Maximizing Genetic Progress in the New Age of Genomics

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The Role of Genetics

- Focus before Genomics and Sexed Semen:
  - Selecting AI Sires with traits to improve herd deficiencies
  - Improve genetics of next generation
  - Purchase animals/embryos of high genetic merit
- Focus after Genomics and Sexed Semen:
  - Selecting AI Sires with traits to improve herd deficiencies
  - Improve genetics of next generation
  - Improve current herd genetics
  - Breeding to AI beef cattle
  - Speed up genetic progress by breeding and sell low genetic merit animals

AgSource Products

- Genetic Summary Report
  - Analysis and Monitoring Tool
    - Summary of genetic traits for the current herd
    - Trends of genetics by year of birth
    - Trends of genetic traits for the herd by test date
    - Analysis of phenotypic data as it relates to genetic information
    - Inbreeding analysis and predominant genetics in the herd
    - Trends of future genetics by evaluating genetic traits for service sires and young stock

AgSource Products

- Genetic Selection Guide
  - Decision Support Tool to improve breeding and culling decisions and maximize genetic progress
    - Cows
    - Heifers
    - Unborn progeny
  - Use NM$

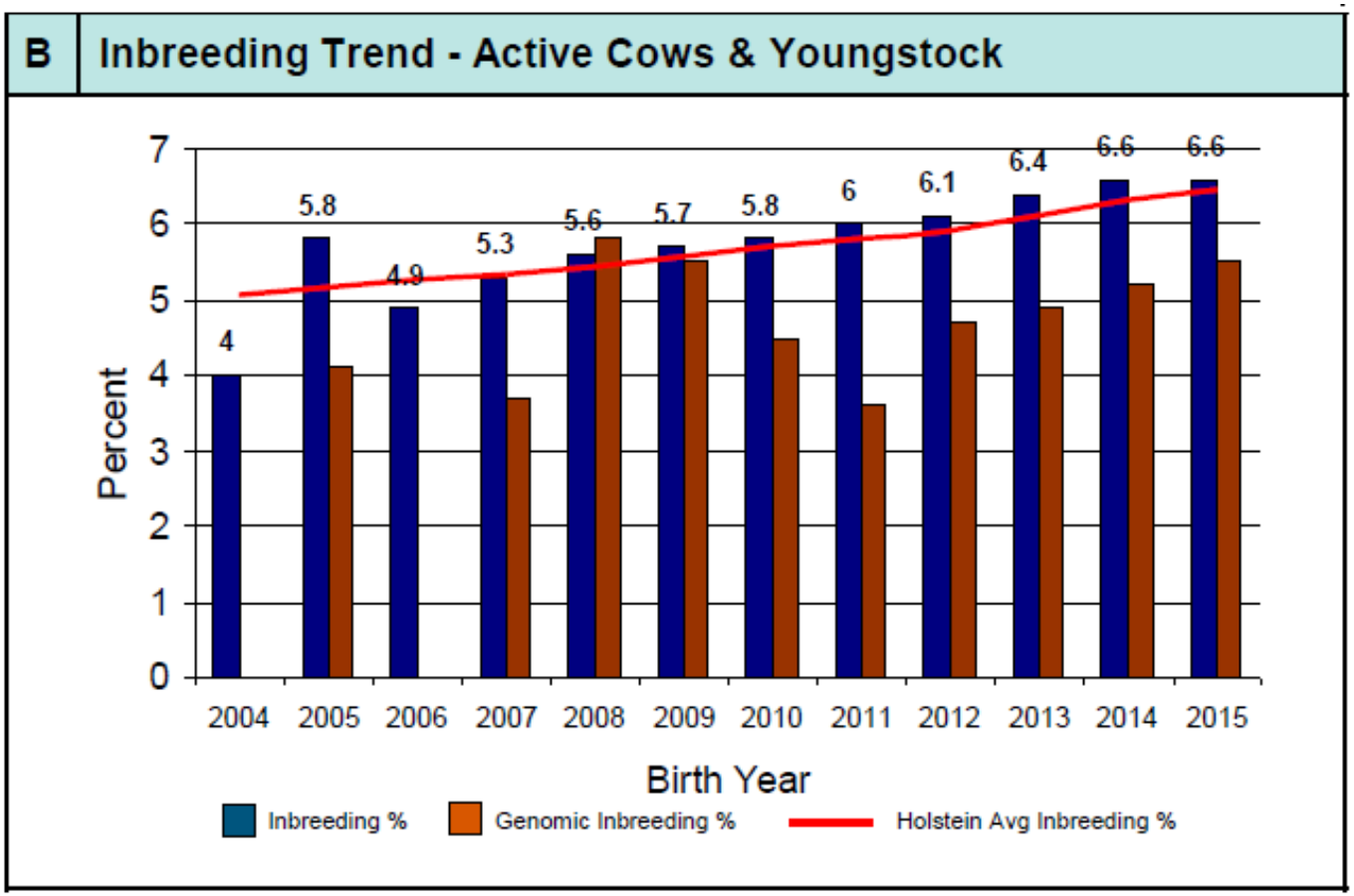
Current Herd Genetics

- Herd Values
- Benchmarking
  - Distribution
  - Top Genetics

A	Genetic Summary - Active Cows & Youngstock									
	Cows					Youngstock				
		Percentile					Percentile			
	Your Herd	20th	50th	80th	Avg 80th	Your Herd	20th	50th	80th	Avg 80th
Number	2595		398010			2187		364170		
NM$	127	-67	54	170	246	273	48	175	294	370
CM$	128	-70	56	177	257	281	50	181	305	384
FM$	124	-65	49	159	231	255	40	160	272	344
PTA Milk	246	-372	34	444	722	472	-121	246	600	842
PTA Fat	12	-14	2	18	29	26	-1	14	28	38
PTA Fat %	0.01	-0.06	0.00	0.07	0.12	0.03	-0.04	0.02	0.08	0.11
PTA Pro	7	-9	2	12	20	17	0	10	20	26
PTA Pro %	0.00	-0.02	0.00	0.03	0.05	0.01	-0.02	0.01	0.04	0.05
PTA SCS	2.96	3.07	2.96	2.87	2.81	2.90	3.02	2.93	2.84	2.78
PTA PL	1.2	-0.9	0.5	2.0	2.9	2.3	-0.1	1.5	3.0	3.9
PTA DPR	0.2	-0.8	0.4	1.5	2.3	0.5	-0.4	0.6	1.7	2.5
Avg Inbred %	6.0		5.6			6.5		5.9		
Avg Fut Inbred %	6.2		6.0			6.5		6.3		

