

Aiding selection decisions for dairy females using genomics and sexed semen

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DAIRY RECORDS MANAGEMENT SYSTEMS

www.drms.org

Why genotype heifers?

For \$28€ – 35 € per heifer,
producers can purchase genotypes
with reliability ~ 70% for production traits

... compared with ~ 35% from
parent averages if both parents are known

Decision making...

- Received first female genomics results in February 2012
- Dairy producers – which heifers to:
 - Flush for merchandizing
 - Flush for their own herd
 - Breed with sexed semen
 - Breed to beef bull or cull



Integrating into Commercial Dairy*

- **Multiple options to improve profitability**
 - **Cull at 2 mo or cull as yearlings**
 - **Genotype bottom 50%, keep top 90%**
 - **Genotype top 50%, select top 10, 20 or 30%**
 - **Genotype all, sell bottom 10, 20 or 30%**
 - **...**

* Weigel, K.A., P.C. Hoffman, W. Herring, and T.J. Lawlor, Jr., 2012. Potential gains in lifetime net merit from genomic testing of cows, heifers, and calves on commercial dairy farms. *J. Dairy Sci.* 95:2215-2225.



Who is DRMS?

- 1 of 4 Dairy Records Proc. Centers in U.S.
- Edit and process DHIA records
- Deliver management reports and data files
- Software for on-farm, web and handhelds
- 19 dairy farmer cooperatives
 - 31 labs
 - 780 field technicians
 - 14,000 herds
 - 2.2m cows (49% of U.S. DHIA cows)



795 Herds are Genotyping

61% enrolled on breed registry programs

39% not enrolled

34% < 100 cows

50% 100 – 499

10% 500 – 999

6% \geq 1,000

RHA Milk for Holstein herds

10% < 9,000 kg

44% 9,000 – 10,999

38% 11,000 – 12,999

8% \geq 13,000



18,496 heifers in 795 herds

17,322	Holstein	56%	0 – 3 mo
1,092	Jersey	18%	4 – 6 mo
81	Brown Swiss	18%	7 – 12 mo
		8%	13+ mo

82%	Sire and Dam
13%	Sire only
3%	Dam only
2%	Neither parent



Rate of Heifer Genomic Testing

75% < 10% of heifers

15% 10 – 24%

7% 25 – 49%

3% > 50%



List 1. Which heifers to genotype?

- 'Heifers < 6 months – Not Genome Tested'
- Sorted on Parent Average for Net Merit
 - Prediction of lifetime profit minus breed average
- Target potential heifers to flush or cull
 - * some have recommended breeding 'bottom' to beef bulls

List 1.

Barn Name	Heifer	Birth Date
SASHA	11111130	1-17-12
ELWOOD	11111131	2-24-12
869	11111132	2-21-12
LILA	11111133	4-24-12
BLANCH	11111134	1-15-12

Sire	Dam Barn Name	MGS
1HO08784	SALTY	7HO07839
14HO05639	ERICA	29HO12209
14HO05639	ERICA	29HO12209
1HO09167	ELAINE	29HO12209
1HO08778	BOUNCER	7HO08221

Hfr Flag	NMS	Parent Average PTA					
		Milk	Fat	Pro	SCS	PL	DPR
P 94	+517	+1049	+32	+34	2.39	4.0	+0.7
P 86	+509	+1121	+61	+30	2.33	3.4	+0.0
P 86	+509	+1121	+61	+30	2.33	3.4	+0.0
P 78	+469	+1240	+35	+33	2.42	3.4	+0.5
P 73	+463	+1093	+29	+31	2.45	4.3	+0.0



List 1.

Hfr Flag		NM\$
P 94		+517
P 86		+509
P 86		+509
P 78		+469
P 73		+463
P 68		+429
P 63		+420
P 52		+419
P 52		+419
P 52		+419
P 42		+417
P 36		+413
P 31	S	+396
P 23	S	+353

Heifer Flag = rank
for NM\$
on this list

Sire only
... missing Dam



List 2. Which heifers to keep?

- 'Heifers < 12 Months – Genome tested'
- Genotypes replace parent averages
- Plus gPTA Type and inbreeding coefficient

List 2.

Hfr Flag	NM\$
N 20	+703 G
N 20	+697 G
N 20	+685 G
N 20	+603 G
N 20	+591 G
P 80	+557 G
P 77	+556 G
P 74	+555 G
P 70	+533 G
P 67	+510 G
P 64	+507 G
P 61	+500 G
P 58	+499 G
P 54	+484 G
P 51	+481 G

Genotyped

In Top 20% Nationally

Percentile rank on this list



List 2.

