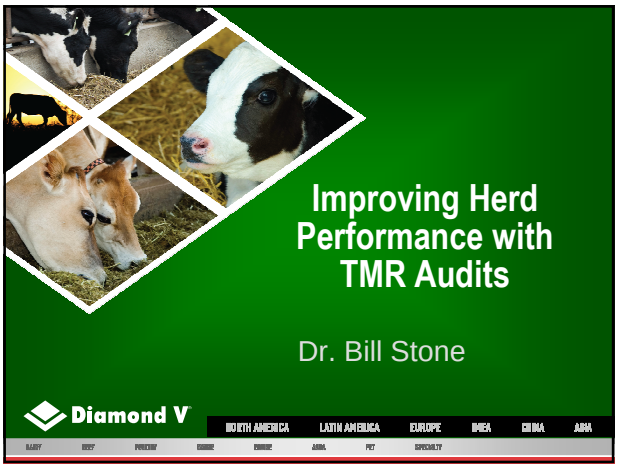


Areas we evaluate

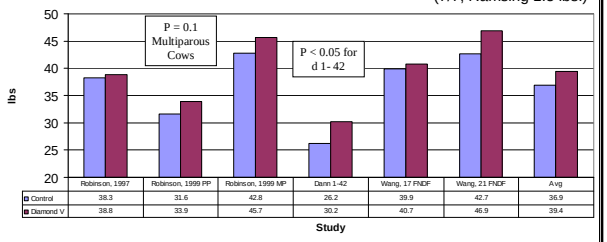
- Forage quality
- Silo management
- Shrink
- Load preparation
- Refusals
- Feed delivery times
- Ration consistency

Why Diamond V and TMR Audits?

- It gets us on lots of good dairies
- The TMR audits have helped to improve TMR consistency, reduce shrink, and improve herd performance and feed efficiency
- Diamond V products improve production and feed efficiency

Diamond V Peer Reviewed Transition Studies – Early Post-partum DMI Responses

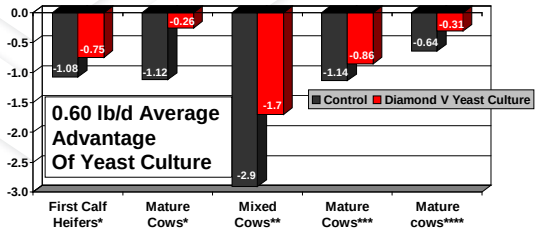
Effects of Feeding Diamond V on DMI of Early Post-partum Dairy Cows
6/6 (100%) positive; avg + 2.5 lbs (+6.7%) (7/7; Ramsing 1.5 lbs.)



	Robinson, 1997	Robinson, 1999 PP	Robinson, 1999 MP	Dann 1-42	Wang, 17 FNDF	Wang, 21 FNDF	Avg
Control	38.3	31.6	42.8	26.2	39.9	42.7	36.9
Diamond V	38.8	33.9	45.7	30.2	40.7	46.9	39.4

Diamond V

Body Weight Change (lb/d) During Early Lactation



*Robinson and Garrett. 1999. JAS. 77:988-999
** Dann et al., 2000. JDS. 83:123-127.
*** Erasmus et al., 2005.
****Robinson. 1997. JDS. 80:1119-1125

Diamond V

Example Of Diamond V Yeast Culture On Feed Efficiency

7% Improvement With XP (South Dakota State University Study)

Item	Control	Diamond V Yeast Culture	% Response
Milk, lb/d	76.9	78.0	+1.4%
4% FCM, lb/d	68.7	70.5	+2.6%
DMI, lb/d	50.9	48.7	-4.3%
Feed Efficiency	1.39[a]	1.49[b]	+7.2%

[a,b] P < 0.05
Feed Efficiency = 4% FCM/DMI

Schingoethe et al., 2004. J. Dairy Sci. 87:4178-4181.

