaced abomasums (Table 1). This paper will address the major factors I see increasing the amount of variation between formulated and consumed rations.

Feeding Management Variables That Reduce Ration Accuracy And Consistency

The three main areas that have the greatest potential for altering the formulated ration from the consumed ration are the feeds, the feeder, and the cows.

Feedstuff Variation

One of a nutritional consultant's responsibilities is to have an accurate analytical description of the feeds used in a dairy's ration. Tabular values are often used in ration formulation for concentrate feeds. This is completely acceptable, as long as one is confident that the tabular values accurately describe the feeds. Some concentrates are more variable than others (St-Pierre, 2001). Ration variation can be reduced by analyzing forages, by using feedstuffs that are more consistent, and by designing a ration with an increased number of feedstuffs (Table 2). Multiple feedstuffs reduce variation since the variance in the amount of a nutrient supplied by a given feedstuff increases by the square of the amount of the feedstuff fed. Rations can be balanced closer to an animal's requirements when these concepts are implemented (St-Pierre, 2001).

Feeders should evaluate commodity loads 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.

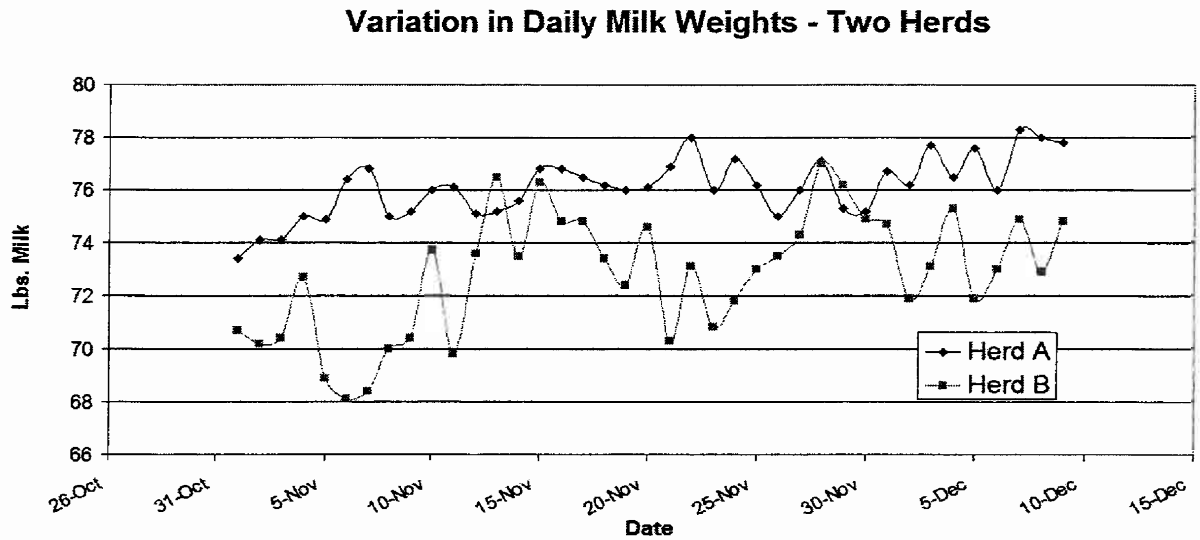

Figure 1. Daily average milk production from two dairies. There is much more daily variation evident in Herd B than in Herd A. A fourteen day BST cycle is also evident in Herd B.

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.

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.