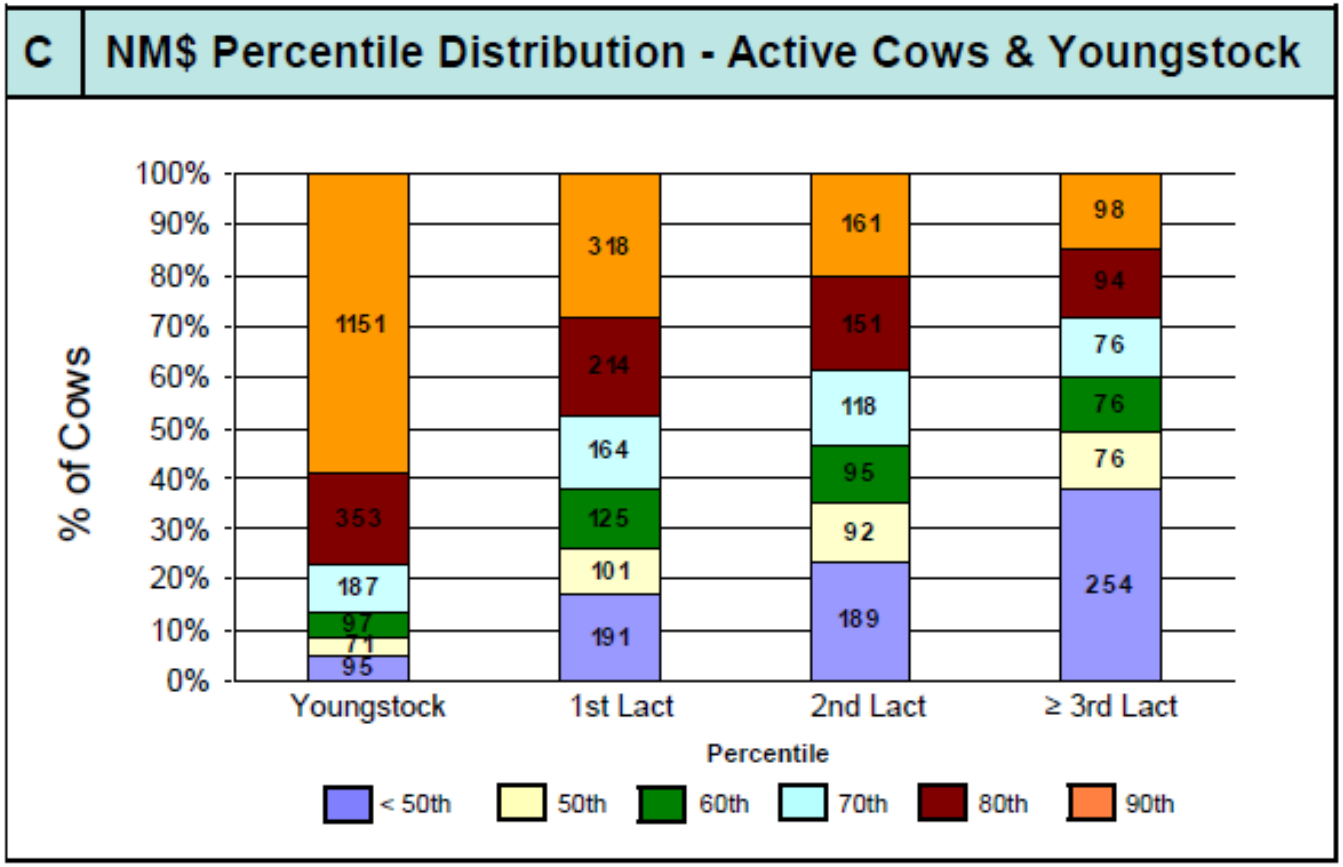
Inbreeding Trend

- Pedigree or Genomic average by year of birth
- Comparison with Breed trends
- Production losses due to inbreeding