Diamond V

Observations

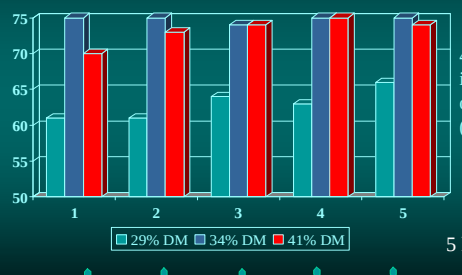
Diamond V

Forage quality

- CS – dry
  - Moderately processed
  - Low temps
- Haylage – good odor
  - Stable temps

Diamond V

Effect of Maturity on Whole Plant Corn Silage Digestibility

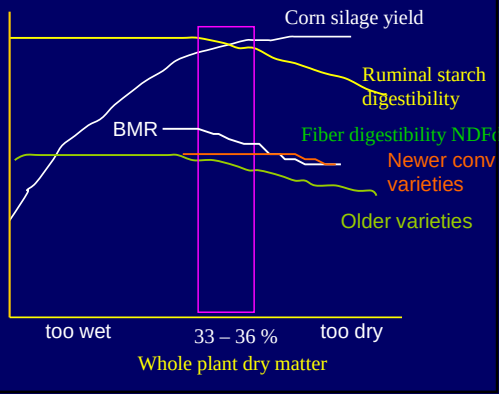


41% DM is for illustration only (not harvest!)

5 hybrids

Pioneer Hi-Bred Int'l, 2001

Harvest Considerations with Corn Silage



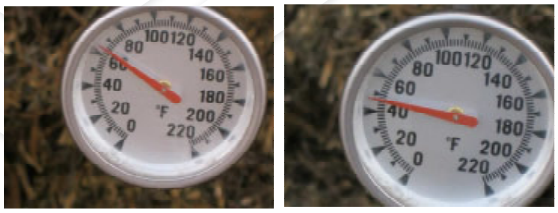
12’ disc bine

Hlge 2nd 2007
DM 39%
CP 22%
Bound 1%
Sol CP 61%
ADF 31%
NDF 39%

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

8’ merger

Haylage piles 1&2:
Left pile; Right pile



Silage temperatures and apparent densities

Forage quality

- Haylage density did not seem nearly as great as CS, which was probably the cause of the higher temps in the haylage (long particles, maybe not enough packing weight)
- Both had good fermentation odors
- The poor quality haylage at the top of the bunker was being selectively removed and fed to heifers
- We would be happy to have a Forage Management Meeting with the crops crew

Forage particle size, % retained

	CS	BMR	Hlge	Hlge (Purch)
Coarse	15	21	51	12
Medium	59	56	33	58
Fine	26	22	16	29

Silage Face Management Goals

Remove spoiled silage
Vertical smooth faces
Remove enough silage to avoid heating
Mix removed silage with loader bucket or mixer wagon
No loose silage at end of feeding
Leading edge of plastic weighted with tires and removed at least weekly

Diamond V

Removing Spoiled Haylage

Always Review Worker Safety
O_2 limiting two layers of plastic minimizes spoilage