Forages, and haylages in particular, have a large potential for variation. The degree of variation at a given dairy depends largely on its ability to manage their cropping and harvesting systems. One advantage that bunker silos have over upright silos and bags is that ensiled feed from a given load or field is spread over a larger area of the silo. Thus, changes in forage dry matter (DM) or chemical measurements occur more gradually than in other storage systems. However, variation can still occur across the height of a silo. To estimate this potential variation, eleven corn silage and nine haylage bunker silos from nine dairies located in central New York were evaluated (Stone et al., 2003). Samples were collected on six dairies with a backhoe, on two dairies with a loader bucket, and on one dairy with a face shaver. Sample collection was designed to reflect the feed that would be fed if a loader bucket of feed was obtained from a region (upper, middle, or lower) of the silo as compared to the entire height of the silo face. Silos above (n = 15) approximately twelve feet in height were divided into thirds for sampling, while those less (n = 4) than approximately twelve feet were split into halves. The vertical trench was dug to a depth of about 8 – 12". Feed removed from each section was thoroughly mixed and then subsampled to obtain a sample approximately 5-10% the size of the removed silage pile. This sample was then again thoroughly mixed and finally subsampled for analysis of DM, ADF, NDF, CP, lactate and VFA with wet chemical procedures (Dairy One, Ithaca, NY). The entire approximately 3 liter sample was ground for analytical procedures.

Two test silos (one alfalfa and one corn silage) were used to evaluate the consistency of the sampling and the laboratory procedures. The sampling procedure described above was duplicated once for each silage pile obtained from the upper, middle, and lower sections of the silos. These samples were then examined in triplicate for DM and NDF, and singly for ADF, CP, lactate, and VFA to compare the consistency of sampling and laboratory procedures. Generally, the results were very consistent (Figure 2). This indicates that the measured variation within silage regions was actually occurring.

Within each silo, deviations from the minimum analytical result for DM, ADF, NDF, CP, and VFA were determined. Maximum deviations within a given silo were determined by dividing the range by the minimum analyzed value. For example, a silo with measurements of 44.5, 41.2, and 36.6 would have a maximum deviation of 21.6%.

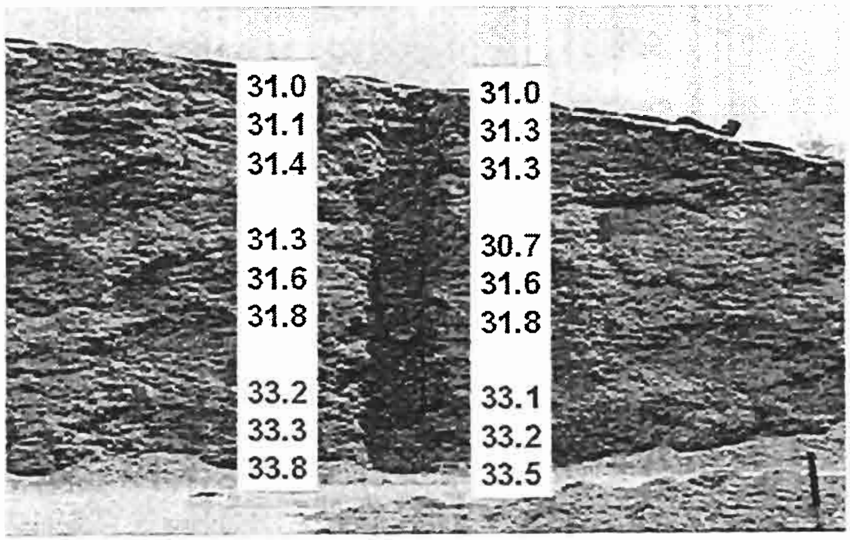

Figure 2. Method of sampling bunker silos to obtain consistent (DM) results.
A trench .2 - .3 m deep was dug into a corn silage silo with a backhoe. The silage was segregated into three piles obtained from the upper, middle, and lower thirds of the silo. These piles were mixed with a silage fork and then sub-sampled twice to form two smaller, approximately 30 lb. DM piles. These sub-piles were then further mixed and subsequently sampled twice for analysis. The two samples obtained from each region of the silo were tested in triplicate for DM. The results within and between samples for each region of the silo were very consistent, as the DM results indicate.