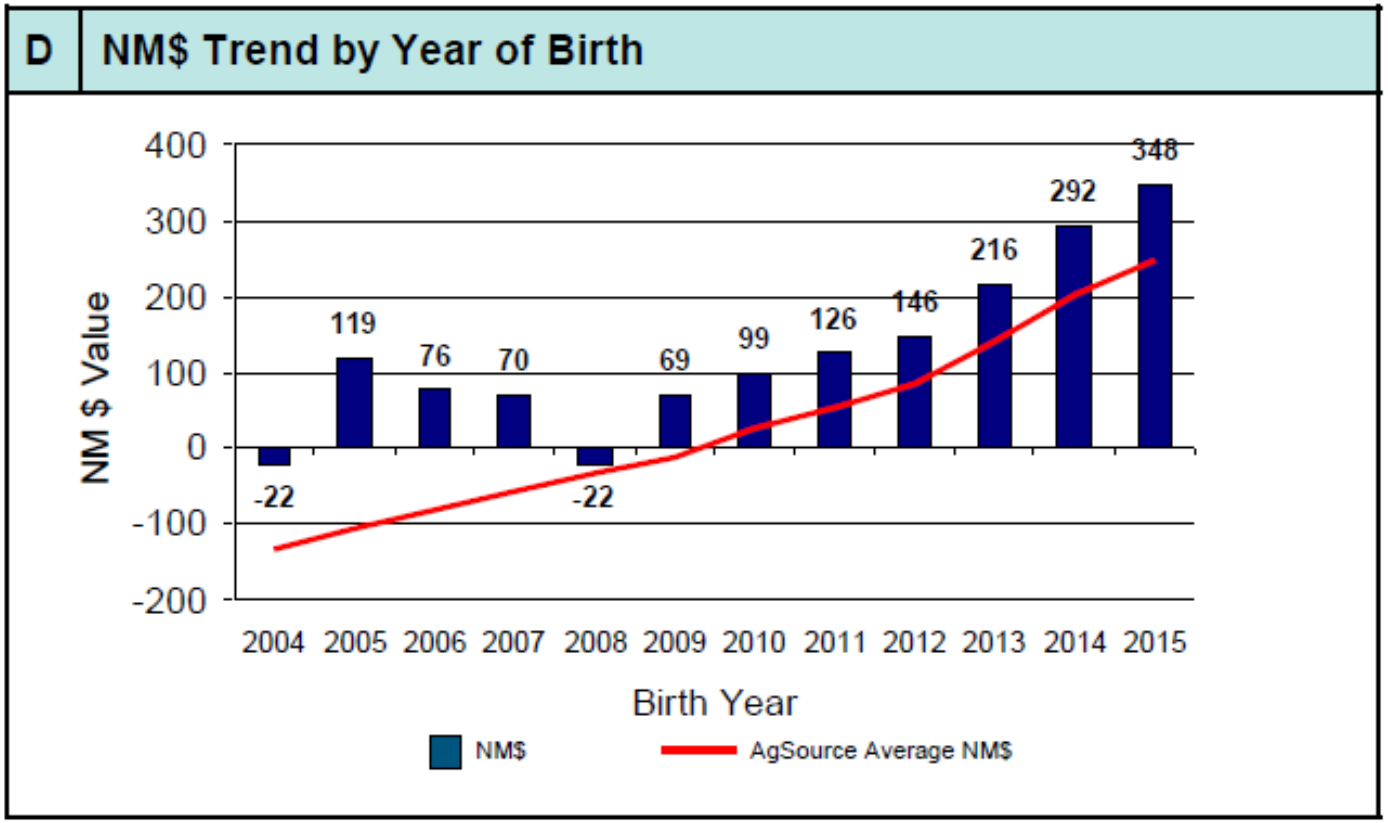
National Ranking of Genetics

- Ranking of current genetics
- NM$
- National comparison



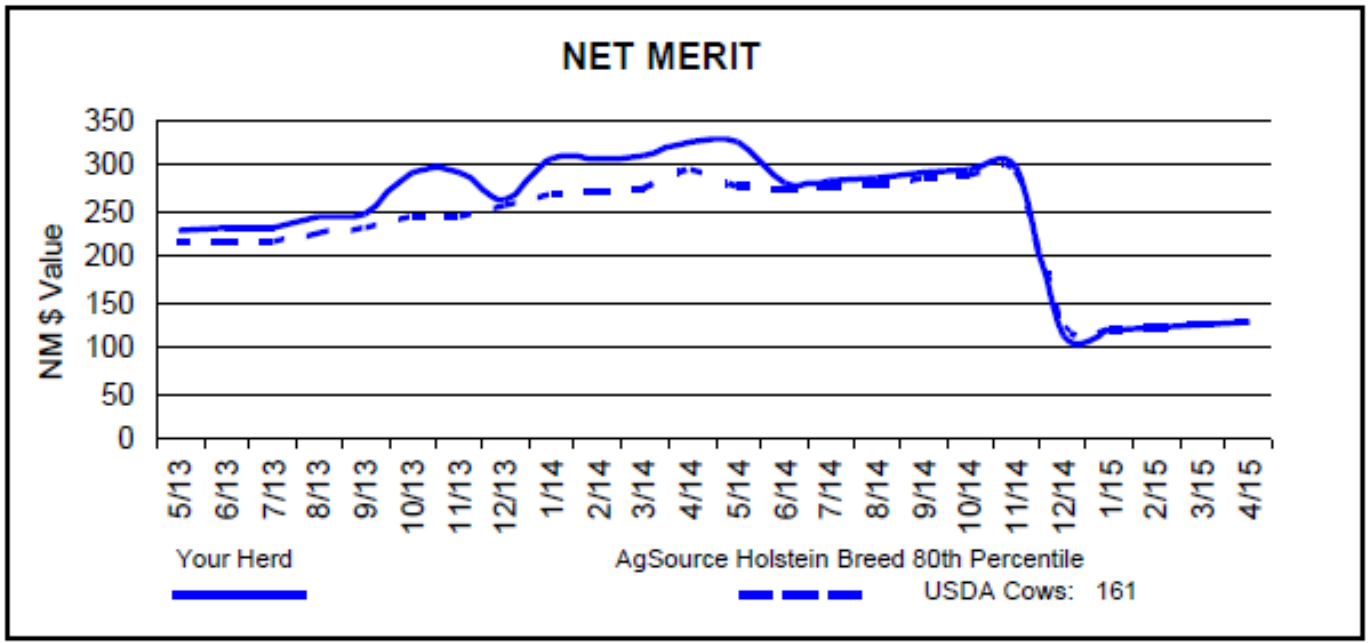
Genetic Trend by Year of Birth

- Measure of genetic progress within the herd
- Benchmark with AgSource herds



Genetic Trend

- Measure of herd level genetics
- Impacted by:
  - Breeding
  - Culling
- Benchmarked against top herds



