Integration of Routine Computerized Monitoring Solutions for Milk Meter Performance into the Services offered by Milk Recording Organizations as a Tool for Improved Dairy Producer Satisfaction

February 10, 2018

Bruce Dokkebakken
General Manager Minnesota DHIA

43 years

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DHIA
307 BRIGHTON AVENUE SOUTH
07.27.2006 07:37

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Minnesota DHIA 2017

- 295,342 cows tested from 1,430 herds (average of 209 cows)
- 72,508 cows checked for Pregnancy using milk
- 34,085 cows tested for Johne's Disease using milk
- 44,220 eartags sold (RFID and management)
- On average herd reports were mailed or e-mailed **2.14 days** after sample date

Minnesota DHIA 2017

- Average of 11 sample days per herd
- 2,000 portable Tru Test meters in the hands of 64 field techs

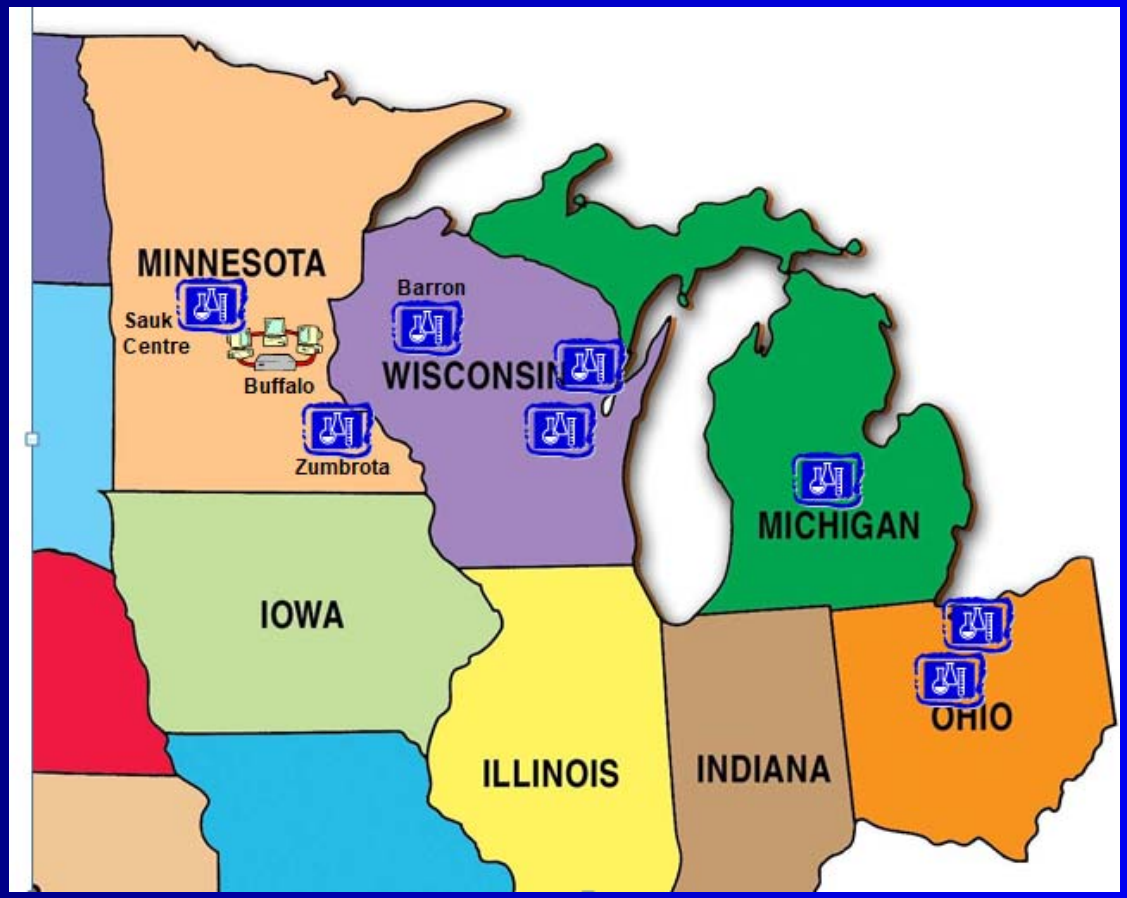
Minnesota DHIA 2017

- 511 herds have software from DHIA (36%)
- 63% of herds are downloaded by a consultant who has permission to access data to help dairy
- Data from Minnesota DHIA members is processed at all 4 U. S. Dairy Records Processing Centers at the option of the producer (10 years)

Minnesota DHIA 2017

- Average production in 2017 was 25,136 pounds of milk per cow, with 957 pounds of butterfat and 789 pounds of protein or 11,311 kg of milk, 431 kg of butterfat, and 355 kg of protein
- SCC average was **238,000**.
- **2017 Milk Price paid to farmers was $17.74 per hundredweight – 36% lower than 2014**

Data handling for 8 milk labs



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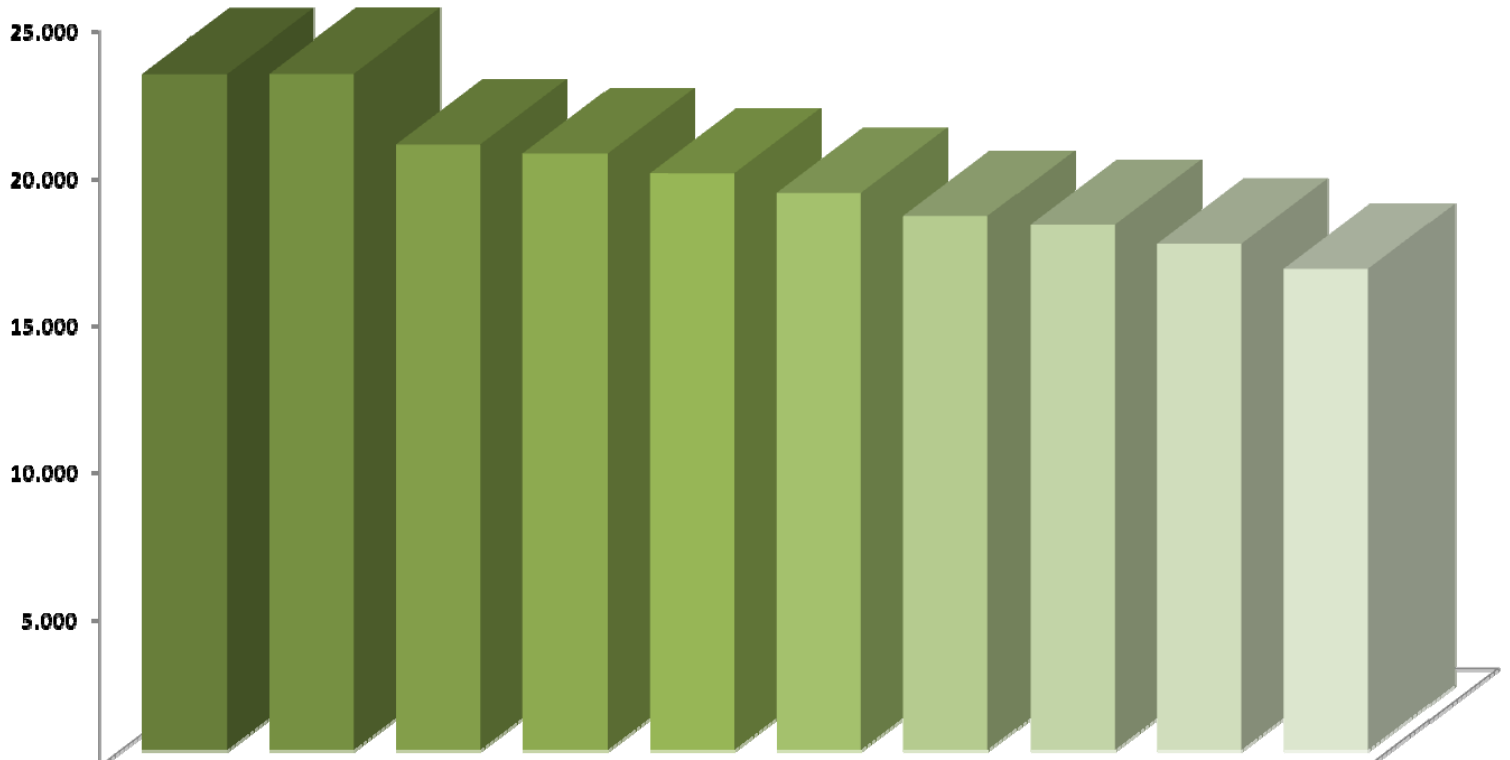
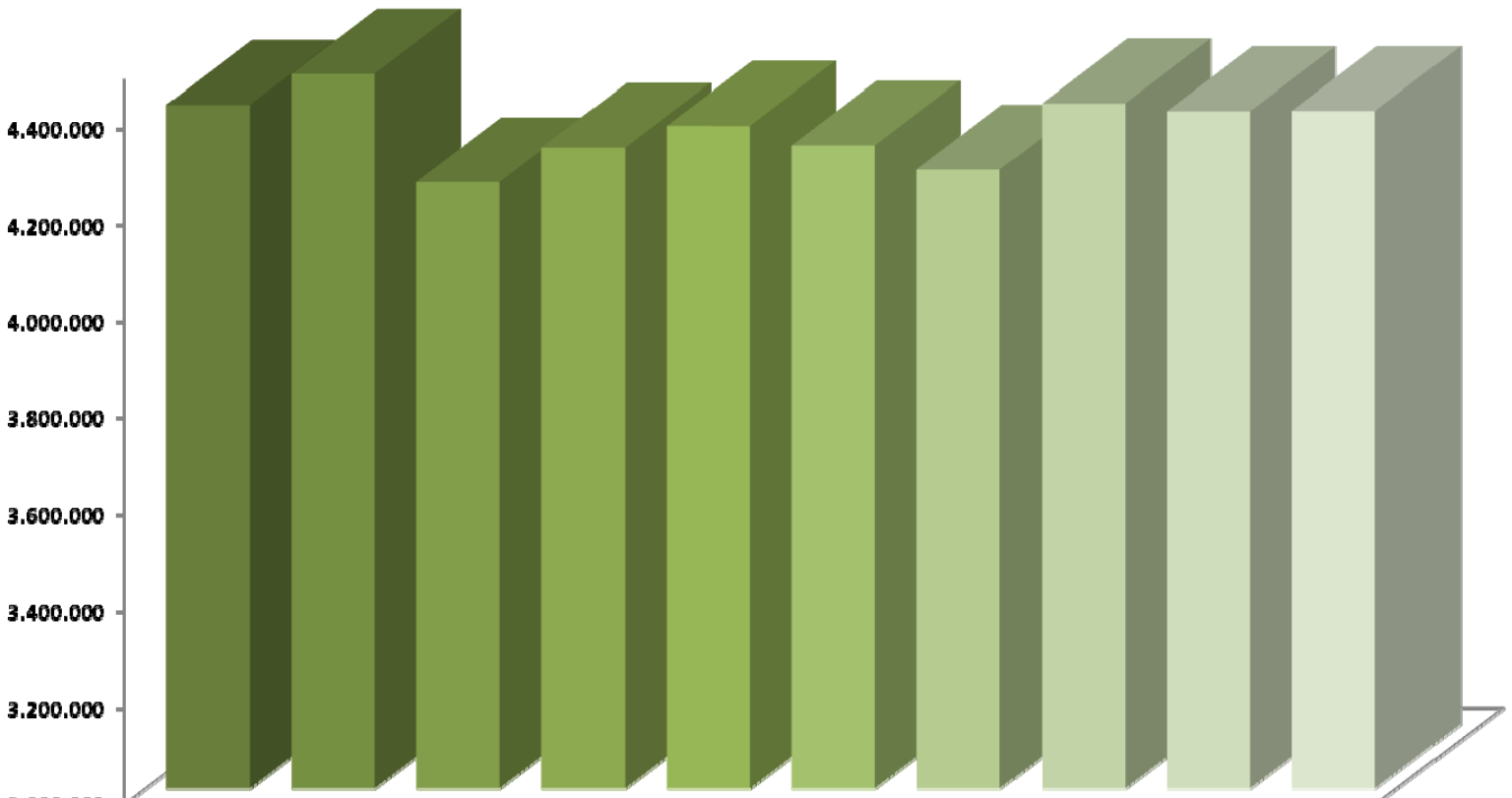
Herds on DHI Programs



