**TEAM**

Chair Asha Miles | USDA-ARS-AGIL

Membership Jeffrey Bewley | HAUSA

Sophie Eaglen | NAAB

 Robert Fourdraine | DRMS

 Kristen Gaddis | CDCB

 Steven Sievert | NDHIA

Advisory Joao Durr | CDCB

 Jay Weiker | CDCB BOD

In attendance: Asha, Joao, Jay, Steve, Robert, Kristen, Jeffrey

In absentia: Sophie, Steve last ½

**PROPOSED AGENDA**

1. **Example data file with flow rates (Steve)**

Raw data exported from the cloud can vary by OEM and nomenclatures but usually include the following information:

|  |  |
| --- | --- |
| Header | Description |
| Cow\_number | Herd-specific, not unique |
| Cow\_id | Herd-specific, not unique |
| Meter\_address | ID for specific meter in parlor |
| Milkingshift\_id |  |
| Flow\_0\_15\_sec | Lbs of milk during this specific time interval |
| Flow\_15\_30\_sec | Lbs of milk during first 15-30sec |
| Flow\_30-60\_sec | “ |
| Flow\_60\_120\_sec | “ |
| Milk\_weight | Total milk yield (lbs) |
| Attach\_duration | Time from cluster attachment to take off  |
| Reattach\_counter | Binary, yes or no |
| Manual\_mode\_count |  |
| Manual\_detach\_count |  |
|  |  |

Flow rates are more for management insights – indicative of equipment and milker performance (udder prep, initial letdown, etc.) and will vary greatly by cow, milking event, and milkers). Nonetheless, may have effect on overall MS. Data is available with this level of precision, how useful/noisy it is TBD.

1. **Discuss expanded data analysis (Asha/Kristen)**
	1. Robert provided 7 new herds (2 AMS)
	2. See data-summary below notes in comments below
	3. Lead on more AMS data (Jeffrey) interested producer using GEA rotary robot
2. **Plan for CDCB Producer Advisory Committee Meeting**
	1. Brainstorm questions tabled
	2. Timeline/Schedule Meeting? No rush, after PAC election in April
3. **Schedule next meeting/action items**

What’s next?

PAC – several members mentioned they have a lot of data from their parlor & use to group cows by lactation and MS within lactations and have increased throughput by 25% by doing this

 \*May be willing to share some data we can add in

We want to present on these data in broader context of management insights, but also for eventual GE.

Action Items

-add more data (AMS)

 Follow-up with PAC (~2+ herds)

 Jeffrey will follow-up with 1 large herd

-expand analysis, especially milking interval for AMS

**2b. DATA SUMMARY**

**Traditional Herds (n = 6)**

***Data cleaning***

The constraints outlined in Table 1 were decided after exploratory analysis of Herd 9 only. Table 1 shows the reduction in usable data for each traditional (non-AMS) herd and the total dataset per these filtering and editing rules.

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| Table 1. |
|  | Herd 9 | Herd 1 | Herd 2 | Herd 37 | Herd 4 | Herd 5 | ALL  |
| Starting # records | 1,183,269 | 363,451 | 284,319 | 165,297 | 259,476 | 66,168 | 2,321,980 |
| *Subsetting* |  |  |  |  |  |  |  |
|  Holstein only | 1,173,309 | 311,607 | 269,028 | 144,555 | 197,830 | 62,294 | 2,158,623 |
|  Last 150d only | **882,561** | **296,935** | **252,625** | **139,611** | **193,608** | **61,421** | **1,826,761** |
| *Data cleaning* |  |  |  |  |  |  |  |
|  Milking duration1 | 744,513 | 241,326 | 232,673 | 129,361 | 179,983 | 58,374 | 1,586,230 |
|  Milk weights2 | 742,184 | 241,130 | 232,572 | 119,138 | 179,625 | 57,582 | 1,572,231 |
|  Milking speed3 | 694,827 | 235,903 | 228,793 | 115,838 | 178,642 | 57,432 | 1,511,435 |
|  DIM4 | 624,315 | 178,767 | 184,784 | 93,082 | 144,140 | 45,538 | 1,270,626 |
|  >10 records/cow5 | 622,603 | 178,028 | 183,606 | 92,790 | 143,767 | 45,362 | 1,266,156 |
| **Final # records** | **622,603** | **178,028** | **183,606** | 92,790 | **143,767** | **45,362** | **1,266,156** |
| **% reduction6** | **29.5%** | **40.1%** | **27.3%** | **33.5%** | **25.8%** | **26.1%** | **30.7%** |
| 1duration > 1 min and < 15 minutes2milk weights >1 lb and < 60 lbs3milking speed > 1 lb/min and < 15 lbs/min4d in milk > 10 and < 3055at least 10 observations per cow6data lost per herd relative to bolded # of subsetted records, not starting #7this was a 2X herd, all others 3X |

***Correlations of Milking Speed among Milkings***

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| --- |
| Table 2.  |
|  | Herd 9 | Herd 1 | Herd 2 | Herd 3 | Herd 4 | Herd 5 | **ALL** |
| MS1:MS2 | 0.49 | 0.62 | 0.57 | 0.57 | 0.78 | 0.69 | **0.62** |
| MS1:MS3 | 0.47 | 0.63 | 0.57 | -- | 0.77 | 0.72 | **0.61** |
| MS2:MS3 | 0.47 | 0.61 | 0.65 | -- | 0.77 | 0.70 | **0.63** |