Impact of Sexed Semen Use

- Comparison of genetics for:
  - Conventional breeding
  - Breeding with sexed semen
  - Non AI breeding
- Evaluate genetic differences and phenotypic impact

F	Semen Type Analysis - Active Cows		
	Conventional	Sexed	Natural / Unk
Num Cows	2244	255	153
NM$	139	83	-74
CM$	140	79	-74
FM$	134	93	-73
ME Milk	32731	32578	31701
ME Fat	1256	1187	1165
ME Protein	982	966	950
LSSCC	2.0	2.6	2.5

Use of Genomic Testing

- Comparison between conventional genomic test results
- Actual measure of inbreeding %
- Risk for future inbreeding

G	Genomic Evaluation Analysis - Active Cows and Youngstock					
	Traditional		Genomic Tested		Imputed	
	Cows	Youngstock	Cows	Youngstock	Cows	Youngstock
Number	1034	22	1540	1889	19	43
NM$	111	186	138	264	133	333
CM$	108	187	142	271	131	343
FM$	118	185	128	246	140	310
Avg Inbr %	5.9	6.3	6.0	6.5	6.9	6.8
Avg Fut Inbr %	6.2	6.4	6.3	6.5	6.5	6.5
Gen Avg Inbr %			4.6	5.1	7.0	0.0
Gen Fut Inbr %			6.7	7.0	4.9	0.0

Impact of Genetics

- Breakout by NM$ Quartiles
- Are higher NM$ cows outperforming lower NM$ cows

H	Genetic and Phenotypic Trend by NM$ Quartile - Active Cows								
Quartile	Num Cows	NM $	CM $	PTA Milk	PTA Fat	PTA Pro	PTA SCS	PTA DPR	ME Milk
1	627	308	313	604	30	19	2.91	0.6	33631
2	626	173	177	305	16	10	2.94	0.4	32974
3	626	84	85	173	8	5	2.98	0.1	32527
4	626	-34	-38	-40	-4	-3	3.01	-0.2	31760

ME Milk	ME Fat	ME Pro	LSSCC	Days Open	TCI©
33631	1321	1008	1.8	135	187
32974	1277	994	2.0	135	228
32527	1225	976	2.1	133	142
31760	1175	944	2.4	146	-12

Future Risk of Inbreeding

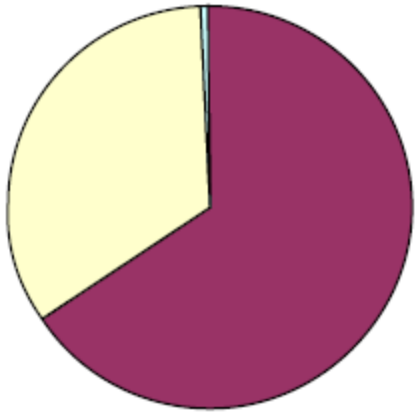
- Risk of future inbreeding
- Predominant blood lines based on sire and grand sires
- Assist in selection of future breeding sires

I	Most Prevalent Genes - Top Sires based on Cows and Youngstock				
Sire Name	Sire NAAB	Total Genes	# Daughters	# PG Daughters	# MG Daughters
PLANET	007HO08081	155.25	80	314	147
SHOTTLE	029HO12209	96.75	5	368	9
O MAN	007HO06417	92.25	3	338	25
GOLDWYN	200HO03205	89.25	1	350	5
SHAMROCK	007HO10849	69.75	93	66	27
SUPER	001HO08778	69.25	25	198	29
CROWN	007HO09321	62.50	93	0	64
ROBUST	007HO10524	60.25	22	191	6
MAYFIELD	007HO11283	59.75	112	0	15
MAN-O-MAN	014HO04929	58.25	6	213	8
BOLTON	029HO11111	58.25	9	172	43
SHOT	007HO09222	49.25	80	0	37