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Number of Herds on DHI	23.005	23.013	20.609	20.304	19.628	18.958	18.173	17.875	17.228	16.372

Year

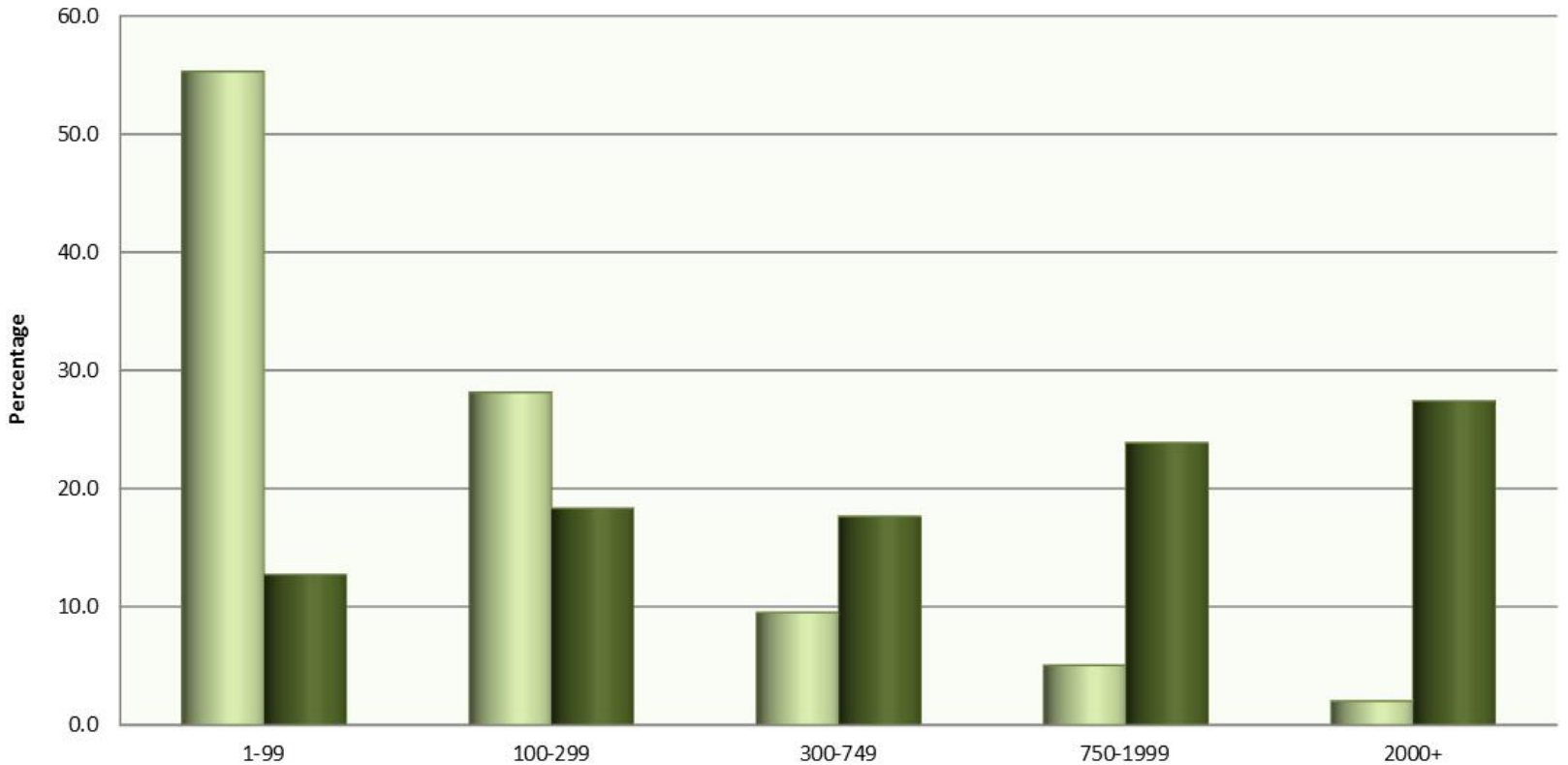
Cows on DHI Programs



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Number of Cows on DHI	4.414.821	4.478.447	4.255.950	4.326.663	4.371.598	4.331.157	4.281.654	4.417.597	4.401.410	4.402.309

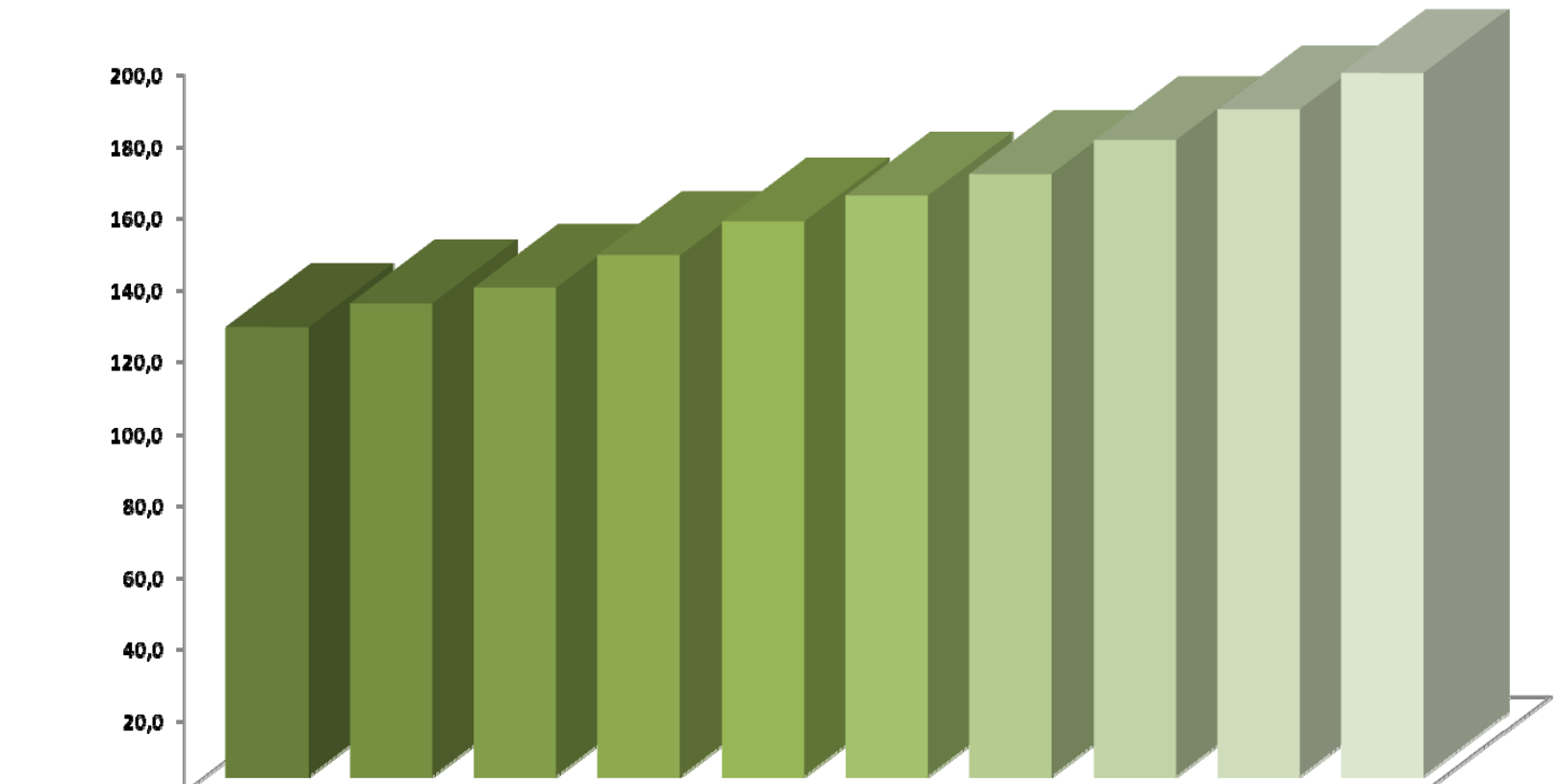
Year

Distribution of Herds and Cows on DHI



Herd Size in Cows	1-99	100-299	300-749	750-1999	2000+
Percent of Herds	55.29	28.14	9.52	5.03	2.01
Percent of Cows	12.72	18.34	17.65	23.87	27.42

