

**ACROSS-BREED TABLES
for 2010
with year 2008 Angus base**



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Background

- Across-breed EPD adjustment factors have been computed for BIF since 1993
- Account for differences in EPD base in the genetic evaluations of each breed involved
- Uses USMARC Germplasm Evaluation (GPE) data to adjust for breed differences

Numbers of Sires, Progeny, Daughters, and Grandprogeny by Breed of Sire: Weaning Weight and Milk

Breed	Number				Breed	Number			
	Sires	Prog	Dau	G Prog		Sires	Prog	Dau	G Prog
AN	122	1,496	559	2,704	BV	21	291	94	544
HE	125	1,910	743	3,485	CH	89	818	260	1,282
RA	36	465	119	529	CA	14	124	0	0
SH	42	289	74	269	GV	63	784	262	1,256
SD	15	134	70	373	LM	53	826	273	1,404
BM	25	222	51	247	MA	34	282	91	533
BR	43	481	176	768	SA	44	283	91	364
BN	24	217	43	229	SM	63	790	267	1,392
SG	15	116	0	0	TA	7	191	80	367

**Birth Weight Sire Breed Differences
Adjusted to Birth Years of 2007 and 2008**

Breed	Update		Breed	Update	
	2009	2010		2009	2010
Angus	0.0	0.0	Braunvieh	5.1	5.0
Hereford	4.2	4.9	Charolais	8.1	7.7
Red Angus	1.0	0.8	Chiangus	3.1	4.1
Shorthorn	6.1	6.6	Gelbvieh	3.6	3.5
South Devon	4.9	5.3	Limousin	3.7	3.6
Beefmaster	6.0	5.7	Maine-Anjou	5.2	4.6
Brahman	10.8	12.2	Salers	2.1	2.3
Brangus	3.1	2.4	Simmental	4.6	4.3
Santa Gert.	6.4	5.8	Tarentaise	1.8	2.0

**Weaning Weight Sire Breed Differences
Adjusted to Birth Years of 2007 and 2008**

Breed	Update		Breed	Update	
	2009	2010		2009	2010
Angus	0.0	0.0	Braunvieh	-21.2	-13.0
Hereford	-5.3	-2.0	Charolais	18.0	21.4
Red Angus	-17.7	-16.1	Chiangus	-18.9	-19.2
Shorthorn	-9.3	-8.8	Gelbvieh	-0.8	2.2
South Devon	3.1	0.7	Limousin	-4.3	-0.4
Beefmaster	8.0	4.5	Maine-Anjou	-14.1	-13.6
Brahman	6.4	11.5	Salers	-3.0	-1.4
Brangus	0.3	-2.6	Simmental	13.9	15.0
Santa Gert.	-22.4	-13.0	Tarentaise	-9.8	5.7

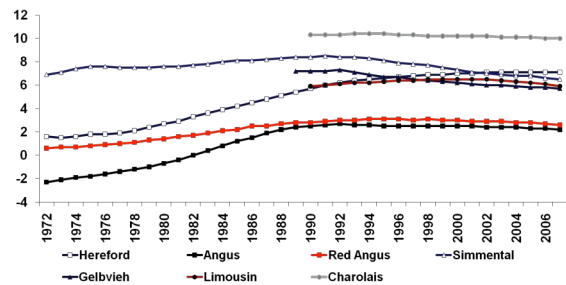
**Yearling Weight Sire Breed Differences
Adjusted to Birth Years of 2007 and 2008**

Breed	Update		Breed	Update	
	2009	2010		2009	2010
Angus	0.0	0.0	Braunvieh	-65.7	-43.2
Hereford	-28.1	-27.0	Charolais	13.1	11.5
Red Angus	-29.5	-31.1	Chiangus		-43.9
Shorthorn	-3.8	-9.1	Gelbvieh	-18.6	-16.7
South Devon	-5.9	-9.4	Limousin	-29.5	-30.4
Beefmaster	-23.5	-26.6	Maine-Anjou	-23.7	-27.7
Brahman	-55.6	-55.9	Salers	1.9	-8.9
Brangus	-19.9	-19.6	Simmental	-0.1	2.5
Santa Gert.		-51.6	Tarentaise	-51.1	-29.5