***Correlations between Milking Interval and Milking Speed***

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| --- |
| Table 3.  |
|  | Herd 9 | Herd 1 | Herd 2 | Herd 34 | Herd 4 | Herd 5 | **ALL** |
| MI311:MS1 | -0.17 | -0.02 | -0.04 | -0.02 | -0.20 | -0.04 | **-0.21** |
| MI122:MS2 | 0.10 | 0.01 | 0.17 | -0.01 | 0.09 | 0.29 | **0.09** |
| MI233:MS3 | 0.12 | 0.01 | 0.09 | -- | 0.15 | 0.06 | **0.09** |
| 1interval between milking 3 of the prior day and milking 1 of the day of MS12interval between milking 1 and milking 23interval between milking 2 and milking 342X herd, so MS31 is really MS21 |

Hypothesize that the higher correlations could be in cases where the interval is longer (for that particular herd). Need to pull out those metrics to confirm (e.g., is the longest MI for Herd 2 MI12, positive correlation suggests as MI is longer MS is faster). The absolute value of each MI was taken first, so negative correlations are not an artifact of how “time” is written/calculated across dates, they indicate an actual inverse relationship of milking interval and speed.

***Correlations between Milking Speed and Milk Yield***

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| Table 4.  |
|  | Herd 9 | Herd 1 | Herd 2 | Herd 3 | Herd 4 | Herd 5 | **ALL** |
| MS1:MY1 | 0.56 | 0.59 | 0.46 | 0.39 | 0.62 | 0.57 | **0.58** |
| MS2:MY2 | 0.59 | 0.59 | 0.46 | 0.44 | 0.61 | 0.55 | **0.53** |
| MS3:MY3 | 0.57 | 0.61 | 0.43 | -- | 0.61 | 0.56 | **0.55** |
|  |  |

***Milking Speed over Lactation – ALL HERDS***

Edited data for all but the DIM constraints are plotted. The red dashed lines indicate DIM constraints of >10 DIM and <305 DIM. Sample Size by DIM is also plotted to show availability of data in early and late lactation.











**AMS Herds (n = 2)**

***Raw Data Summary***

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***Data Cleaning***

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| Table 5. |
|  | Herd 6 | Herd 7 | AMS ALL | Traditional ALL  |
| Starting # records | 80,271 | 60,352 | 140,623 | 2,321,980 |
| *Subsetting* |  |  |  |  |
|  Holstein only | 78,871 | 53,198 | 132,069 | 2,158,623 |
|  Last 150d only | **76,329** | **39,736** | **116,065** | **1,826,761** |
| *Data cleaning* |  |  |  |  |
|  Milking duration1 | 72,258 | 37,132 | 109,390 | 1,586,230 |
|  Milk weights2 | 69,194 | 36,531 | 105,725 | 1,572,231 |
|  Milking speed3 | 54,402 | 29,480 | 83,882 | 1,511,435 |
|  DIM4 | 43,983 | 14,521 | 58,504 | 1,270,626 |
|  >10 records/cow5 | 43,545 | 14,281 | 57,826 | 1,266,156 |
| **Final # records** | **43,545** | **14,281** | **57,826** | **1,266,156** |
| **% reduction6** | **43.0%** | **64.1%** | **50.2%** | **30.7%** |
| 1duration > 1 min and < 15 minutes2milk weights >1 lb and < 60 lbs3milking speed > 1 lb/min and < 15 lbs/min4d in milk > 10 and < 3055at least 10 observations per cow6data lost per herd relative to bolded # of subsetted records, not starting # |

***Correlations of Milking Speed among Milkings***

For now, these were only calculated for the first 3 milkings, as with traditional herds, given the steep drop off in sample size.

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| Table 6.  |
|  | Herd 6 | Herd 7 | AMS ALL | **Traditional ALL** |
| MS1:MS2 | 0.71 | 0.54 |  | **0.62** |
| MS1:MS3 | 0.72 | 0.56 |  | **0.61** |
| MS2:MS3 | 0.73 | 0.62 |  | **0.63** |

***Correlations between Milking Interval and Milking Speed***

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| --- |
| Table 7.  |
|  | Herd 6 | Herd 7 | AMS ALL | **Traditional ALL** |
| MI311:MS1 |  |  |  | **-0.21** |
| MI122:MS2 | 0.26 | 0.26 |  | **0.09** |
| MI233:MS3 |  |  |  | **0.09** |
| 1interval between milking 3 of the prior day and milking 1 of the day of MS12interval between milking 1 and milking 23interval between milking 2 and milking 3 |

***Correlations between Milking Speed and Milk Yield***

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| --- |
| Table 8.  |
|  | Herd 6 | Herd 7 | AMS ALL | **Traditional ALL** |
| MS1:MY1 | 0.50 | 0.59 |  | **0.58** |
| MS2:MY2 | 0.52 | 0.60 |  | **0.53** |
| MS3:MY3 | 0.49 | 0.60 |  | **0.55** |
| 1interval between milking 3 of the prior day and milking 1 of the day of MS12interval between milking 1 and milking 23interval between milking 2 and milking 3 |

***Milking Speed over Lactation – ALL HERDS***

Edited data for all but the DIM constraints are plotted. The red dashed lines indicate DIM constraints of >10 DIM and <305 DIM. Sample Size by DIM is also plotted to show availability of data in early and late









In AMS system you change feed tables based on DIM, tend to be strict cut offs that don’t follow a curve (can create some of these dramatic changes in sample size – issue of feed availability)