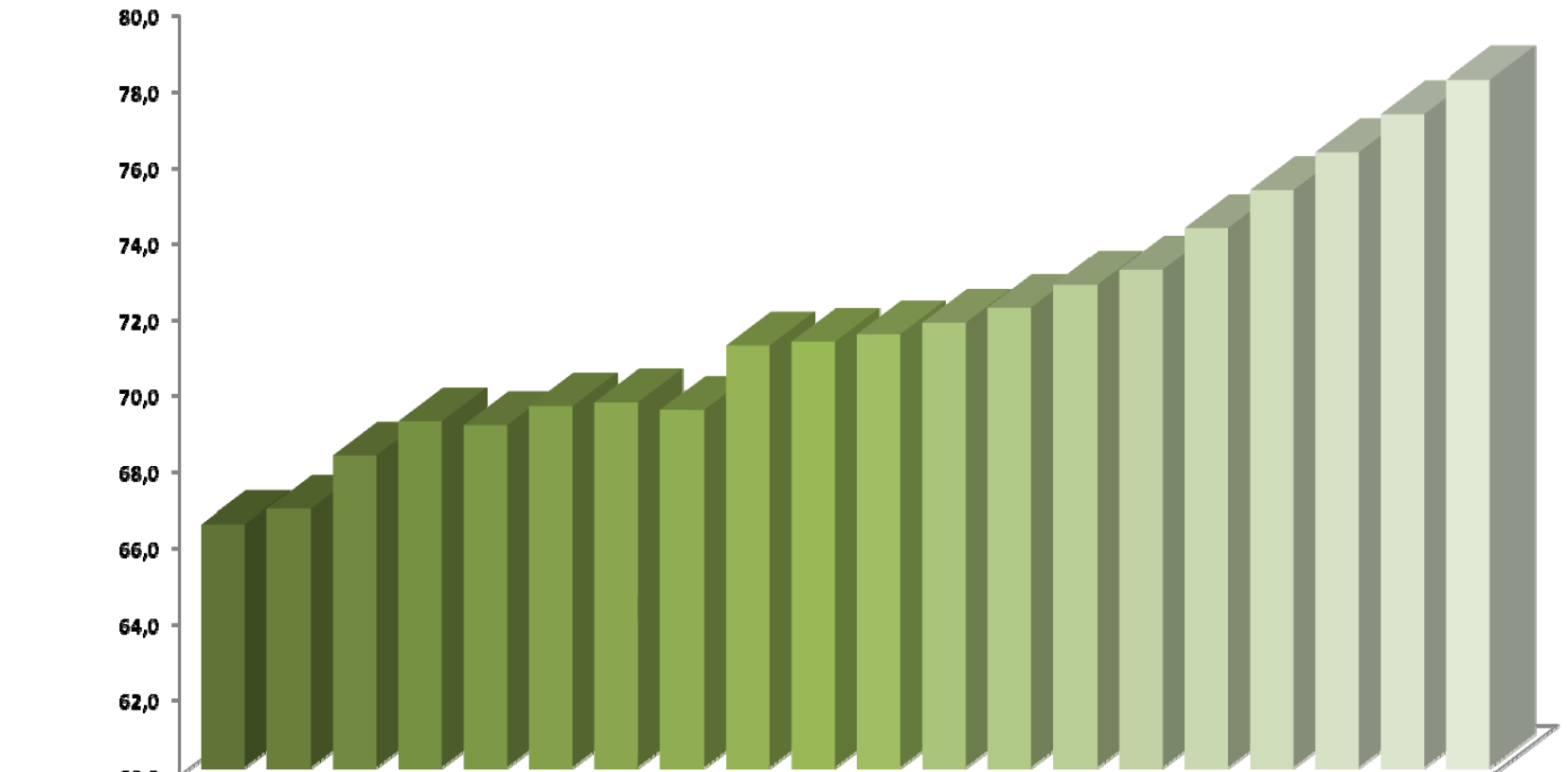
Average Size of DHI Herds - 2007 to 2016



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Herd Size in Cows	125,1	131,7	136,1	145,2	154,6	161,8	167,8	177,3	185,9	196,0

Year

Average Test Day Milk Yield of DHI Herds



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ave TD Milk (lbs.)	66,4	66,8	68,2	69,1	69,0	69,5	69,6	69,4	71,1	71,2	71,4	71,7	72,1	72,7	73,1	74,2	75,2	76,2	77,2	78,1

Year

35.1 kilos per day

Changing Dynamics of Herd Recording

Traditional herd recording programs rely on

- **Portable meters owned by herd recording organization**
- **Control of meter maintenance, calibration and operation**
- **Investment in equipment carried by recording organization**

The new construct of herd testing

- **Smaller number of herds coupled with increased herd size**
- **Desire for immediate access to data and results**
- **Investment in integrated milking systems/software by dairy**
- **Desire for increased labor and data handling efficiency**
- **Use of multi-day milk yield averages in recording programs**

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Changing Dynamics of Herd Recording in the USA

	Portable Meters					*Dairy Owned Meters*				
	2009	**2011**	**2013**	**2015**	**2017**	**2009**	**2011**	**2013**	**2015**	**2017**
Total Meters	112,389	107,369	91,415	78,707	72,193	46,875	56,034	102,113	122,722	149,238
Calibration Method										
Water Test %	100	100	100	100	100	68	49	30	32	30
Statistical %						32	51	70	68	70

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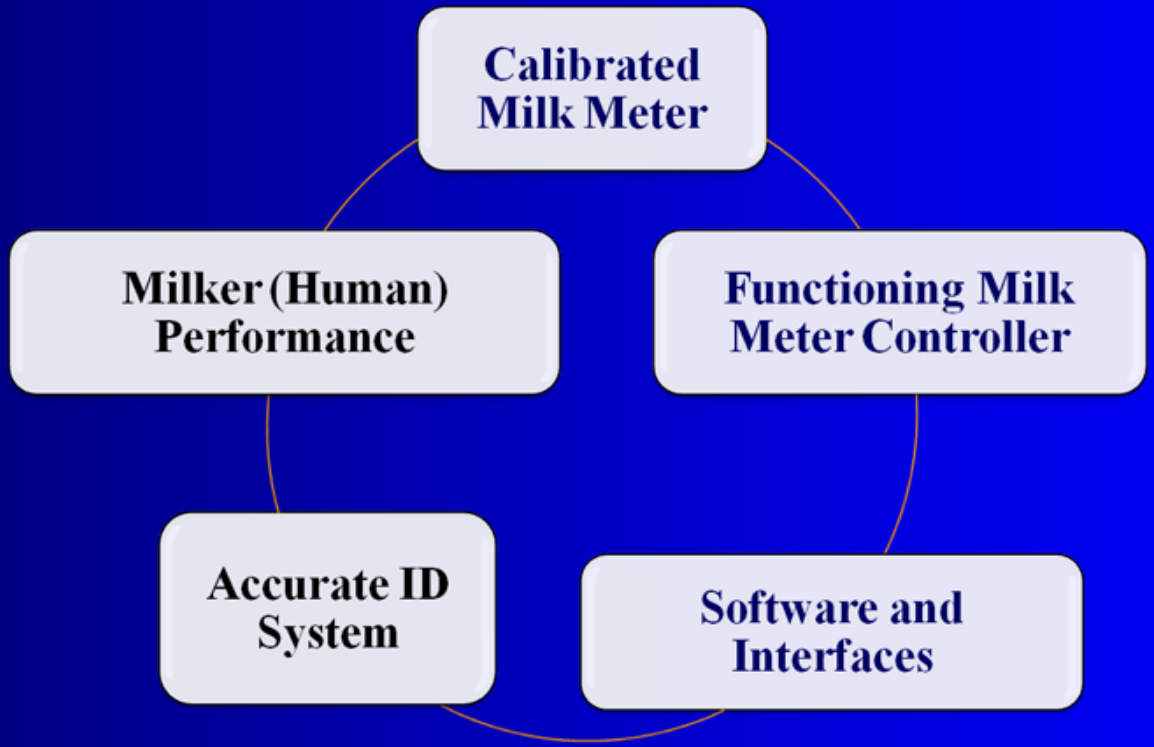
With the Customer in mind

- For electronic meters, we try to provide a service that shows benefits, rather than showing up with a “you must calibrate or else” attitude