Work to improve silage face management

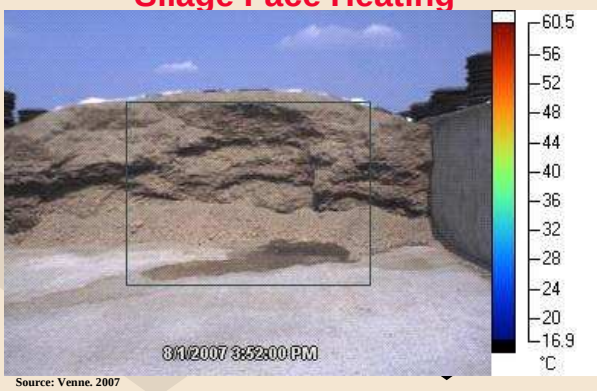

Diamond V

Face management: repair defacer or try a different manufacturer



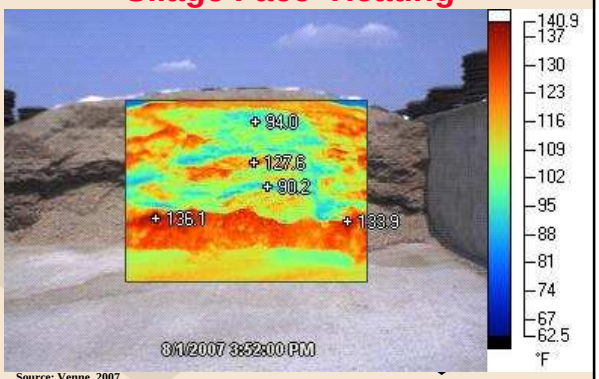

Diamond V

Silage Face Heating



Source: Venne. 2007

Silage Face Heating



Source: Venne. 2007

Silage Can Heat During The Winter

Defacer

- Fritsch makes a rugged, reliable defacer
- 5” teeth are standard; They have made models with 6” teeth if faster removal is necessary
- The largest one they make is a 10’ model. They could make a larger one if your loader had adequate hydraulic oil flow (60 g/min through the couplers)

Video and additional info at:
http://www.fritschequipment.com/facer.html

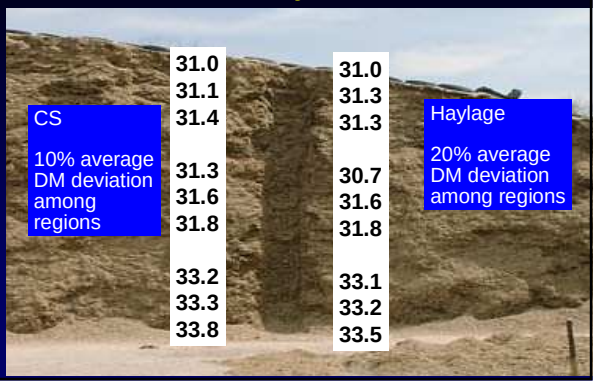
Excellent Face on Haylage Pile

- This dairy defaced, pushed the feed into a pile, and premixed it with the loader bucket. This reduces silage variation that occurs throughout the bunker, making for a much more consistent TMR.

Diamond V

Reducing ration variation Forages

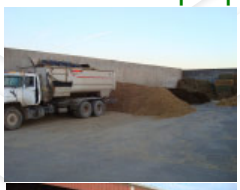
Corn Silage DM – Sampling and Laboratory Consistency Evaluation



Premixing forage to minimize variation

Diamond V

Reducing variation and increasing load preparation speed

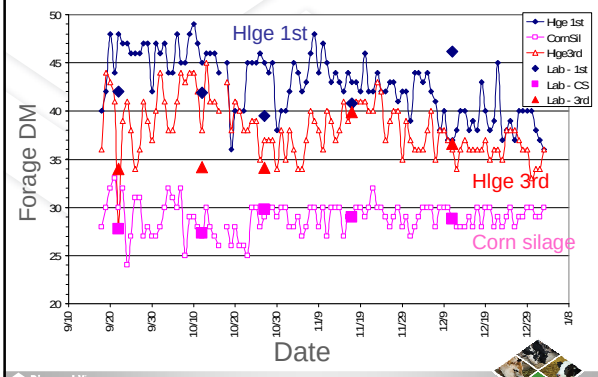


- This dairy defaces when the feeder arrives, loads the silage on the the feed truck, and briefly mixes it as the the silage is moved adjacent to the commodity building
- Now the feeder can quickly and accurately prepare a load of feed with CS, Hlge, grain mix, and corn meal

Diamond V

Diamond V

Forage DM – Farm and Lab measurements

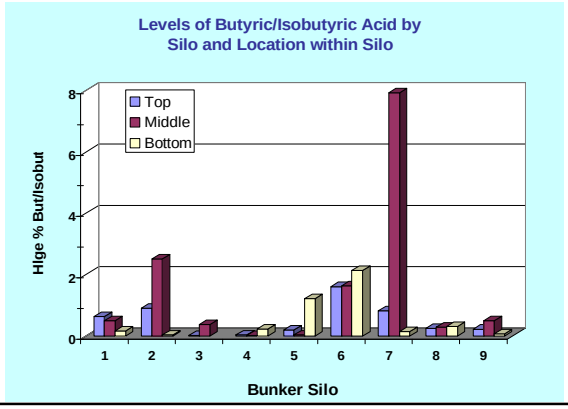


Diamond V

Diamond V

Diamond V

Be wary of layers of poorly fermented feeds



Accuracy of ingredient loading 2000 cow MI dairy

Maine dairy (below)