**Maternal Milk Sire Breed Differences
Adjusted to Birth Years of 2007 and 2008**

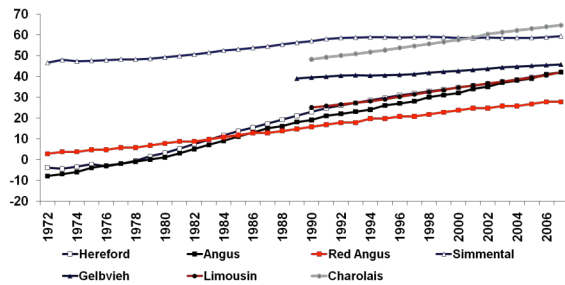
Breed	Update		Breed	Update	
	2009	2010		2009	2010
Angus	0.0	0.0	Braunvieh	10.4	10.2
Hereford	-22.0	-22.6	Charolais	-8.4	-11.3
Red Angus	-7.4	-8.7	Chiangus		
Shorthorn	5.1	3.7	Gelbvieh	7.4	5.3
South Devon	-5.6	-7.8	Limousin	-13.4	-15.1
Beefmaster	-15.9	-15.8	Maine-Anjou	-1.3	-3.1
Brahman	14.3	9.4	Salers	1.0	-1.3
Brangus	-10.8	-10.2	Simmental	-2.6	-4.8
Santa Gert.			Tarentaise	2.7	2.3

Genetic Trends for Birth Weight, lb



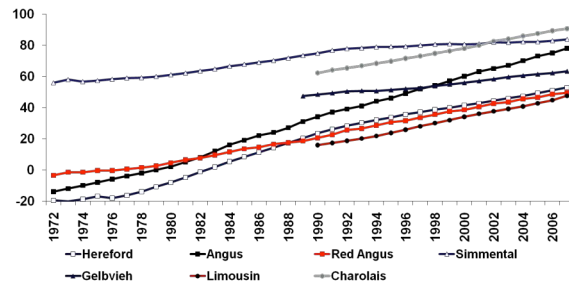
Adapted from Spring 2010 Genetic Trends from Breed Associations and 2010 AB-EPD factors

Genetic Trends for Weaning Weight, lb



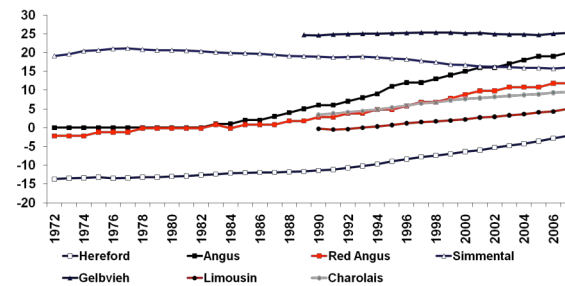
Adapted from Spring 2010 Genetic Trends from Breed Associations and 2010 AB-EPD factors

Genetic Trends for Yearling Weight, lb



Adapted from Spring 2010 Genetic Trends from Breed Associations and 2010 AB-EPD factors

Genetic Trends for Maternal Milk, lb



Adapted from Spring 2010 Genetic Trends from Breed Associations and 2010 AB-EPD factors

**BWT: Table Factors to Adjust EPD of
Bulls of Different Breeds (2009 and 2010)**

Breed	Update		Breed	Update	
	2009	2010		2009	2010
Angus	0.0	0.0	Braunvieh	7.5	7.3
Hereford	2.9	3.4	Charolais	9.7	9.3
Red Angus	2.9	2.6	Chiangus	4.1	5.0
Shorthorn	6.1	6.4	Gelbvieh	4.5	4.3
South Devon	4.5	4.8	Limousin	4.2	4.2
Beefmaster	7.7	7.3	Maine-Anjou	5.5	4.8
Brahman	11.2	12.5	Salers	3.4	2.6
Brangus	4.7	4.9	Simmental	5.5	5.2
Santa Gert.	8.1	7.4	Tarentaise	2.5	2.2