Key Concept with Statistical Monitoring of Daily Milk Meters

The in-place milk meter is only part of a linked system that includes…



Using Third-Party software

- **Interface with manufacturer's software**
  - ***GEA Westfalia (Dairy Plan)***
  - ***Afikim (Afimilk, Afifarm)***
  - ***Boumatic (Provantage, Metrix)***
  - ***DeLaval (Alpro)***
  - ***DairyMaster***
  - ***Universal***

- **Short List of Vendors**
  - ***Dairy Comp 305 (Valley Ag Software)***
  - ***PCDart (Dairy Records Management Systems)***
  - ***DHI Plus (DHI-Provo) – under development***

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PCDart 817
EMMR

t34120121 33m Ref: 37m08-23-08 082308 06:53 Pg 1
t817 - Milking Report - Electronic Milk Meter Monitoring Report - Date 08-22-2008

Stall No.	No. Milkings	No. Obs.	% Difference From Expected	
1	10	71	+2.0	
2	10	71	+3.0	
3	10	69	-5.8	Diff. 5%
4	10	67	-1.8	
5	10	66	+0.4	
6	10	58	-0.1	
7	10	59	+0.6	
8	10	55	+0.4	
9	10	74	+0.7	
10	10	75	+6.7	Diff. 5%
11	10	77	+1.1	
12	10	77	+0.6	
13	10	78	-2.9	
14	10	73	-3.1	
15	10	67	-0.7	
16	10	63	-1.9	

Electronic Milk Meter Monitoring Report (EMMMR) Detail
Percent Difference From Expected By Milking

	********** Date/Milking Number **********									
Stall No.	08-22 1	08-22 2	08-21 1	08-21 2	08-20 1	08-20 2	08-19 1	08-19 2	08-18 1	08-18 2
1	+5.5	+2.8	+1.7	-1.1	+4.9	+5.8	-2.5	+3.2	+2.7	-1.3
2	+1.4	+5.4	-2.8	-0.1	-0.5	+4.4	+8.7	+1.1	+13.6	-0.6
3	+3.9	-0.5	+8.9	+2.2	-1.4	-96.5	+5.2	+8.3	-6.2	-5.0
4	-1.3	-8.1	+0.5	+4.1	-6.3	-4.1	-2.7	-0.9	-0.9	-1.5
5	-1.8	+2.7	-3.7	+3.5	+0.0	+7.2	-0.7	-0.8	+0.5	+0.5
6	-0.9	-1.7	+0.9	-2.9	-0.2	+6.8	-1.7	-0.3	-0.2	-0.4
7	+1.4	-9.8	+3.7	-5.2	+4.0	+6.0	+3.2	-4.8	-1.0	+4.6
8	-1.1	-2.9	-5.1	-3.2	+1.5	+3.7	+2.3	+7.7	-1.4	+3.6
9	+2.0	+1.6	+1.7	-2.1	+0.0	+6.1	-0.5	-1.6	+0.0	+0.7
10	+6.6	+7.8	+13.6	+2.0	+7.4	+15.5	+2.9	+4.8	+1.2	+4.3
11	+6.0	-2.4	-2.2	+6.5	-2.3	+5.0	+0.5	-0.3	+0.0	+1.8
12	-2.8	+0.9	-0.7	-0.5	+6.5	+4.9	-1.3	-0.7	+1.3	+0.0
13	-0.2	+2.1	+1.9	-1.7	-11.5	-0.7	-6.5	-1.2	-4.9	-5.4
14	-9.2	-3.6	-2.4	-2.9	-4.7	-1.2	+0.0	-3.8	-4.5	+1.2
15	-1.6	+0.8	-1.3	-1.8	+2.2	+12.1	-4.2	-10.5	+2.1	-3.1
16	-10.2	+1.4	-12.1	+2.6	+3.0	+8.4	-0.7	-2.6	-3.0	+0.5
AV.	+0.1	-0.1	+0.1	+0.2	+0.0	+0.1	-0.1	-0.2	-0.2	-0.2

Detail information for each milking for each cow stored in file METERDTL.CSV
File is located in PCDART 34120121. Open file with spreadsheet program.

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DC 305 – Parlor Performance Report

POTTER M1.txt
- Dairy Comp 305 ---------- NORTH STAR ACRES ---------- Page {$PAGE}
- Command : PARLOR\VM1P
- Expanded:
-
- NORTHSTAR ---------- North Star Acres ---------- 7/28/09---

Milking report for 7/28/09 Milking 1 at 12:07 PM 3.04E 12

PEN	Total Milk	Milk /Hr	Milk /Cow	Cows	Cows /Hr	Total Time	Start Time	Stop Time	Avg #/m	Avg Dur	Avg Dev	Not ID
1	1399	2268	22	64	103	0:37	4:09	4:47	5.0	4.5	1	4
2	1663	1918	16	106	122	0:52	4:57	5:49	3.7	4.3	0	6
3	1912	383	22	88	17	4:59	5:54	10:54	4.4	5.1	-1	3
5	4176	1482	29	146	51	2:49	6:48	9:38	5.7	5.3	-1	7
6	4672	1752	33	142	53	2:40	8:18	10:58	6.0	5.7	0	8
4	2130	2778	30	71	92	0:46	9:49	10:35	5.6	5.6	0	3
9	490	2100	41	12	51	0:14	10:45	10:59	5.4	8.0	0	0
Total	16442	2406	26	629	92	6:50	4:09	10:59	5.2	5.2	0	31

Description	Pen	1	2	3	5	6	4	9
% Units were attached	33	31	36	6	19	21	36	28
Milk / stall / hour	100	92	79	15	61	73	115	86
Cows / stall / hour	3.8	4.2	5.0	0.7	2.1	2.2	3.8	2.1
Flowrate 0 to 15 seconds	1.4	1.1	1.0	1.0	1.5	2.0	1.5	1.5
Flowrate 15 to 30 seconds	5.6	5.0	4.1	4.8	5.8	6.9	6.3	7.0
Flowrate 30 to 60 seconds	5.3	5.2	3.4	4.2	5.6	6.1	6.7	8.0
"Peak" Flowrate	7.0	7.2	4.4	5.7	7.7	8.3	7.8	8.8
Milk in the first 2 minutes	11	11	7	9	12	14	13	15
Percent milk in 2 minutes	43	52	47	42	43	41	44	36
Percent time in low flow	20	21	30	22	17	17	18	19
Seconds in low flow	64	57	79	69	57	60	61	96

Error Summary:	Pen	1	2	3	5	6	4	9
Reattach	12	1	2	1	4	1	3	0
No Letdown	41	4	6	6	9	11	5	0
Manual Mode	10	0	2	3	0	1	1	3
Early Falloff	1	0	0	0	1	0	0	0
Late Rehang	8	0	1	1	2	2	2	0
Manual Detach	28	4	1	2	5	6	8	1
Total	99	9	12	13	21	21	19	4

Stall	Cows	Dev	Milk	Time	Flow	Cond	Peak	Fall	Mode	MDet
1	30	0	23	5.0	4.7	9.2	6	1	0	1
2	30	0	25	5.7	4.6	9.3	5	0	2	2
3	30	0	26	5.4	4.7	9.2	6	1	1	1
4	28	0	26	5.7	4.6	9.1	5	1	0	0
5	28	0	24	5.0	4.9	9.2	6	0	0	0
6	27	0	26	5.3	5.1	8.7	6	1	1	1
7	26	1	25	4.7	5.4	8.5	8	0	0	1
8	26	-1	25	5.2	5.3	9.2	7	2	0	2
9	26	-2	23	4.8	5.0	9.9	7	0	1	0
10	26	0	26	5.4	5.0	9.4	6	1	1	1
11	26	1	26	5.8	4.9	9.1	7	5	1	1
12	26	0	24	4.9	5.0	9.4	6	2	0	2

Page 1

POTTER M1.txt

5.3	9.4	6	1	0	2
5.5	9.2	7	0	0	0
5.3	9.6	7	1	0	1
5.0	9.7	7	1	1	1
5.3	9.6	6	1	0	1
5.1	9.8	7	0	0	2
5.0	9.2	6	1	0	2
6.0	8.8	8	1	1	3
5.3	8.9	7	0	0	0
5.4	8.9	7	0	0	0
5.1	8.7	6	1	1	4
5.9	9.1	8	1	0	0
5.1	9.2	7	1	0	1

Flow	Cond	Peak	Fall	Mode	MDet
4.9	9.2	6	14	7	12
5.3	9.2	7	8	3	16
5.1	9.2	6	11	5	14

DairyCOMP 305

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“Scheduler” in on-farm DC 305 dumps cowfile backup to Bertha daily (150 herds)

- Patty is responsible for supporting herds with Dairy Comp 305 electronic meter interfaces. She also supports PC Dart.
- She is the point of contact on any issues with e-meter performance.
- This provides an opportunity to build confidence and comfort between DHIA and the customer

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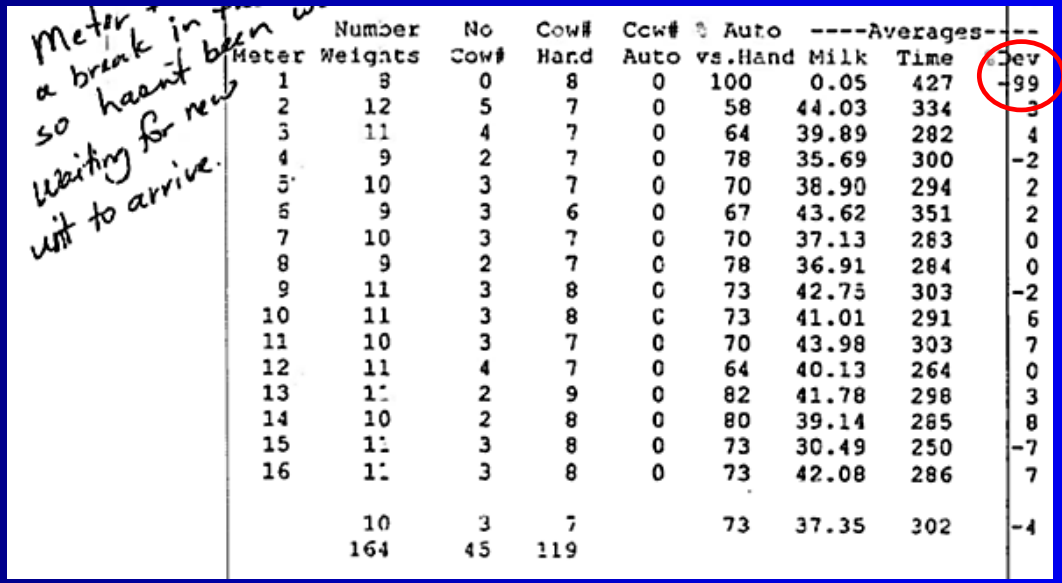
Patty creates at least one parlor report per month per herd

- Eyeballs them for issues and follows up with email if needed
- If meter is “off” she checks that meter after the dairy has notified her of repair, or on the next monthly check
- Posts data into Excel every month

Causes contact from DHIA



Meter [illegible] a break in [illegible] so haven't been [illegible] waiting for new [illegible] unit to arrive.