Accurate feeder

- Corn silage, haylage, beet pulp, corn meal, SBM, cotton seed, protein/min mix
- "We don't have enough commodity bays to have a lactating cow grain mix"
- "Great feeder. He's leaving and it's going to be very difficult to replace him."
- TMR Tracker – over fed SBM by 1150 lbs/day (~ 15% per day)

Diamond V

How We Add The Liquid Affects TMR Consistency

video

Diamond V

Whey addition

Diamond V

Load Preparation

- Unique whey application system really distributed the whey uniformly over the TMR.

Great whey manifold

Excellent distribution across the TMR

Diamond V

Make the feeder's life easier, and the rations more accurate

	Lb. DM	Lb. DM
Corn silage	12	12
Haylage	2.0	2.0
Wheat straw	4.75	4.75
Corn meal	.75	
Whole cotton	.92	
Citrus-Soy mix	3.0	
Expeller SBM	2.7	
Minerals	.45	
Dry fat	.1	
Calcium sulfate	.15	
Limestone	.12	
Prefresh grain mix		8.75

Close-up Mixing…Mineral Mix Hanging Up on Screws

What group was fed before the prefresh cows?

Video

Diamond V

Load Size Too Small

Mineral Not Completely Delivered To the Close-up Dry Cows

Diamond V

When Do You Add Low-Inclusion Ingredients

Make Sure Wagon Is Level: Trioliet 3-Screw Parked In Loading Ramp

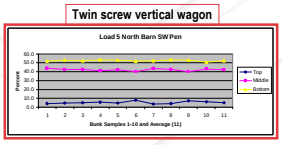
Proper Ingredient Mix Order

- Depends on the type of mixer (vertical vs horizontal), experience and if forage processing is required
- Add lower inclusion ingredients early in mix
- Blend like-ingredients together, i.e. haylage and alfalfa squares
- Avoid direct contact of wet sticky by-products with fine particle dry feeds

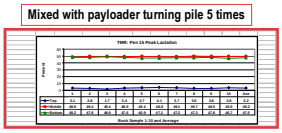
1. Large squares or rounds of hay / straw
2. Dry fine ingredients / Feed Additives
3. Cottonseed or on-farm pre-blend
4. Wet byproducts
5. Haylage
6. Corn Silage
7. Liquid

Well Mixed TMRs Obtained By Different Methods

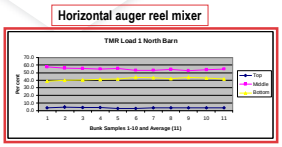
Twin screw vertical wagon



Mixed with payloader turning pile 5 times



Horizontal auger reel mixer



Diamond V

DAIRY

Mixing TMR With A Payloader

Diamond V

DAIRY

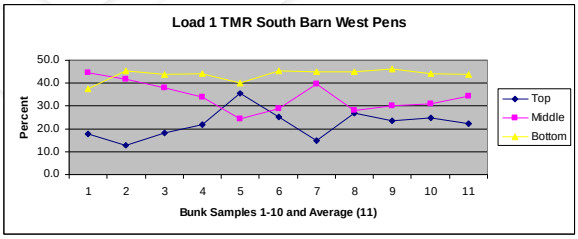
"Feed Particles Mix When Falling Together At the Same Time"

"Any ingredient or process that interferes with this will affect TMR consistency"

Diamond V

DAIRY

An Inconsistent Lactation Ration



Diamond V

Visual evaluation of the mixer and its operation




Diamond V

TMR truck

Auxillary kicker plate and kicker brace needed; goes on leading edge of the flighting

Wagon not cleaning out


Placed at 3/8" to closest point of tub when it is turned

Diamond V

Visual evaluation of mixer wagon

Is the mixer too full
with a 16,000 lb load?