Current Inbreeding Level

- Inbreeding Distribution
- Measure of mating program effectiveness to manage inbreeding
- Comparison with AgSource herds

J | **Inbreeding Distribution - Active Cows and Youngstock**



Top Inbreed %	
Name	Inb %
9704	29.8
15495	28.8
14090	28.5
14632	18.7
15832	17.5
15893	17.3
15892	17.3
13997	17.3
13916	17.1
15057	14.4

Holstein Distribution	<3.12%	3.12 - 6.25%	6.25 - 12.4%	≥12.5%
Your Herd		65.3	34.3	0.4
AgSource	2.1	71.4	26.1	0.4

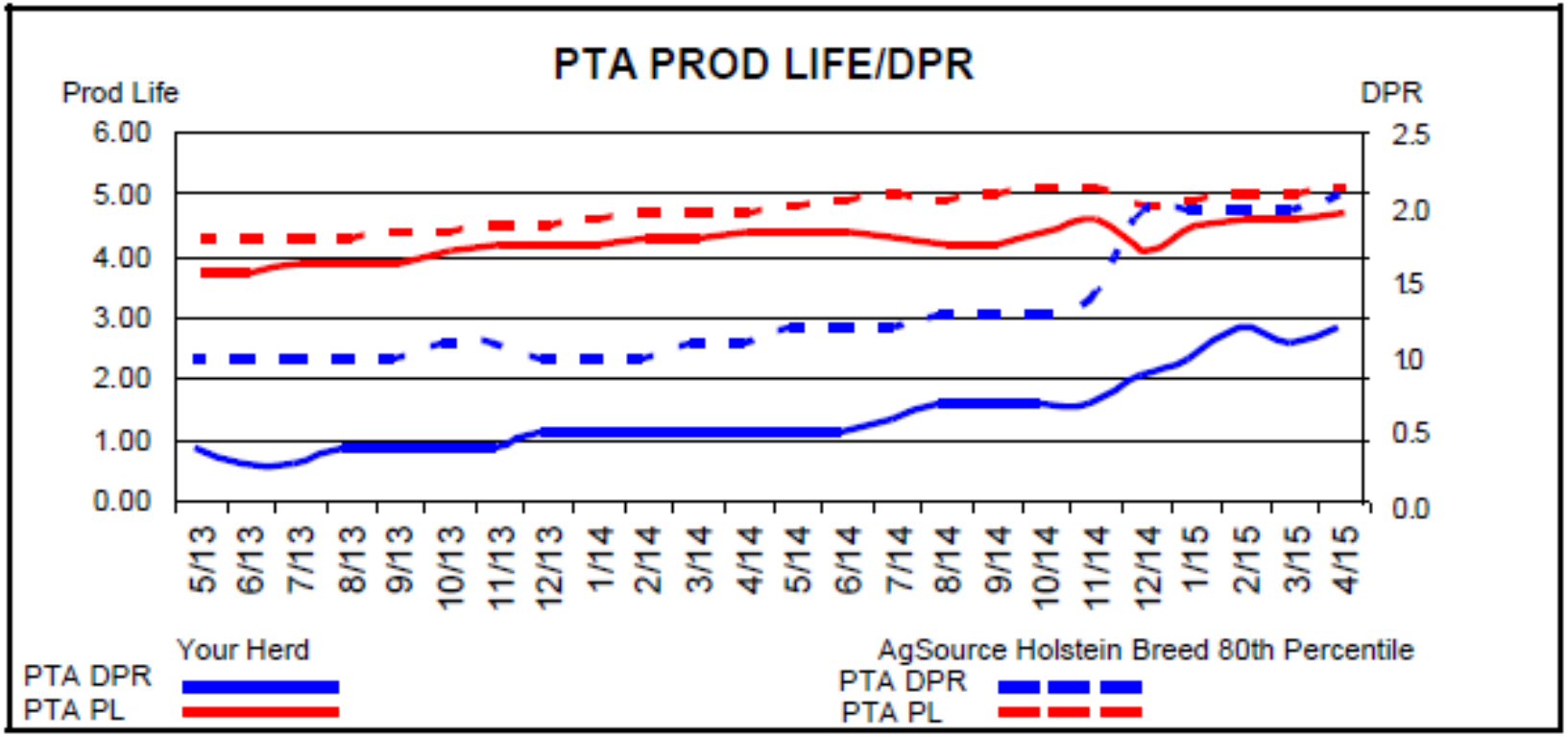
Sire Expression

- Genetic and Phenotypic performance of offspring

K	Sire Expression - Top Sires based on Number of Lactating Daughters								
Sire Name	**Sire NAAB**	**# Daughters**	**NM $**	**CM$**	**FM$**	**ME Milk**	**ME Fat**	**ME Pro**	**LSSCC**
CROWN	007HO09321	92	122	135	91	33544	1295	1048	1.8
PLANET	007HO08081	74	249	242	266	34533	1206	1016	2.6
TRIGGER	029HO13846	55	169	175	153	33784	1278	1018	2.1
JAMMER	029HO10483	52	91	89	94	33459	1262	999	2.2
PALERMO	014HO05411	48	94	102	73	33428	1285	1021	2.0
ALEXANDER	007HO08221	47	85	80	98	31892	1256	952	2.6
SHAMROCK	007HO10849	46	263	253	287	32851	1285	960	1.5
BEACON	029HO13366	43	198	194	207	35165	1331	1046	2.2
SHOT	007HO09222	43	136	131	145	31143	1240	919	1.7
BRONCO	007HO08747	42	219	215	227	36035	1285	1069	2.4
ALTAOTTO	011HO09317	41	159	177	117	32898	1268	1022	2.5
ALTAROSS	011HO09703	38	89	101	62	31611	1209	978	2.2

Service Sire Genetics

- Measure of Selection of Sires
- Comparison against Top AgSource Herds



Future Genetics

- Genetics of the next generation
- Selection of replacement animals

M	Genetic Summary Active Youngstock by Age Group										