Meter	Number Weights	No Cow#	Cow# Hand	Ccw# Auto	% Auto vs.Hand	----Averages---- Milk	Time	Dev
1	8	0	8	0	100	0.05	427	-99
2	12	5	7	0	58	44.03	334	3
3	11	4	7	0	64	39.89	282	4
4	9	2	7	0	78	35.69	300	-2
5	10	3	7	0	70	38.90	294	2
6	9	3	6	0	67	43.62	351	2
7	10	3	7	0	70	37.13	283	0
8	9	2	7	0	78	36.91	284	0
9	11	3	8	0	73	42.75	303	-2
10	11	3	8	0	73	41.01	291	6
11	10	3	7	0	70	43.98	303	7
12	11	4	7	0	64	40.13	264	0
13	11	2	9	0	82	41.78	298	3
14	10	2	8	0	80	39.14	285	8
15	11	3	8	0	73	30.49	250	-7
16	11	3	8	0	73	42.08	286	7
	10	3	7		73	37.35	302	-4
	164	45	119					

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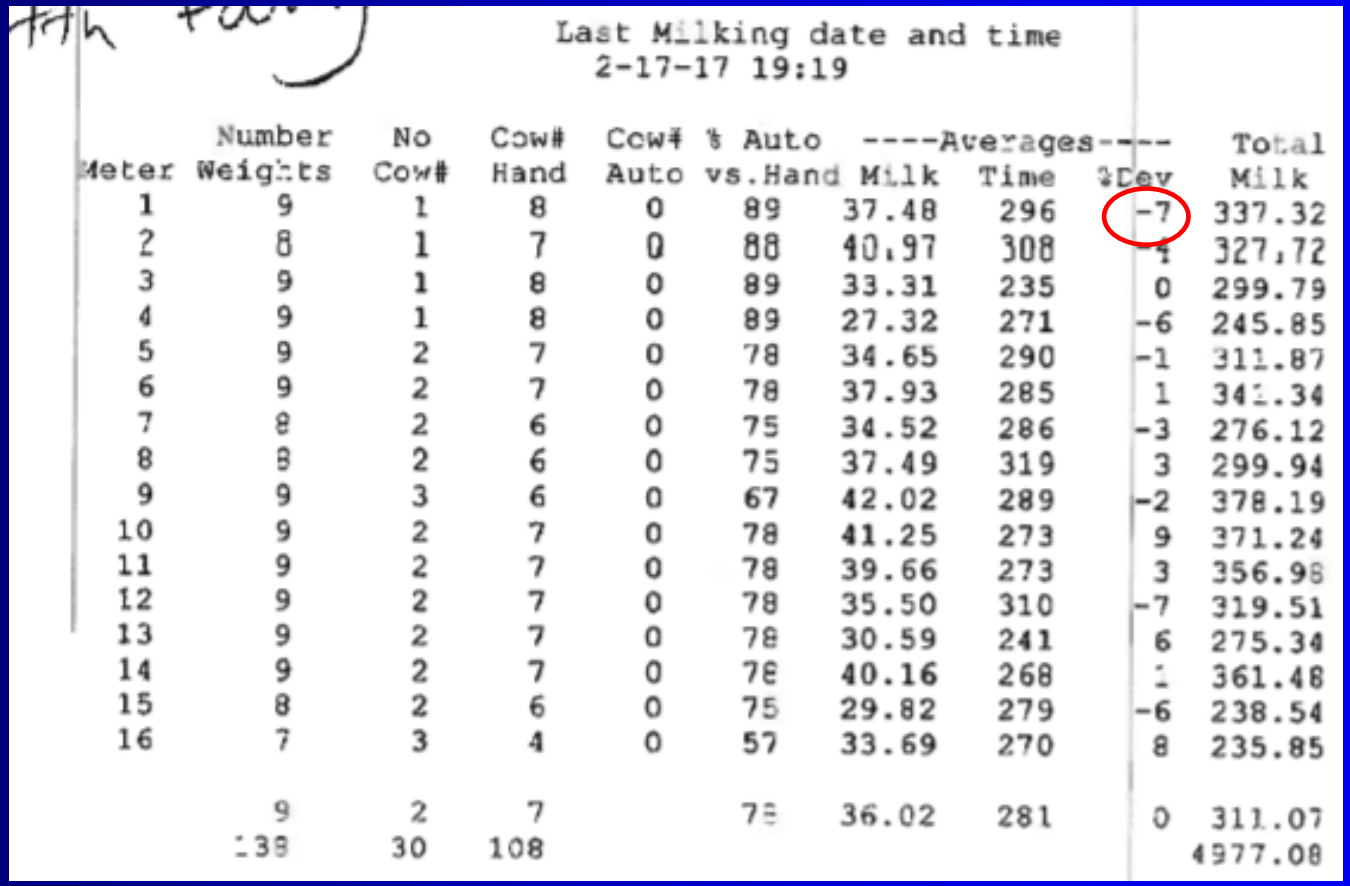
Outcome of contact



4th Facility

Last Milking date and time
2-17-17 19:19

Meter	Number Weights	No Cow#	Cow# Hand	Cow# Auto	% Auto vs.Hand	----Averages---- Milk	Time	%Dev	Total Milk
1	9	1	8	0	89	37.48	296	-7	337.32
2	8	1	7	0	88	40.97	308	-4	327.72
3	9	1	8	0	89	33.31	235	0	299.79
4	9	1	8	0	89	27.32	271	-6	245.85
5	9	2	7	0	78	34.65	290	-1	311.87
6	9	2	7	0	78	37.93	285	1	341.34
7	8	2	6	0	75	34.52	286	-3	276.12
8	8	2	6	0	75	37.49	319	3	299.94
9	9	3	6	0	67	42.02	289	-2	378.19
10	9	2	7	0	78	41.25	273	9	371.24
11	9	2	7	0	78	39.66	273	3	356.98
12	9	2	7	0	78	35.50	310	-7	319.51
13	9	2	7	0	78	30.59	241	6	275.34
14	9	2	7	0	78	40.16	268	1	361.48
15	8	2	6	0	75	29.82	279	-6	238.54
16	7	3	4	0	57	33.69	270	8	235.85
	9	2	7		78	36.02	281	0	311.07
	138	30	108						4977.08

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And occasionally, the contact on e-meters becomes a software support conversation because of that “touch” and that comfort

Using DC305 to monitor meters

- Non-invasive (done remotely)
- Enables targeted feedback to producer on needed repairs or service *for their benefit in utilizing the management information*

Using DC305 to monitor meters

- When done right, this doesn’t loook like a QC regulatory system. It looks like outstanding service.

Using DC305 to monitor meters

- The bottom line – cost effective routine monitoring of meter performance not only helps assure data quality and integrity, but results in **improved communications** with the dairy and a **tighter connection** to the Milk Recording organization..

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Considerations on Meter Performance Reports

- Low cost
- Frequency – i.e. monthly
- Easy for producer
- Easy for DHIA
- Shorter turnaround and targeted repairs compared to annual water test calibration
- Identify weaknesses in the entire linked milk recording system
- Service opportunity for herd recording organization – build value into recording program
- Ongoing assurance of data validity for use in recording programs

Advantages

- Does not clearly indicate whether a meter is operating within tolerances
  - *Part of the process*
  - *Not the answer or result*
- There is no meter system certification or validation without…
  - *communication*
  - *interpretation*
  - *action*
  - *follow-up*
- Does not replace installation test or routine maintenance

Disadvantages

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Who Benefits from Monitoring Meter Performance?

The benefit to milk recording database accuracy is just the frosting on the cake

Dairy Farmers are “Time Poor”

Time $avers with DHIA

- Milk Pregnancy
- PCR DNA
- Action Lists / Chore lists
- Parlor performance data
- Summary and Benchmark data for a look at how I am doing – now I might know where to look

What Else

can we do that is economical, useful, creates good will, and keeps the customer looking to us to help them in a world where data has become overwhelming?

What else can we do

- To make better use of the data we already have?
- To learn more from the milk sample we already have?
- To help sort through all that new data?

Change

- Milk price in the U.S. has changed dairying and milk recording.
- We need to find more useful and creative ways to supply services that make a $ difference to dairies, or we will have a lot less data to worry about in our databases.