Haylage varied more than corn silage (Table 3), although there were examples of extreme variation, particularly in DM, in both crops. In some situations a feeder could be delivering an entirely different ration from one load of feed to the next if care was not taken in obtaining the forage from the silo. For example, a 54.5% forage ration can range from a 52.8 to a 56.4% forage diet if forage DM were properly obtained (from the entire height or face of the silo), and then the feeder fed by regions. The range could increase to 51 to 59% forage if the sample collected for DM analysis was obtained from one of the regions of the silo (as high as someone could reach, for example), and then the feeder also fed according to regions. Variation like this could result in groups of cows being completely out of feed one day, and having a large surplus the next. Digestive disturbances would be expected to increase with a fluctuating feeding program. Dairy feed personnel need to be aware of this variation, and of the difference it can make to the final ration delivered to the cow. Techniques to minimize forage variation, such as obtaining each bucket of feed from the height of the silo face or the premixing of forages obtained from across the entire face of the silo, should be part of feeding standard operating procedures on dairies. Some dairies have reduced ration variability by premixing each forage and running a DM prior to feeding. Silage face shavers can vastly improve bunker face management, and reduce ration variation by mixing forages from across the height of the silo.

Table 3. Deviations between different regions (upper, middle, and lower) in nine haylage and eleven corn silage bunker silos.

	DM	CP	ADF	NDF	NEL	Lactic	Acetic	Total VFA
Haylage results								
Smallest deviation, %	5.2	3.3	1.1	5.4	1.6	5.2	25	7
Largest deviation, %	44.7	52.1	20.0	24.8	20.0	646	163	287
Average deviation, %	21.0	17.6	10.7	14.7	9.9	112	72	69
Median deviation, %	19.4	9.5	9.9	14.4	9.3	57	50	38
Corn silage results								
Smallest deviation, %	1.3	2.5	2.3	.5	1.4	3.8	11.2	.1
Largest deviation, %	55.0	29.5	18.3	18.6	5.6	48.7	131	41.3
Average deviation, %	12.3	11.0	8.4	8.6	3.1	25.6	53.7	20.5
Median deviation, %	8.3	10.0	8.6	8.4	2.8	26.0	29.9	21.4

Variation within a silo must be considered during the collection of a sample for DM or a more complete analysis. The objective is to collect a sample that accurately represents the silage. 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 face shaver 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 "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 can be done by hand, 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 would then be mixed in the mixer wagon, discharged, subsampled, remixed by hand, and finally sampled using a scooping motion.

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%).

Dry matter results obtained from both Koster testers and microwave ovens have been consistent with a laboratory standard (Oetzel et al., 1993). However, the microwave method required much more time since the operator must remain at the oven during drying. The microwave method also required additional training as compared to the Koster tester. The Koster tester may be more reliable if it is used with a higher quality balance than the scale that typically accompanies the unit. The electronic moisture tester evaluated was comparable to the other on-farm methods for haylage DM determination but was not accurate for corn silage DM (Oetzel et al., 1993). The individual determining DM should know the relationship between DM measured on-farm and those generated by the laboratory by analysis of split samples of the same feedstuff. If a systematic bias is found, farm DM results can then be proportionally adjusted to correspond with laboratory derived values.

Feeder Responsibilities to Minimize Load Variation

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, they should have an understanding of the following areas:

- Dry matter – what it is, why it is important, and how it should be calculated. Bucholtz (1999) reports that most feeders attending MSU Feeder Schools were uncomfortable with arithmetic, and had a poor understanding of the DM concept.
- Face management – methods to keep the silage face straight, with minimal disturbance of packed silage, and minimal amounts of loose feed left at the end of feeding.
- Silage collection for load preparation – ideally silage is premixed or removed with a face shaver to minimize variation across the bunker.
- 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 animal performance.
- The potential effect on animal performance of layers of feed within the bunker that are of poor quality.

Load preparation

- Ingredient sequencing – what order works best?
- The importance of accuracy when loading an ingredient into the mixer wagon.
- Mixer operation - When it should be started, 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).
- 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.

Several of the commercially available computerized feed management software systems (EZfeed™, www.dhiprovo.com; Feed Supervisor®, www.feedsupervisor.com; Feed Watch™, www.vas.com; TMR Tracker®, 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 cow numbers are correct, an accurate assessment of dry matter intake can be obtained. Additionally, the software systems help in inventory management and to reduce shrink.

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.

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.

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, 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.

Group intakes should be within approximately 5% of the formulated diet. Otherwise, the formulated diet is not truly being consumed, and the nutritional consultant may need to make a ration intake adjustment.