Diamond V

Over-loaded reel mixer

Diamond V

Tired mixer wagon

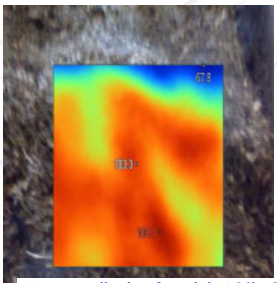
Diamond V

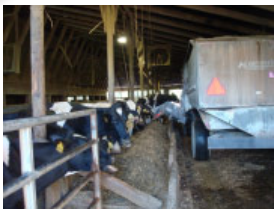
Refusals - Group 3

Hot, spoiled refusal (110º) Cows in bunk? Worn concrete? Friendly rats in broken concrete

Most pens at ~ 3% refusals

Group 3





Hot, spoiled refusal (110º) Cows in bunk? Worn concrete? Friendly rats in broken concrete

PA dairy - Refusals at 7 AM

Fresh cows returning from parlor

High Cows

PA dairy - Feeding behavior

Fresh cows ~ 15 min post-feeding – hungry!

Fresh cows that did not get up when fresh feed was delivered

Diamond V

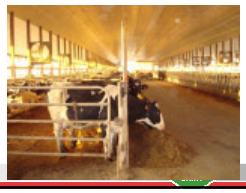
Timing and number of feedings

Today most groups were out of feed (Monday morning event?)

Want lactating cows, especially fresh cows, to have feed when returning from the parlor

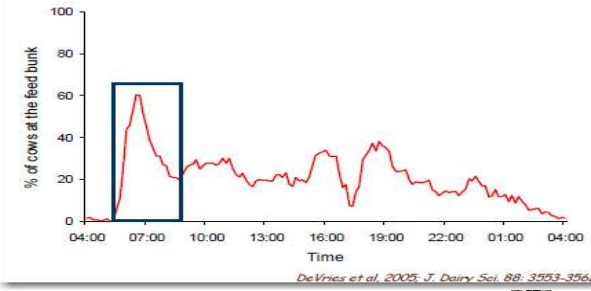
Ideally this would be fresh TMR, but another option is to feed them later in the day

Ideally all groups would be fed at least twice per day, 3x would likely lead to more consistent meals



Diamond V

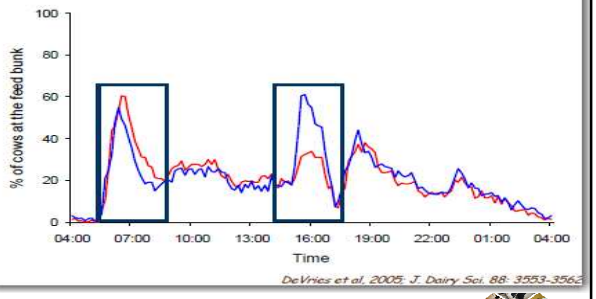
Delivery of feed once per day



DeVries et al, 2005. J. Dairy Sci. 88: 3553-3562

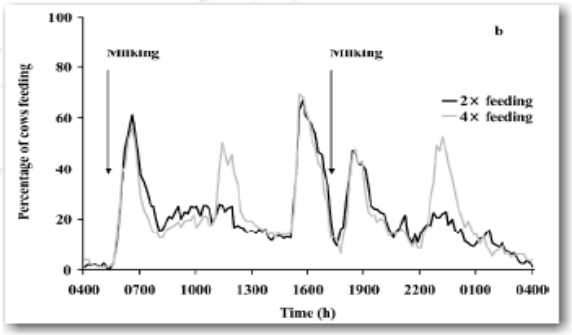
Diamond V

Delivery of feed twice per day



DeVries et al, 2005: J. Dairy Sci. 88: 3553-3562

Diamond V



Diamond V

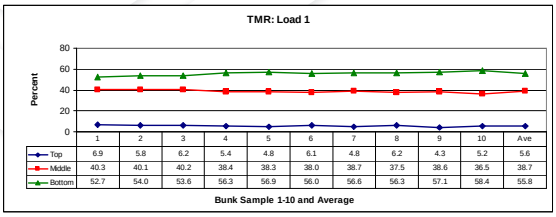
TMR Evaluation

Diamond V

Penn State Particle Separator: 10 samples per pen

Diamond V

Penn State Particle Separator: Group 3 – H bunk



	1	2	3	4	5	6	7	8	9	10	Ave
Top	6.9	5.8	6.2	5.4	4.8	6.1	4.8	6.2	4.3	5.2	5.6
Middle	40.3	40.1	40.2	38.4	38.3	38.0	38.7	37.5	38.6	36.5	38.7
Bottom	52.7	54.0	53.6	56.3	56.9	56.0	56.6	56.3	57.1	58.4	55.8