Example: BWT

Breed	If Breed		Table	=	Across-Breed
	EPD				EPD
Angus	2.6	+	0.0	=	2.6
Simmental	3.2	+	5.2	=	8.4
Red Angus	0.6	+	2.6	=	3.2

WWT: Table Factors to Adjust EPD of Bulls of Different Breeds (2009 and 2010)

Breed	Update		Breed	Update	
	2009	2010		2009	2010
Angus	0.0	0.0	Braunvieh	21.4	25.6
Hereford	-2.8	0.5	Charolais	38.2	41.9
Red Angus	-5.4	-2.3	Chiangus	-19.6	-16.7
Shorthorn	19.9	20.6	Gelbvieh	1.7	5.7
South Devon	6.9	4.6	Limousin	-3.4	1.4
Beefmaster	44.2	41.0	Maine-Anjou	-10.7	-9.2
Brahman	36.3	42.0	Salers	22.7	2.2
Brangus	21.9	20.9	Simmental	25.0	28.4
Santa Gert.	17.1	27.5	Tarentaise	29.7	34.2

YWT: Table Factors to Adjust EPD of Bulls of Different Breeds (2009 and 2010)

Breed	Update		Breed	Update	
	2009	2010		2009	2010
Angus	0.0	0.0	Braunvieh	12.8	26.8
Hereford	-16.1	-15.5	Charolais	51.9	50.8
Red Angus	-4.4	-5.5	Chiangus		-39.4
Shorthorn	52.8	47.4	Gelbvieh	-12.6	-10.2
South Devon	-1.4	-4.0	Limousin	-28.6	-29.1
Beefmaster	44.0	42.9	Maine-Anjou	-22.8	-25.0
Brahman	2.2	2.6	Salers	52.3	-5.5
Brangus	19.9	20.6	Simmental	22.4	28.3
Santa Gert.		23.9	Tarentaise	17.9	23.4

MILK: Table Factors to Adjust EPD of Bulls of Different Breeds (2009 and 2010)

Breed	Update		Breed	Update	
	2009	2010		2009	2010
Angus	0.0	0.0	Braunvieh	30.6	30.9
Hereford	-17.5	-17.6	Charolais	5.6	3.1
Red Angus	-3.0	-4.2	Chiangus		
Shorthorn	23.1	22.4	Gelbvieh	9.9	8.3
South Devon	-6.5	-8.0	Limousin	-14.2	-15.5
Beefmaster	2.6	3.2	Maine-Anjou	-0.8	-2.3
Brahman	29.0	24.4	Salers	13.1	-0.1
Brangus	2.4	3.6	Simmental	13.7	11.8
Santa Gert.			Tarentaise	22.2	22.7

Breed of Sire Means and Deviations from Angus on Industry Scale (Spring, 2010 Genetic Evaluations; lb)

Breed	BWT*	WWT*	YWT*	MILK*
Angus	92 (0.0)	601 (0.0)	1,020 (0.0)	592 (0.0)
Hereford	96 (4.9)	599 (-2.0)	993 (-27.0)	569 (-22.6)
Red Angus	92 (0.8)	585 (-16.1)	989 (-31.1)	583 (-8.7)
Shorthorn	98 (6.6)	592 (-8.8)	1,011 (-9.1)	595 (3.7)
S. Devon	97 (5.3)	602 (0.7)	1,011 (-9.4)	584 (-7.8)
Beefmaster	97 (5.7)	606 (4.5)	994 (-26.6)	576 (-15.8)
Brahman	104 (12.2)	613 (11.5)	964 (-55.9)	601 (9.4)
Brangus	94 (2.4)	599 (-2.6)	1,000 (-19.6)	581 (-10.2)
Santa Gert.	97 (5.8)	588 (-13.0)	969 (-51.6)	
Braunvieh	97 (5.0)	588 (-13.0)	977 (-43.2)	602 (10.2)
Charolais	99 (7.7)	523 (21.4)	1,032 (11.5)	580 (-11.3)
Chiangus	96 (4.1)	582 (-19.2)	976 (-43.9)	
Gelbvieh	95 (3.5)	603 (2.2)	1,004 (-16.7)	597 (5.3)
Limousin	95 (3.6)	601 (-0.4)	990 (-30.4)	577 (-15.1)
Maine Anjou	96 (4.6)	588 (-13.6)	993 (-27.7)	589 (-3.1)
Salers	94 (2.3)	600 (-1.4)	1,011 (-8.9)	590 (-1.3)
Simmental	96 (4.3)	616 (15.0)	1,023 (2.5)	587 (-4.8)
Tarentaise	94 (2.0)	607 (5.7)	991 (-29.5)	594 (2.3)