Age Group	# Heifers	# Pregnant	NM $	CM $	FM $	PTA Milk	PTA Fat	PTA Pro	PTA SCS	PTA PL	PTA DPR
< 3 mo	246	0	349	357	328	645	34	23	2.90	2.9	0.3
3 - 5 mo	252	0	310	318	290	551	30	20	2.90	2.6	0.4
6 - 8 mo	340	0	294	300	277	535	27	18	2.88	2.6	0.5
9 - 11 mo	292	0	283	291	263	478	26	17	2.88	2.5	0.4
12 - 14 mo	220	34	285	293	268	486	28	18	2.91	2.5	0.4
15 - 17 mo	333	247	252	259	235	444	23	16	2.92	2.2	0.6
18 - 20 mo	295	277	205	214	183	319	19	13	2.92	1.7	0.5
> 20 mo	208	205	212	217	200	309	20	11	2.93	1.8	0.6

Breeding for the Next Generation

C	Cow Lactation Data												Pedigree			Dam Production		
							Avg Dev From Herd 305 ME									Avg Dev From Herd 305 ME		
Cntl Num	Barn Name	Visible ID	Cow ID	Lact Num	NM$ *Est	Due Date	Milk	Fat	Pro	Avg Days Open	Avg LS	Avg TCI ®	Sire ID	MGS ID	Dam ID	Milk	Fat	Pro
2820	2820	2820	840003006805211	1	$295 G2	06-20	-296	173	22		1.6		7HO07853	7HO06417	988	7583	208	198
2794	2794	2794	840003006805185	1	$266	02-04	8891	155	182		1.2		7HO08477	7HO08425	811	-4083	-142	-136
2808	2808	2808	840003006805199	1	$291	03-29	2282	157	153		1.6		29HO11753	7HO05375	901	1218	109	26
1036	1036	1036	62650384	4	$527 G1	11-12	-488	41	13	176	2.7	2829	7HO06417	7HO06168	856	9802	64	253
1021	1021	1021	62650369	5	$676 G1	12-03	2951	360	115	110	1.3	1063	7HO06417	7HO05841	819			
2224	2224	2224	840003001083779	3	$284	10-29	6513	139	79	109	1.7	4448	7HO09179	7HO05386	1397			
2796	2796	2796	840003006805187	1	$249	05-12	682	-76	30		1.6		11HO07965	7HO06782	2100	3168	107	116
2800	2800	2800	840003006805191	1	$399	05-20	7094	165	237		3.3		7HO08477	7HO07193	2116	3799	-6	95