SUMMARY

A multitude of steps and procedures need to be correctly done in order for the consumed ration to be very similar to the formulated ration. The feeds, the feeder, the mixer wagon, the cows, and management of the bunk all influence the degree of variation between these two potentially different diets. Improvements in production consistency and cow health are two benefits that should result from these efforts.

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HIGH COW REPORT
FEBRUARY, 2004

MILK

Arizona Owner	Barn#	Age	Milk	New Mexico Owner	Barn #	Age	Milk
* Mike Pylman Dairy	3759	6-05	41,460	* Providence Dairy	8130	--	41,230
* Treger Holsteins, Inc.	877	--	36,100	* Providence Dairy	4151	4-07	39,330
* Rio Blanco Dairy	5733	3-02	35,390	* New Direction Dairy	1683	4-02	36,400
* Mike Pylman Dairy	5913	4-02	35,200	* Providence Dairy	9553	3-01	36,060
* Triple G Dairy, Inc.	1459	4-06	34,950	* New Direction Dairy	253	--	35,840
* Mike Pylman Dairy	4336	6-02	34,900	Pareo Dairy	8159	5-03	35,633
* Danzeisen Dairy, LLC	3379	5-11	34,850	* Providence Dairy	111	2-11	35,350
* Stotz Dairy	14563	4-06	34,610	* Providence Dairy	4809	3-06	35,330
* Rio Blanco Dairy	4305	5-08	34,600	* Providence Dairy	4516	4-01	35,240
* Mike Pylman Dairy	2122	4-02	34,450	* New Direction Dairy	1467	4-04	35,160

FAT

Arizona Owner	Barn#	Age	Fat	New Mexico Owner	Barn #	Age	Fat
Dairyland Milk Co.	2784	5-07	1406	Pareo Dairy	1509	5-04	1386
* Dairyland Milk Co.	688	5-04	1373	* New Direction Dairy	1683	4-02	1360
* Danzeisen Dairy, LLC	4356	3-04	1346	Pareo Dairy	1256	6-03	1337
* Triple G Dairy, Inc.	1459	4-06	1318	Pareo Dairy	1105	6-03	1323
* Triple G Dairy, Inc.	620	4-06	1296	* New Direction Dairy	35	--	1306
Goldman Dairy	3046	6-01	1290	* New Direction Dairy	253	--	1301
* Stotz Dairy	12821	5-10	1280	* New Direction Dairy	231	--	1288
* Dairyland Milk Co.	2012	3-00	1270	* New Direction Dairy	1206	3-11	1272
* Triple G Dairy Inc.	1781	5-07	1261	* New Direction Dairy	1467	4-04	1266
* Triple G. Dairy Inc.	397	6-07	1256	Pareo Dairy	8159	5-03	1245

PROTEIN

Arizona Owner	Barn#	Age	Protein	New Mexico Owner	Barn #	Age	Protein
Dairyland Milk Co.	2784	5-07	1070	* Providence Dairy	8130	--	1270
* Triple G. Dairy, Inc.	1459	4-06	1056	* New Direction Dairy	1683	4-02	1143
* Stotz Dairy	14563	4-06	1052	* New Direction Dairy	253	--	1125
Dairyland Milk Co.	2843	3-03	1035	* Providence Dairy	4151	4-07	1104
* Triple G Dairy Inc.	620	4-06	1034	* New Direction Dairy	1467	4-04	1089
* Mike Pylman Dairy	3757	6-05	1033	* Providence Dairy	4516	4-01	1085
* Mike Pylman Dairy	2120	3-02	1025	* New Direction Dairy	231	--	1083
* Triple G Dairy, Inc.	397	6-07	1024	Vaz Dairy	1996	3-01	1075
* Triple G Dairy, Inc.	1781	5-07	1020	* Providence Dairy	3672	5-08	1075
* Triple G. Dairy, Inc.	176	5-08	1016	* Providence Dairy	9553	3-01	1071