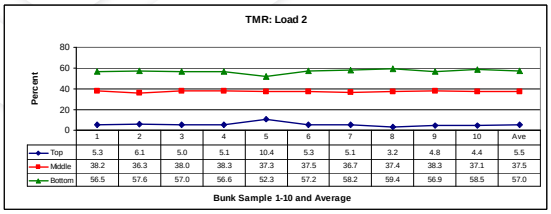
We would like each of these lines to be as straight as possible. This would indicate that there was little variation in particle size along the length of the bunk, and that the ration is consistent along the bunk.

Diamond V

Group 1 (west barn)

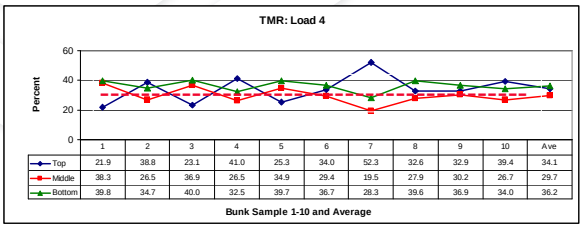
Diamond V

Group 1 (west barn)



Diamond V

Prefresh

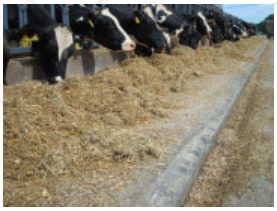


Diamond V

Processed hay

Diamond V

Prefresh diet, hay



Diamond V

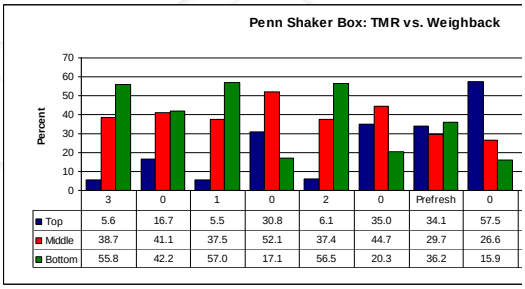
Managing ration variation caused by the cow

Processing Straw or Hay

Video

Diamond V

Refusals vs Ration

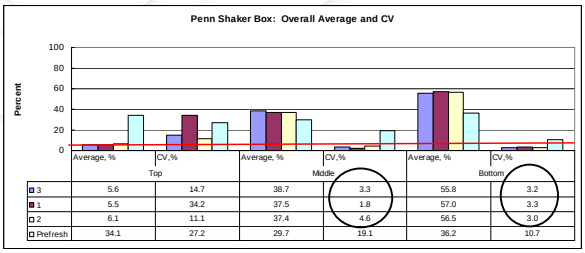


	3	0	1	0	2	0	Prefresh	0
Top	5.6	16.7	5.5	30.8	6.1	35.0	34.1	57.5
Middle	38.7	41.1	37.5	52.1	37.4	44.7	29.7	26.6
Bottom	55.8	42.2	57.0	17.1	56.5	20.3	36.2	15.9

Diamond V

Coefficient of variation (CV):

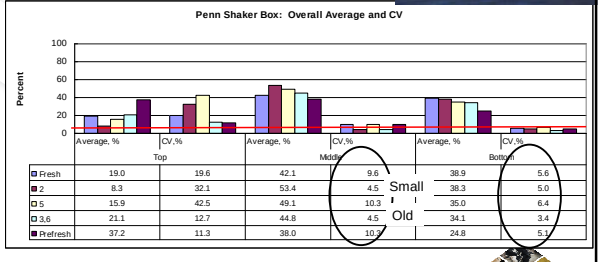
Measure of the amount of variation around the mean
Goal of < 5% for middle screen and pan