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When I grow up and have my own dairy

- *I want to test my fresh cows weekly looking for SCC, ketosis, NEFA, butterfat/protein relationships, and other health tests available in the milk, and more important stuff we don't know about yet*
- *I want to test select pens of animals or select cows in select pens for PG/open using milk*

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When I grow up and have my own dairy

- *I may occasionally even want to test my whole herd ….. If someone else is willing to pay for that - I will share the data with them*
- *I don't need to hire DHIA to collect data I will not be able to use (or want to use)*

When I grow up and have my own dairy

- *it will be large enough for milk recording to justify showing up WEEKLY to sample only the 300 cows in the fresh pen or the 200 cows I plan to dry off in the next 2 weeks*
- *And it will be important enough for me to justify that cost*
- *Do the data folks want good data from my 3,000 fresh cows /yr or not?*

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At times, farmers worry about which data to look at, when they should be worrying about which cow to look at.

- .

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We support our local (& happy) dairy farmers

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What else can we do

to help dairy producers in their endeavor to help feed a hungry world.

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Much can be accomplished by cooperation

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Thank you ICAR

Minnesota DHIA

The World is run by those who show up.

Thank you

for showing up.

Acceptable 817 EMMR

Stall No.	No. Milkings	No. Obs.	% Difference From Expected
101	10	252	-1.1
102	10	246	+1.6
103	10	252	0.0
104	10	257	-0.1
105	10	258	-0.4
106	10	253	-1.9
201	10	259	-0.3
202	10	260	+3.7
203	10	254	+0.7
204	10	258	+0.2
205	10	260	-0.8
206	10	254	-2.0

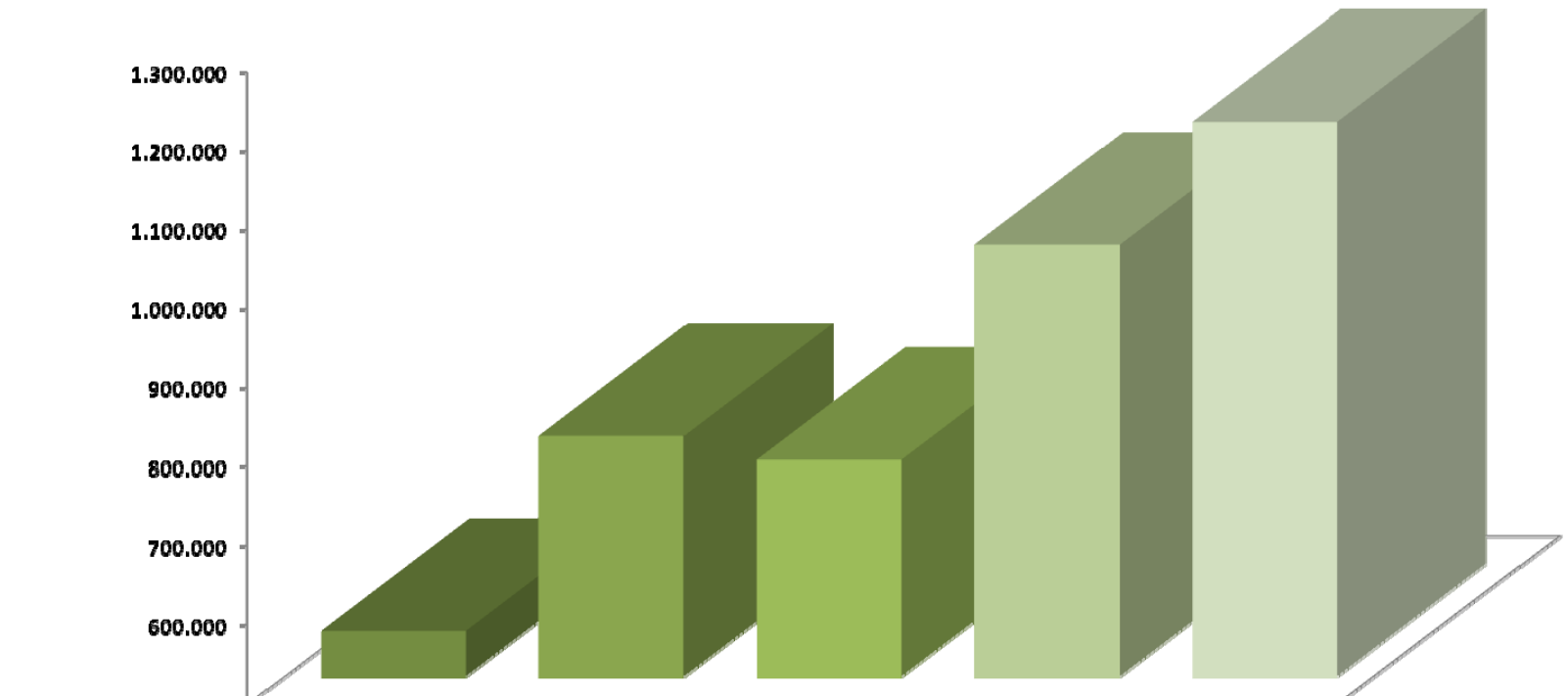
Stall No.= Station (first char.), Side (next char.) and Stall (last 2 chars.)

817 - Milking Report - Electronic Milk Meter Monitoring Report - Date 02-21-2011

Electronic Milk Meter Monitoring Report (EMMMR) Detail
Percent Difference From Expected By Milking

Stall No.	Date/Milking Number 02-21 1	02-21 2	02-21 3	02-20 1	02-20 2	02-20 3	02-19 1	02-19 2	02-19 3	02-19 4
101	+1.1	+2.4	-3.5	-2.4	-2.1	+1.4	-7.7	+0.4	-1.2	+1.1
102	+9.2	-0.7	-2.7	+1.6	+5.8	+1.8	+3.3	+2.1	-0.5	-4.5
103	-1.4	+0.7	+1.2	+1.1	-1.0	-1.4	+2.1	+0.1	-0.6	-1.2
104	-2.4	-3.1	-0.2	+2.0	+4.1	-1.3	+1.1	-2.6	-0.3	+2.5
105	-2.2	-1.6	+1.4	+4.8	-2.5	-0.4	+1.6	-0.3	-4.2	-1.0
106	+2.3	-5.8	-2.3	-3.5	-3.7	-1.4	-0.9	+0.2	-1.4	-2.8
201	-4.6	-2.5	+2.6	+1.3	-0.3	-0.6	-3.4	+1.9	+1.1	+1.1
202	+1.9	+3.2	+5.7	+2.8	+2.4	+4.9	+5.9	+2.3	+3.7	+4.2
203	-0.4	-0.5	+2.1	+2.0	+0.8	+1.3	+0.7	+0.6	-2.0	+2.1
204	+1.4	+1.1	+0.5	-2.9	-1.2	+2.5	+0.7	-0.7	+1.8	-0.6
205	+0.0	-4.0	-1.3	+0.6	-0.1	-2.0	-2.4	0.0	+2.3	-1.9
206	-3.3	-2.5	-2.8	-5.3	+0.2	-4.1	-0.9	-1.7	+2.4	-1.2

DHI Cows by Herd Size During 2016



	1-99	100-299	300-749	750-1999	2000+
Number of Cows on DHI	557.683	803.683	773.705	1.046.183	1.201.811

Number of Cows per Herd

Potential Sources of Error in Data Recording

Accuracy	Excellent	Good	Fair
Milk Meter	98%	98%	98%
Controller	99%	99%	99%
Animal ID	100%	97%	95%
Milker (Human)	99%	99%	99%
Data Transfer	100%	100%	100%
Maximum Data Accuracy from On-Farm System	**96%**	**93%**	**90%**

- **Calibrating the milk meter alone may not be sufficient**
- **Errors also exist when using portable meters for herd recording**
- **Need to review entire system and minimize errors**

Variables Required for Meter Performance Report

- **Date**
- **Herd name or Herd code**
- **Animal ID**
- **Stall or meter ID**
- **Measured milk weight**
- **Number of milkings represented at each stall/meter**
- **Deviation for each stall/meter**
- **Optional**
  - ***Defined tolerance for reference***
  - ***ID errors (missing cows, duplicate reads, wrong pens)***
  - ***Reattachment and manual detach incidents***
  - ***Milking time deviations***
  - ***Milking speed***
  - ***Cross reference with milk shipped weights integrated into the report or software program***

Calculation of the Daily Milk Meter's Performance

Expected Milk Weight (MW) this milking

$$\textit{Yield average on the last X milkings at } M_n \textit{ * "herd factor"}$$

$$\left(\frac{\Sigma_{i=1}^{X} y_{ni}}{X}\right) \times \frac{h_{n(\textit{current milking})}}{\left(\frac{\Sigma_{i=1}^{X} h_{ni}}{X}\right)}$$

Deviation from Expected

$$\textit{Cow Deviation}\ (\text{kg}) = \textit{Measured yield}\ (\text{kg}) - \textit{Expected yield}\ (\text{kg})$$

Meter Deviation (%)

$$\frac{\textit{sum of cow deviations}\ (\text{kg})\ \textit{for this milk meter}}{\textit{sum of expected yields}\ (\text{kg})\ \textit{of these cows for this milk meter}} \times 100$$

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Removal of Outliers from Calculation

Expected Milk Yield (2x), Adjusted for Herd Effect

	<65%	<70%	<75%	<80%	>120%	>125%	>130%	>135%
Observed,n	12	21	33	69	109	33	15	12
Observed, %	0.07	0.12	0.18	0.37	0.42	0.18	0.08	0.07
<14 DIM	8	14	20	46	84	24	11	10
14-21 DIM	3	5	5	8	10	5	2	1
22-28 DIM	1	1	4	7	7	3	2	1
29-35 DIM	0	1	2	4	5	1	0	0
>35 DIM	0	0	2	4	3	0	0	0