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

ARIZONA – TOP 50% FOR F.C.M. [b]
FEBRUARY, 2004

OWNERS NAME	Number of Cows	MILK	FAT	3.5 FCM	C.I.
* Stotz Dairy West	2177	27,662	998	28,139	15.1
* Red River Dairy	4740	26,640	956	27,016	13.5
* Treger Holsteins, Inc.	620	26,173	909	26,052	14.1
* Triple G Dairy, Inc.	4175	25,013	934	25,956	14.0
* Mike Pylman Dairy	3750	25,428	902	25,616	14.3
* Danzeisen Dairy, LLC	1321	25,231	902	25,531	14.0
University of Arizona Holsteins	164	25,089	881	25,129	14.2
* Stotz Dairy East	1020	24,375	870	24,642	0.0
* Wigwam Dairy	1384	24,000	860	24,318	14.2
* Arizona Dairy Company	5821	23,765	834	23,795	13.9
* Zimmerman Dairy	1160	22,844	822	23,202	14.8
* Hillcrest Dairy	2351	23,172	776	22,599	13.9
* Del Rio Holsteins	907	22,668	786	22,543	13.1
* Dairyland Milk Company	2845	22,965	775	22,493	13.5
* D C Dairy, LLC	1016	22,193	794	22,467	13.4
Paul Rovey Dairy	405	21,884	787	22,220	13.5
Yettem Dairy	2558	18,566	863	22,017	13.2
* Saddle Mountain Dairy	2329	22,953	741	21,936	13.8
* Butler Dairy	585	22,120	753	21,771	14.3
* Caballero Farms, LLP	1857	21,140	761	21,477	14.0
Goldman Dairy	2031	21,425	748	21,389	13.8
Shamrock Farm	7944	21,517	736	21,235	13.7
* Withrow Dairy	5038	21,939	713	21,044	13.0
* RG Dairy, LLC	1188	20,971	734	20,966	13.9
Lunts Dairy	564	20,486	741	20,870	13.9

NEW MEXICO TOP 50% FOR F.C.M.[b]
JANUARY, 2004

OWNERS NAME	Number of Cows	MILK	FAT	3.5 FCM	C.I.
* Pareo Dairy #1	1423	26,543	943	26,769	14.0
Providence Dairy	2869	26,413	843	25,091	13.5
* Hide-Away Dairy	2132	26,044	852	25,077	13.2
* New Direction Dairy 1	33	23,892	905	25,006	15.4
* Tallmon Dairy	482	25,939	846	24,935	14.8
* Pareo Dairy # 2	2980	24,181	889	24,872	13.4
* Do-Rene Dairy	2244	24,851	860	24,691	13.7
Ken Miller Dairy	393	24,522	858	24,517	13.9
New Direction Dairy # 2	1878	23,592	868	24,277	14.4
* Goff Dairy # 1	3875	23,585	842	23,852	14.4
Wormont Holsteins	1391	22,721	830	23,284	14.6
Butterfield Dairy	1664	22,650	824	23,156	13.5
Price's Roswell Farm	2897	22,748	806	22,906	13.4

[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 FEBRUARY, 2004

		ARIZONA	**NEW MEXICO**
1.	Number of herds	50	25
2.	Total cows in herd	80,086	44,381
3.	Average herd size	1602	1775
4.	Percent days in milk	90	87
5.	Average days in milk	198	200
6.	Average milk – all cows per day	63	63
7.	Average percent fat – all cows	3.6	3.6
8.	Total cows in milk	69,259	38.642
9.	Average daily milk for milking cows	70.5	72.3
10.	Average days in milk – 1st breeding	83	70.5
11.	Average days open	162	150.8
12.	Average calving interval	14	14
13.	Percent somatic cell – linear 0-4	92	81.5
14.	Percent somatic cell – linear 5-6	4	12.4
15.	Percent somatic cell – linear 7 & above	4	5.2
16.	Average previous days dry	62	63
17.	Percent cows leaving herd	36	29.6
		STATE AVERAGE	
	MILK	21,584	24,913
	Percent butterfat	3.60	3.57
	Percent Protein	2.97	3.04
	Pounds fat	775	888
	Pounds protein	633	711

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