	Average, %	CV,%	Average, %	CV,%	Average, %	CV,%
3	5.6	14.7	38.7	3.3	55.8	3.2
1	5.5	34.2	37.5	1.8	57.0	3.3
2	6.1	11.1	37.4	4.6	56.5	3.0
Prefresh	34.1	27.2	29.7	19.1	36.2	10.7

Diamond V

Coefficient of variation:
goal is less than 5%

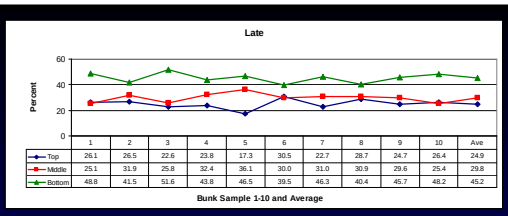


	Average, %	CV,%	Average, %	CV,%	Average, %	CV,%
Fresh	19.0	19.6	42.1	9.6	38.9	5.6
2	8.3	32.1	53.4	4.5	38.3	5.0
5	15.9	42.5	49.1	10.3	35.0	6.4
3,6	21.1	12.7	44.8	4.5	34.1	3.4
Prefresh	37.2	11.3	38.0	10.2	24.8	5.1

Small
Old

Diamond V

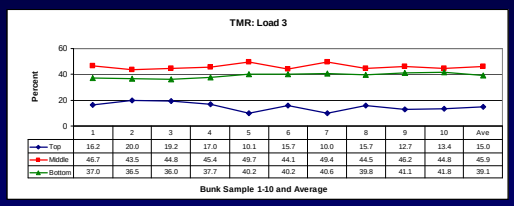
These next two dairies had the same make and model Kuhn Reel augie



	1	2	3	4	5	6	7	8	9	10	Ave
Top	26.1	26.5	22.6	23.8	17.3	30.5	22.7	28.7	24.7	26.4	24.9
Middle	25.1	31.9	25.8	32.4	36.1	30.0	31.0	30.9	29.6	25.4	29.8
Bottom	48.8	41.5	51.6	43.8	46.5	39.5	46.3	40.4	45.7	48.2	45.2

Dairy 1
16k load

CV
14.7
11.8
8.6



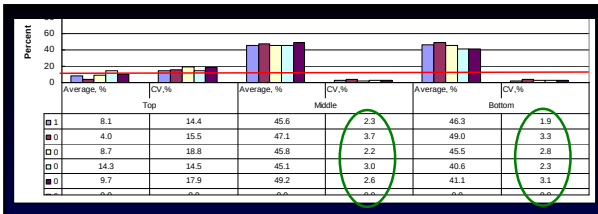
	1	2	3	4	5	6	7	8	9	10	Ave
Top	16.2	20.0	19.2	17.0	10.1	15.7	10.0	15.7	12.7	13.4	15.0
Middle	46.7	43.5	44.8	45.4	49.7	44.1	49.4	44.5	46.2	44.8	45.9
Bottom	37.0	36.5	36.0	37.7	40.2	40.2	40.6	39.8	41.1	41.8	39.1

Dairy 2
13k load

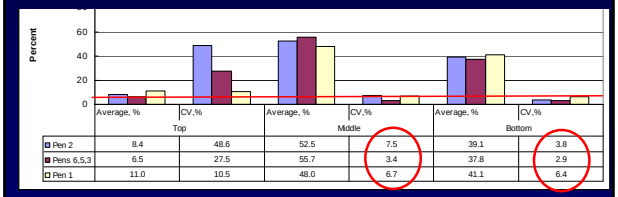
CV
23
4.6
5.4

GW 16k load; HF 13k load Reel Augies

Data on the next slide are from two dairies with the same type of mixer – Kuhn Knight 4 auger



Keen attention to detail by the feeder (above)



Proper load size and mixing reduces variation

- Mix time:
  - Adequate?
  - Excessive?
  - Recorded and controlled?
  - Should it vary with varying load sizes?
- Is the load too large for proper mixing?