*Adjusted to USMARC EPD and weight means for Angus

Carcass Trait Across-Breed Factors

- Regressions still more different than 1.00 relative to weight traits
- Within breed regressions much more variable
- For now, carcass trait regression coefficients fixed at 1.00
 - May 'settle' as more data added from new GPE

This year

- To participate, breeds must calculate EPD with age-adjusted endpoint and report EPD on a carcass basis
- This year, 13 breeds were able to supply EPDs in this form
- EXPECT CHANGES in years to come

Carcass Trait Breed Differences Adjusted to a Birth Year of 2008

Breed	Marbling	Ribeye Area	Fat Thickness
Angus	0.00	0.00	0.000
Hereford	-0.65	-0.12	-0.061
Red Angus	-0.35	-0.18	-0.064
Shorthorn	-0.47	0.08	-0.185
South Devon	-0.08	0.14	-0.121
Santa Gertrudis	-0.95	-0.48	-0.150
Braunvieh	-0.65	0.72	-0.177
Charolais	-0.74	0.75	-0.245
Chiangus	-0.69	0.34	-0.148
Limousin	-1.09	1.24	
Maine-Anjou	-1.03	1.04	-0.221
Salers	-0.45	0.64	-0.227
Simmental	-0.77	0.87	-0.227

Table Factors to Adjust Carcass EPD of Bulls of Different Breeds to an Angus Base

Breed	Marbling	Ribeye Area	Fat Thickness
Angus	0.00	0.00	0.000
Hereford	-0.33	-0.14	-0.050
Red Angus	-0.06	-0.06	-0.051
Shorthorn	-0.10	0.20	-0.158
South Devon	-0.03	0.11	-0.118
Santa Gertrudis	-0.60	-0.30	-0.137
Braunvieh	-0.31	0.89	-0.165
Charolais	-0.42	0.75	-0.233
Chiangus	-0.48	0.60	-0.155
Limousin	-0.75	1.05	
Maine-Anjou	-0.88	1.06	-0.208
Salers	-0.20	0.80	-0.214
Simmental	-0.55	0.94	-0.224

Summary

- Reevaluate regression for carcass traits in future years
- Carcass differences between breeds for are in the expected direction and relative magnitude

Questions?

Germplasm Evaluation Program

Current Status and Future

SIRE BREEDS EVALUATED IN THE GERMLASM EVALUATION (GPE) PROGRAM AT USMARC^a

Cycle I 70-72	Cycle II 73-74	Cycle III 75-76	Cycle IV 86-90	Cycle V 92-94	Cycle VI 97-98	Cycle VII 99-00	Cycle VIII 01-02
Hereford Angus Jersey S. Devon Limousin Simmental Charolais	Hereford Angus Red Poll Brahman Braunvieh Gelbvieh Maine Anj. Chianina	Hereford Angus Brahman Sahiwal Pinzgauer Tarentaise Nellore Piedmontese	Hereford Angus Longhorn Salers Galloway Shorthorn Piedmontese	Hereford Angus Tuli Boran Belg. Blue Brahman Piedmontese	Hereford Angus Wagyu Norweg. Red Sw. Red&Wh. Friesian	Hereford Angus Red Angus Limousin Charolais Simmental Gelbvieh	Hereford Angus Beefmaster Brangus Bosman Romesinano
^a 3-way crosses out of F ₁ dams Hereford Hereford Angus Angus Brahman Brangus Devon Santa Gert. Holstein							

^a Sire breeds mated to Angus and Hereford females, Composite USMARC III (1/4 Angus, Hereford, Red Poll and Pinzgauer) cows were also included in Cycles V, VI, VII, and VIII.