C	Heifer Data						Pedigree			Dam Production Data						
											Avg Dev From Herd 305 ME					
Cntl Num	Barn Name	Visible ID	Cow ID	Age (Yr-Mo)	Est NM$	Due Date	Sire ID	MGS ID	Dam ID	Lact Num	Milk	Fat	Pro	Avg Days Open	Avg LS	Avg TCI ®
3189	3189		840003008967522	0-11	$372		7HO08221	7HO07536	2478	2	4081	103	134	82	1.5	3707
3132	3132		840003008967465	1-1	$468		14HO04929	7HO06782	2071	2	-274	-29	-22	83	1.1	-240
3220	3220		840003008967553	0-10	$331		14HO04929	7HO07596	2071	1	511	114	-9	77	4	
3218	3218		840003008967551	0-10	$349		7HO09321	7HO08221	2685	1	364	59	-61	80	0.6	
3209	3209		840003008967542	0-10	$381		1HO08778	7HO08190	2586	1	2999	-88	47		1.7	
3210	3210		840003008967543	0-10	$420		1HO08778	1HO07235	2586	3	-3238	-101	-35	107	1.7	1231
3206	3206		840003008967539	0-10	$343		7HO09321	7HO06758	2006	4	-1072	148	16	98	0.9	3150

Maximizing your Genetic Returns

- Ranking unborn progeny on NM$
- Minimize calf raising expenses

A Number of Calves per Month (Using 1 month avg NM$ for comparison)

Month	Count	Avg NM$	Month	Count	Avg NM$	Month	Count	Avg NM$
September	19	$270	December	51	$289	March	48	$269
October	53	$288	January	47	$303	April	20	$284
November	57	$298	February	39	$323	May	22	$320

Est Calf NM$
Quartile 1
Quartile 2
Quartile 3
Quartile 4

B

This report shows the NM$ values for progeny of cows that have been bred and confirmed pregnant, ranked by Due Date. If the cow (Calf Dam NM$) does not have NM$ yet, it will be based on the values of the Sire and Dam if available (denoted with *). Future offspring where either Sire or Dam are missing NM$ will not receive an Est Calf NM$ value.

C Dam Data			Calf Data				Pedigree			Dam Production Data						
											Avg Dev From Herd 305 ME					
Cntl Num	Barn Name	Visible ID	Calf Dam NM$ *Est	Calf Sire NM$	Est Calf NM$	Due Date (≤ 40)	Calf Sire ID	Calf MGS ID	Calf Dam ID	Lact Num	Milk	Fat	Pro	Avg Days Open	Avg LS	Avg TCI ®
2899	2899	2899	$299*	$391	$345	09-04	200HO05592	7HO09545	840003006805290	0						
2206	2206	2206	$226 G1	$417	$322	09-10	7HO09420	1HO07235	840003001083761	2	5877	292	176	208	2	3987
2128	2128	2128	$220 G2	$73	$147	09-10	7HO08190	1HO07235	840003001083683	3	4086	116	147	144	2	3140
2917	2917	2917	-$2*	$503	$251	09-15	76HO00581	7HO08190	840003006537154	0						
2554	2554	2554	$178 G1	$679	$429	09-17	7HO10850	1HO09486	840003005138755	1	403	59	40	303	2	
2674	2674	2674	$220	$460	$340	09-17	7HO09107	7HO08221	840003005138875	1	1960	7	-18	127	1	
2953	2953	2953	$330*	$467	$399	09-20	7HO09321	7HO08165	840003006537190	0						

Conclusions

- Reviewing genetics performance is an annual task
- Past, current and future genetics
- Components of a successful genetic management program:
  - Sire Selection
  - Mating Program (manage inbreeding)
  - Inventory Management
    - Sexed vs conventional semen
    - Beef versus Dairy
    - Culling Decision
- Genomic testing = Better informed decisions

Questions?

THANK YOU!