- **Exclusion of cows <30 DIM from meter performance report is justified as prediction of expected milk yield is unreliable**
- **May consider removal of expected milk yields deviating ±30%**

Accurate ID is Important

Cow ID and Stall ID are essential to the Meter Performance Report

- **Electronic ID systems**
  - **Manufacturer ID – transponders**
  - **Third Party EID tags and readers**
  - ***Primary Source of Error – TECHNOLOGY***
- **Manual ID entry**
  - **Cow ID is keyed on the controller in the milking stall**
  - **Usually leg bands or visual cow number**
  - ***Primary Source of Error - HUMAN***

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Verification of ID System is Needed…

NorthStar DHIA Services

Electronic ID Verification

Herd Owner: BRUCE + DOUG BLOOM
Herd Number: 34120701
Technician: EVERETT WIEGAND
Technician Number: 564
Date of Test: 08-14-04

Stall #	Elect. ID	Visual ID	Correct	Stall #	Elect. ID	Visual ID	Correct
1	2703	2703	✓	1	2535	2535	✓
2	2737	2737	✓	2	2670	2670	✓
3	2701	2701	✓	3	2767	2767	✓
4	2698	2698	✓	4	2727	[illegible]	✓
5	2677	[illegible]	✓	5	2537	2537	✓
6	2529	2529	✓	6	2599	2599	✓
7	2687	[illegible]	✓	7	2674	2674	✓
8	2720	[illegible]	✓	8	1693	1693	✓
9	9918	9918	✓	9	0	2680	0
10	2709	[illegible]	✓	10	2699	2699	✓
11	2754	[illegible]	✓	11	2724	2724	✓
12	[illegible]	[illegible]	✓	12	2679	2679	✓
13				13			

23 out 24 Animals Read Correctly

Deviating Meters on the Report

- **It does not necessarily mean the meter is out of calibration…**
  - **But if one meter is out of tolerance on the report, the whole report is not usable**
- **Time to be a detective and isolate/correct errors…**
  - **Primary contacts**
    - ***Dairy Manager***
    - ***Representative(s) from Herd Recording Organization***
  - **Secondary contacts**
    - ***Milker(s)***
    - ***Representative from Equipment Manufacturer***

Meter Performance Reports cannot be used with..

- **Herds with incomplete identification or EID system challenges**
- **Herds with one or more failing/non-communicating controllers**
- **Herds with one or more missing or out-of-service meters**

Sources of Variation – ID System

Possible cause(s)

- **Inaccurate ID reads fro automated system**
- **Incomplete herd ID**
- **Duplicate animal ID**
- **Data entry errors by milking personnel**

817 - Milking Report - Electronic Milk Meter Monitoring Report - Date 07-31-2009

Electronic Milk Meter Monitoring Report (EMMR) Detail
Percent Difference From Expected By Milking

Stall No.	07-31 1	07-31 2	07-30 1	07-30 2	07-29 1	07-29 2	07-28 1	07-28 2	07-27 1	07-27 2
	********** Date/Milking Number **********									
80	+10.1	+49.2	+14.6	-8.0	+7.9	+8.2	+11.4	+19.4	+18.7	+18.9
81	-0.1	+52.4	+10.6	+3.3	+4.7	+13.7	+9.9	+24.8	+10.0	+14.8
82	+1.1	+27.3	-0.8	+9.5	+10.0	+19.9	+16.1	+8.8	+29.2	+12.5
83	+10.3	+47.0	+5.0	+6.8	+6.8	+15.5	+13.3	+26.2	+7.3	+19.6
84	+26.9	+56.6	-2.6	+9.8	+5.7	-0.2	+13.3	+17.8	+39.0	-8.6
85	-8.9	+19.4	+5.3	+2.8	-3.5	+11.3	+21.4	+31.4	+20.9	+18.3
86	+116.5	+39.0	+0.9	-28.2	+5.7	+12.7	+15.0	+22.2	+39.3	+27.7
87	+2.0	+59.2	+2.5	+27.5	+0.6	+16.2	+2.3	-5.1	+25.8	+18.3
88	+4.9	+23.8	+22.5	-98.6	+21.8	-24.9	-9.0	+40.3	+44.9	+24.5
89	-4.9	+42.5	+42.5	+73.6	+36.3	+163.0	+30.1	+33.2	+14.9	+18.6
90	+18.6	+10.7	+19.8	+39.0	+27.3	+22.4	+22.4	+11.9	-1.9	+110.9
91	+110.9	+51.5	+12.3	+33.7	+7.9	+51.2	+8.5	+5.4	+18.5	+113.5
92	-11.8	+59.7	+64.5	+24.8	+53.8	+57.8	+57.5	+48.5	+77.9	+27.9
93	+54.8	+60.1	+74.9	+73.2	+20.8	+23.7	+39.6	+21.1	+28.3	+41.8
94	+17.4	+46.3	+48.4	+38.3	+38.4	+29.7	+8.8	+15.6	+54.6	+54.6
95	+41.9	+51.8	+43.6	+66.2	+12.1	+100.5	+39.8	+40.2	+25.9	+45.8
96	+20.5	+43.9	+35.6	+56.3	+78.5	+60.1	+19.6	+27.7	+33.5	+18.4
97	+18.4	+40.9	-13.3	+79.1	+12.3	+103.0	+13.6	+91.0	+45.6	-1.6
98	+39.6	+51.0	+23.0	+103.0	+7.4	+98.8	+28.4	+24.9	+28.9	+58.3
99	-21.5	+31.5	+7.7	+30.7	+1.8	+35.8	+26.6	+72.4	+32.9	+83.7
100	+36.5	+25.7	+70.9	+116.0	+84.3	+86.5	+31.8	+60.3	+44.6	+54.8
101	-11.8	+83.8	+132.8	+194.7	+27.3	+77.7	+22.4	+99.0	-28.5	+116.6
102	+11.6	+29.2	-5.0	+39.8	+6.1	+46.4	+4.0	+16.7	-19.2	+5.7
103	-3.6	+46.8	+89.7	+80.2	+111.3	+49.7	+61.4	+22.1	+29.4	+119.8
AV.	+13.8	+43.7	+27.6	+40.6	+24.4	+44.9	+20.2	+32.3	+25.9	+40.0

Detail information for each milking for each cow is stored in file MeterDtl.csv
File is located in C: PCDART 12184502. Open file with spreadsheet program.

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Sources of Variation – Equipment

- **Reattachment of milkers – Is the total milk weight computed?**
- **Treated cows – do they bypass the meter?**
- **Incomplete letdown by cows**
- **Meter out of calibration**

817 - Milking Report - Electronic Milk Meter Monitoring Report - Date 06-25-2009

Electronic Milk Meter Monitoring Report (EMMMR) Detail
Percent Difference From Expected By Milking

Stall No.	06-25 1	06-25 2	06-25 3	06-24 1	06-24 2	06-24 3	06-23 1	06-23 2	06-23 3	06-23 4
	********** Date/Milking Number **********									
1	+8.1	+2.9	+6.9	+7.8	-0.4	-2.4	+1.6	+1.0	+3.0	+8.9
2	+0.8	+9.5	+4.7	-1.5	+9.6	+5.4	+6.9	+5.7	+3.8	+1.5
3	+4.6	+12.3	+8.4	+9.9	+6.9	+2.1	+6.4	+8.4	+2.9	+2.3
4	+8.0	+2.5	-4.1	+2.8	+3.4	+9.5	+7.2	+4.3	+7.5	+2.4
5	+9.4	+11.7	+3.3	-4.6	+3.7	+6.6	+5.0	-3.0	+13.5	+6.7
6	-2.3	+1.0	+0.6	-0.8	+0.3	-2.3	+4.1	+0.3	-0.9	-1.3
7	+10.4	+6.3	-2.3	+6.0	+7.6	+3.6	+4.7	+6.2	+8.0	+10.0
8	+6.4	-0.6	+0.2	+3.8	+3.3	+1.1	+2.4	+5.8	+6.6	+2.7
9	+4.1	+4.3	+3.3	-0.5	-2.1	+2.3	+1.7	+7.9	+3.8	+8.4
10	+0.3	+4.1	+12.5	+7.8	+0.2	+0.2	+7.8	+8.8	+9.5	+6.3
11	+11.4	-1.6	+9.8	+5.6	+1.9	+2.7	+4.3	+4.0	+1.3	-0.2
12	+2.4	+13.1	+2.2	+4.6	+6.2	+3.0	-5.5	+3.1	-1.6	-0.3
13	-3.3	+0.0	+3.3	-0.6	+2.1	+4.1	+7.8	+5.5	+3.4	-1.0
14	+2.4	+4.2	+13.0	+9.5	+7.1	+6.5	+11.7	+9.4	+6.1	+8.8
15	-5.9	-5.5	-6.2	-3.4	+4.0	-3.8	-5.3	-10.9	-4.9	-11.6
16	+10.3	+10.2	+6.2	+9.8	+14.7	+6.2	+6.3	+10.3	+6.3	+10.6
17	-27.0	-21.9	-22.1	-28.2	-30.1	-23.8	-23.8	-29.2	-24.0	-19.0
18	+1.8	+6.9	+8.2	+9.6	+8.1	+7.8	+13.3	+5.1	+6.2	+1.2
19	-23.3	-22.9	-25.2	-24.3	-27.3	-22.5	-26.7	-22.4	-24.9	-20.1
20	+3.3	+3.2	+10.4	+8.8	-1.2	+15.1	+9.3	+9.7	+6.0	+5.0
21	-25.7	-35.5	-27.9	-18.3	-26.2	-22.0	-26.5	-26.1	-24.4	-25.6
22	-13.1	-14.8	-15.4	-12.1	-10.8	-15.4	-18.5	-21.2	-17.4	-14.2
23	+5.3	+4.4	+6.3	+7.9	+6.2	+8.1	+1.2	+3.1	-2.6	+3.2
24	+3.2	-1.4	-5.7	-0.5	+1.7	-5.0	-1.2	-2.3	-0.6	-2.9
AV.	-0.3	-0.3	-0.4	0.0	-0.5	-0.5	-0.2	-0.7	-0.6	-0.8

Detail information for each milking for each cow is stored in file MeterDtl.csv
File is located in C: PCDART 23150461. Open file with spreadsheet program.