Fertility Haplo.	Prj Hfr NMS\$ Rank
3C	99
3C	99
	99
	98
	98
	97
	97
	97
	97
	97
	97
1C	97
3C	96
3C	95

Rank in milking herd

Top heifers compared to cows

Fertility haplotype Carrier



List 3. Flush, Breed or cull?

- '12+ Months and Not Pregnant'
- Determine # heifers needed plus margin
- If heifer will be bred, then
 - Should female sexed semen be used?
- If NM\$ is moderate, then might be recipient
- Last reasonable opportunity to identify culls

List 3.

Hfr Flag	NM\$
P 97	+503 G
P 94	+495
P 91	+457 G
P 89	+441 G
P 86	+432 G
P 83	+431 G
P 81	+415 G
P 78	+412
P 75	+380
P 72	+370 G
P 70	+353 G
P 67	+350
P 64	+347
P 62	+304
P 59	+297

Some have genotypes
... some don't

Maybe flush these
top heifers



List 3.

Hfr Flag	NM\$
P 22	+179
P 22	+179 G
P 18	+172
P 16	+160
P 13	+144 G
P 10	+122
P 08	+98 G
P 05	+79 G
P 02	+14
P 00	-160

Either use
beef bull or
cull...

Bottom:
compared
to cows

Bottom:
compared
to heifers

Prj Hfr NM\$ Rank
59
59
54
50
46
39
33
30
22
0



List 4. Pregnant Heifers

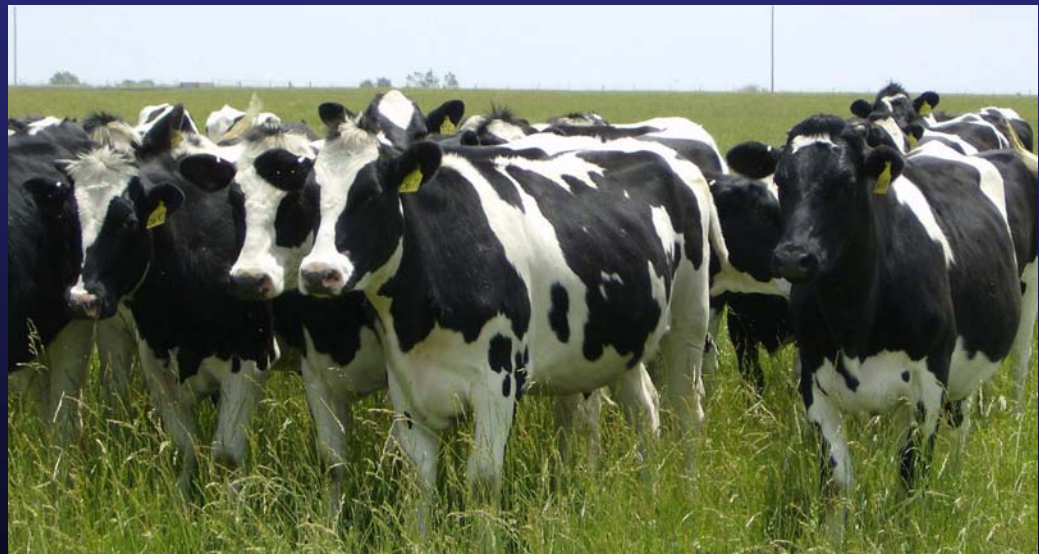
- Aggregates information from other lists
- Adds
 - Due date
 - Service sire's NM\$ and Percentile Rank
 - 'S' = Gender selected semen



List 4.

Hfr Flag	NM\$
P 95	+616 G
P 91	+511 G
P 87	+461
P 83	+435 G
P 79	+375
P 75	+374 G
P 70	+368
P 66	+344 G
P 62	+335 G
P 58	+317 G
P 54	+313 G
P 50	+289
P 45	+272
P 39 S	+258
P 39 S	+258

Top heifers



List 4.

Service Sire				
Due Date	ID		NM\$	NM\$ Rank
10-22	507HO10849	S	+851	99
1-04	29HO13664		+686	99
10-27	14HO05639		+645	98
10-09	11HO10928		+799	99
5-04	29HO14961		+701	99
10-08	507HO10849	S	+635	86
10-09	1HO09192		+613	97
5-30	7HO10721		+749	99
10-23	7HO09501		+590	96
5-30	507HO10849	S	+851	99
10-08	11HO10928		+799	99

Top service sires

Gender selected



Conclusions

- 4 lists
 - At < 6 months = choose heifers to genotype
 - After genotyping = make selection decisions
 - 12+ months = final selection and mating
 - Pregnant = monitor and prepare for calving
- Developing graphs/charts to chart progress
- Reports will change as more commercial farmers choose to genotype

Questions?