Contributing Factors to TMR Variation

DIRTY DOZEN

1. Silage face management
2. Premixing forages
3. Loading accuracy
4. Loading liquids
5. Ingredient inclusion amount
6. Ingredient mix order
7. Mixing Times
8. Equipment Wear
9. Hay Quality & Processing
10. Unlevel TMR Loading
11. Grain Particle Size Variation
12. Delivery Times

Keeping shrink low

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DAIRY

Consider bin storage for light weight, expensive ingredients, or pelleting

Reducing Shrink

Diamond V

DAIRY

Reducing Shrink

Simple wind break adjacent to commodity barn

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Reducing Shrink

Dual bins per ingredient, with adjacent commodity shed for additional flexibility

Mixer is in protected, recessed area and can be loaded from either side

Dynamica generala NIR sensor in loader bucket

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Reducing Shrink

The bin approach – all concentrates in bins. Extended spouts with shade cloth on the walls.
Advantage – look at all of the wasted feed (!)
Disadvantage – pay more for auger delivery

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Improving Accuracy and Reducing Shrink With Electronic Feed Monitoring Systems

Feed Watch, EZ Feed,
TMR Tracker, Feed Supervisor

Scale head

Display

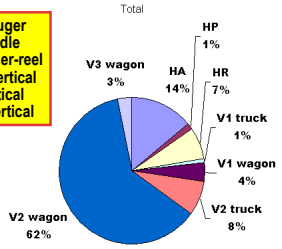
Software
Wireless modems

- **Summary of Diamond V TMR Data**
  - **Best mixer is one that is well maintained and managed by following TMR mixing basics**

Diamond V

Types of TMR Mixer Wagons Tested During TMR Audits

HA = horizontal 4-auger
HP = horizontal paddle
HR = horizontal auger-reel
V1 = single auger vertical
V2 = twin auger vertical
V3 = triple auger vertical



Number of TMR loads tested: 514

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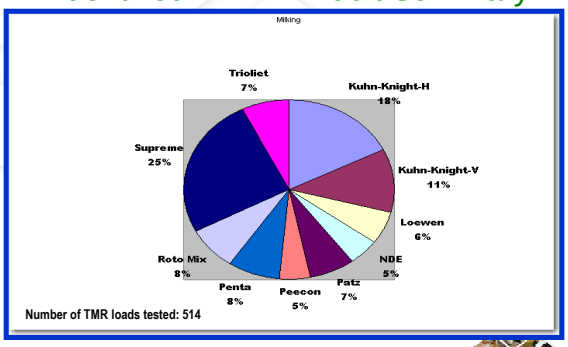
Top 10 Brands of TMR Mixers Indentified in TMR Audit Summary



Coefficients of Variation in All TMRs

	Penn State Screens		
Rank	Middle		Bottom
Top 25%	3.18		2.88
Top 50%	4.44		4.04

Top 25% of TMRs have coefficients of variation of 3% or less
Goal: 3% CV or less in middle and bottom screens of Penn State Shaker box

Coefficient of Variation Levels for TMR Consistency

- **</= 3%**
  - Top 25% of TMRs
  - TMR mixing basics followed
  - excellent - mostly corn silage, haylage and/or chopped hay: easy to mix, new and well-maintained mixers
- **</= 4%**
  - Top 50% of TMRs
  - Not sure cow performance is different from 3% CV
- **>4%**
  - Anecdotal evidence has show 1 to 3 lbs inc. in milk and improved milk fat% after corrections are made
  - Poor TMR Mixing Basics
    - Not mixing long enough after last ingredient
    - Overfilling
    - Worn augers and kicker plates
    - Hay not processed
    - Ingredient mix order not optimized
    - Liquid not loaded in proper position

NY Dairy - Recommendations

- Excellent silage management and feed preparation
- Limited opportunities to further reduce shrink
- Feeding more times per day may have benefits
- H bunk needs to be repaired
- PSPS – coarser?
- Prefresh – mix longer
  - New knives???, or process the hay more before adding it to the mixer

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Thanks

What questions do you have?

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