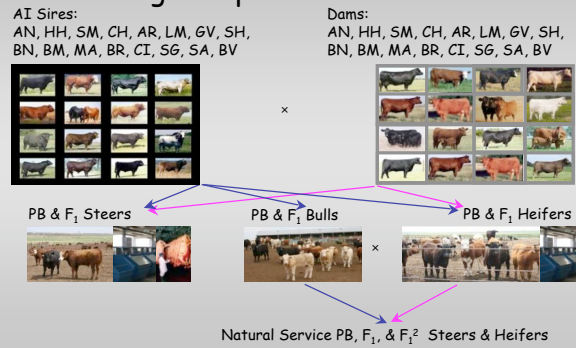
Current Primary GPE Objectives

- Characterization of Genomic Variation in Germplasm Representative of the Beef Industry
 - Linkage Disequilibrium
 - Linkage
- Estimation of Differences Among Breeds Used by the U.S. Beef Industry
 - Multi-breed Genetic Evaluation
 - Breed Differences for New Traits
- Evaluation of Exotic Germplasm

Secondary GPE Objectives

- Estimation of heritabilities and genetic correlations
 - Especially between new physiological indicator traits (e.g., gene expression, proteomics, metabolomics) and economically relevant traits.
 - Among the full spectrum of economically important traits
- Estimate breed-specific heterosis

Target Population Structure



Development of Purebred Populations

- Initially intended to:
 - Improve partitioning of breed effects from heterosis
 - Provide greater separation in breed contrasts
 - Contribute to estimation of breed-specific heterosis
 - Provide more flexibility to respond to changing population needs
- Since the development of the plan, breed-specific SNP effects have become a primary concern in bovine genomics.

Hypothetical Proportion of Calves Under Target Mating Plan

Calf category	Purebred cow design				%
	PB	F ₁	F ₁ ²	Tot	
# Cows calving	1500	1200	300	3000	100
AI purebreds	500			500	16.7
AI-sired F ₁	500		200	700	23.3
AI-sired BC					0.0
MS purebreds	35			35	1.2
MS F ₁	465			465	15.5
MS by F ₁ bulls		1200	100	1300	0.0

Transition to the Target Plan

- Produces a lot of backcrosses as well as F₁s.
- They are contributing information for partitioning breed effects from heterosis.
- The cattle produced in the transition are contributing to the goals of the project.

Current AI-sired Calves Produced

Breed	1/2	3/4	7/8	PB	Total
Angus	74	29	1	75	179
Beefmaster	41	3			44
Brahman	120	11			131
Brangus	44	5	1		50
Braunvieh	143	16			159
Charolais	69	28		94	191
Chiangus	159	17			177
Gelbvieh	59	96	5		160
Hereford	84	10		70	164
Limousin	63	88	6		157
Maine Anjou	130	10			140
Red Angus	54	101	9		164
Salers	136	14			150
Santa Gertrudis	143	18			161
Shorthorn	152	21			173
Simmental	93	30	7	60	190
Total	1564	497	29	300	2390

Transition

- We will have completed what is about equivalent to a cycle including 14 breeds in four years.
- Decrease sampling and AI use of the breeds that are less highly represented in the industry.
- Continue to grade up to higher percentages.
- **We have much more flexibility in how we use the cattle, because we are now continuously updating evaluations of the breeds, instead of creating them.**

Sampling for new GPE

- Already adjusting breed differences for point in time
 - Breed differences are not a constant
 - *GPE supports the ABEPD system*
- Important still to get a representative sample from the breed
 - We sample by sires with the most progeny in recent years
 - Request for data to associations is coming

Questions