Sources of Variation - Equipment

- **Meters installed properly?**
- **Meter out of calibration?**
- **Modifications to milking system?**

Electronic Milk Meter Monitoring Report (EMMMR) Detail
Percent Difference From Expected By Milking

Stall No.	03-18 1	03-18 2	03-18 3	03-17 1	03-17 2	03-17 3	03-16 1	03-16 2	03-16 3	03-15 1
	********** Date/Milking Number **********									
1	+0.0	+1.7	+1.2	+5.1	+5.4	+0.2	+2.9	+2.0	+0.2	+3.7
2	+4.4	+4.5	+5.9	+9.6	+9.9	+1.5	+3.7	+10.0	+1.2	+4.7
3	+2.2	+4.8	+2.9	+3.7	+5.0	-1.2	+4.5	+8.8	+1.2	+5.5
4	-34.2	-37.1	-31.4	-30.6	-25.0	-15.5	-31.0	-30.4	-38.8	-37.4
5	+5.2	+8.2	+4.0	+3.2	+13.4	+3.6	+6.2	+2.0	+2.6	+5.6
6	+0.1	-5.1	-3.4	-5.2	-6.2	-1.2	-9.9	-6.6	-4.7	-1.3
7	+4.5	+4.2	+0.3	+0.9	+0.0	+4.7	+3.8	+7.2	+4.2	+4.6
8	+1.4	+5.1	+3.2	+2.3	-1.2	-1.3	+1.1	+5.3	+2.9	-4.1
9	+2.4	+0.4	+0.2	+1.3	-3.2	-3.3	+8.5	-2.7	-0.5	+3.8
10	+7.4	+6.7	+3.7	-1.5	+8.0	+0.0	+0.6	+1.7	+7.3	+9.8
11	-0.4	+0.0	-1.0	+5.3	-6.5	+0.5	+7.1	+4.6	+9.9	-0.2
12	+4.4	+6.1	+9.6	+7.8	+1.4	+6.6	+2.5	-3.0	+5.3	+6.9
AV.	+0.3	+0.2	+0.1	+0.0	+0.4	-0.4	+0.6	-0.2	-0.3	+0.1

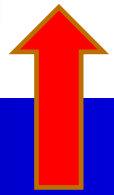
Detail information for each milking for each cow stored in file METERDTL.CSV
File is located in PCDART 32200303. Open file with spreadsheet program.

Sources of Variation – Missing Milkings

Electronic Milk Meter Monitoring Report (EMMMR) Detail

Percent Difference From Expected By Milking

	********** Date/Milking Number **********									
Stall No.	07-30 1	07-30 2	07-29 1	07-29 2	07-28 1	07-28 2	07-27 1	07-27 2	07-26 1	07-26 2
80	+4.6	-4.2	+5.2	-4.2	+0.1		+22.9	-2.1	+4.5	-3.6
81	+3.6	-5.4	+4.1	-5.4	-4.1		+7.6	+0.9	-0.6	+10.1
82	-1.7	-6.2	-2.9	-6.2	+0.0		-3.8	-0.6	+4.4	-6.9
83	+15.0	+10.1	+3.2	+10.1	+11.0		+0.4	-3.4	+3.3	+2.1
84	+9.1	+14.0	+9.5	+14.0	-7.4		+1.2	+11.3	-5.1	+10.3
85	+4.8	+7.4	+5.1	+7.4	+2.3		+9.6	-4.6	+6.0	-1.5
86	-97.5	-96.4	-98.0	-96.4	+6.1		+9.9	+0.0	+4.9	-3.5
87	+1.8	-0.7	+2.4	-0.7	+4.3		-0.7	+6.1	-0.6	+5.2
88	+5.1	+14.1	+5.5	+14.1	+1.4		+0.5	-12.4	+23.6	+4.0
89	-2.0	+3.7	-1.5	+3.7	+1.2		+2.5	+1.5	+9.3	+1.3
90	-9.7	-0.3	-9.3	-0.3	+1.5		-3.2	-0.3	-2.7	+3.6
91	+8.4	-5.2	+3.8	-5.2	-6.3		-1.6	-6.3	-6.5	-6.0
92	+3.7	+3.3	+8.5	+3.3	-0.1		-3.0	+3.5	-4.3	-6.2
93	-6.9	+2.6	-6.6	+2.6	-1.3		-3.8	+8.2	+2.0	+0.4
94	+4.2	+5.0	+4.6	+5.0	-3.9		-2.5	-8.0	+8.1	-0.7
95	+5.4	+1.9	+4.1	+1.9	-11.3		-2.2	-0.8	+1.9	-0.7
96	-3.0	+0.6	-8.4	+0.6	+3.5		+3.0	+4.5	-19.7	+0.0
97	+5.3	+10.4	+5.7	+10.4	+2.5		+3.9	+8.0	+1.9	+0.0
98	+0.5	+6.0	+3.0	+6.0	+0.4		-6.4	+1.7	+4.6	+1.2
99	+0.7	+22.3	+0.8	+22.3	+1.1		+4.5	-2.1	+4.0	-1.6
100	-0.1	+3.4	+0.3	+3.4	+5.8		-14.7	-3.4	+0.1	-3.3
101	+2.0	+7.7	+2.3	+7.7	-3.4		+4.3	+8.4	-8.4	-2.1
102	-2.9	+1.2	-2.2	+1.2	-1.7		-6.4	-2.6	-0.4	-0.4



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Sources of Variation – Software/Interface

- **Upload/interface errors**
  - **ID data not transferred properly**
  - **Milk weights not transferred**
  - **Stall identification errors**
- **Software upgrades or modifications**

Stall No.	No. Milkings	No. Obs.	% Difference From Expected		
80	10	13	-4.1		
81	10	12	-14.9	Diff.	5%
82	10	15	+7.7	Diff.	5%
83	10	16	+12.7	Diff.	5%
84	10	13	-5.0	Diff.	5%
85	10	9	-3.0		
86	10	14	+16.5	Diff.	5%
87	10	15	-2.9		
88	10	10	-9.8	Diff.	5%
89	10	7	+3.7		
90	10	2	-39.3	Diff.	5%
91	10	20	-2.4		
92	10	15	+16.7	Diff.	5%
93	10	8	-15.6	Diff.	5%
94	10	6	-23.2	Diff.	5%
95	10	12	-21.8	Diff.	5%
96	10	13	-2.1		
97	10	9	+6.5	Diff.	5%
98	10	8	-2.1		
99	10	10	-10.4	Diff.	5%
100	10	7	+1.5		
101	10	13	+6.3	Diff.	5%
102	10	15	+4.8		
103	10	9	+9.5	Diff.	5%

Electronic Milk Meter Monitoring Report (EMMMR) Detail
Percent Difference From Expected By Milking

Stall No.	Date/Milking Number 03-11 1	03-11 2	03-11 3	03-10 1	03-10 2	03-10 3	03-09 1	03-09 2	03-09 3	03-08 1
80	+3.8	-25.6	+523.8	+10.1	+9.8		+9.2	-18.3	-19.0	+7.4
81	-20.2		-93.9		+12.4	-17.9	-33.8	-0.2	+7.3	
82		+20.6		+7.3	+24.7	+1.0	+6.6	-1.1	-16.6	+9.2
83	+15.4	+21.3	-93.7	+16.2	+13.2	+23.7	+15.1	-16.4	+20.6	+16.9
84	-19.7		+171.8	-36.6	+25.6	+16.5	-36.9	-9.7		-8.3
85	+4.2	+5.0	-92.3		-2.8			+0.0		-4.6
86				+12.5	-2.6	+21.4	+11.8	+61.2	-9.2	+9.0
87	-5.6	-21.6	-94.6	-0.9	-3.3	-0.4	-1.7		+9.4	
88	+0.0	+36.0		-8.2	-34.4	-32.6	-8.9	-17.5	-22.4	-14.9
89	+0.0	+24.2			-2.7	+6.4		-5.2		+6.3
90					-47.6	-31.2				
91	+8.1	-2.1	-93.6	-3.2	-4.5	-11.6	-3.7	-10.2	+32.1	-29.4
92		+4.7	+531.3	+32.8	+33.7	-7.2	+31.9	-5.3	-9.7	-8.5
93		-16.6	-91.9	-9.5	-11.8	+10.9	-10.4			
94	-1.5	-6.7	-94.8							-26.2
95		-22.3	-33.3	-31.2		-21.0	-31.5		-11.9	
96	-10.1	-9.9	-95.1	+9.7		-18.7	+9.0	+4.6	+21.6	+2.9
97				+2.8	+0.3	+25.8	+1.9	-2.2		-2.7
98				+16.7	-18.5	+35.8	+16.0		-16.9	+2.5
99	+16.5		-90.0		-24.5			+10.8	-16.5	+0.0
100		-12.5				+8.1			-1.4	+18.4
101	+0.0	-20.3		+1.0	+43.6	-5.7	+0.2	+24.3	+22.8	+8.4
102	-3.5	+0.2	+607.3	-6.3	+12.9		-7.3	-10.7		-3.3

Dairies

- Many problems are caught and fixed by the dairy, we think

Minnesota DHIA

We perform this service whether the herd contributes their data or not

Minnesota DHIA