

Developments in multi-country and multi-breed genetic evaluations for beef cattle

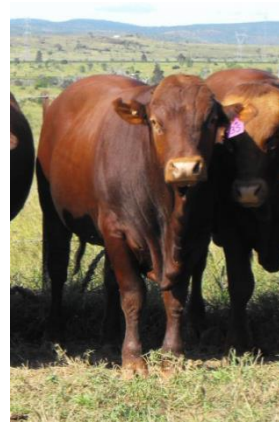
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BREEDPLAN

Agricultural Business Research Institute

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National beef cattle genetic evaluations

- **Most beef-producing countries seek to improve productivity and efficiency**
 - varying levels of pedigree & performance recording
- **National genetic evaluation**
 - productivity & efficiency via genetic improvement
 - almost exclusively breed-specific
 - varying approaches, models, service providers
 - benchmarking of individual cattle & herds
- **Considerable use of imported genetics**
 - for genetic improvement
 - for marketing reasons



The challenge: selecting suitable genetics “from across the border”

- Comparing “unrelated” proofs
- Accuracy of imported genetics in local environment
- Genotype x environment interactions
 - High performance (input) genetics in low performance (input) environments
- How do breeders benchmark their own herd genetics with potential genetics around the world?



29AN2043 BLACK MAGIC

Print/PDF

✉



The Breed's Dominant #1 Beef Value Sire

- ✓ The hottest sire in the industry with top 1% performance traits and high value carcass genetics that make him the breed's #1 \$Beef sire by a wide margin
- ✓ His influence was in high demand at the 2018 National Western including the Loaded \$65,000 top pregnancy as well as the \$30,000 top selling female in the Trowbridge Family & Friends Sale
- ✓ Use BLACK MAGIC to add carcass value, frame size and unmatched performance
- ✓ His progeny are posting ratios of 99 BW, 105 WW, 106 YW, 109 IMF and 102 FAT
- ✓ His 12 year old dam has an average nursing ratio of 113

CALVING EASE ★★

CARCASS MERIT 🍖🍖🍖🍖

- BT CROSSOVER 758N
- SILVEIRAS CONVERSION 8064
- EXG SARAS DREAM S609 R3
- BYERGO PICASSO
- BYERGO ELIA CUPCAKE 5900
- BYERGO MISS CUPCAKE 3600

BYERGO BLACK MAGIC 3348 AAA 17803074 Born 08/14/2013

Owned by: Byergo Angus, MO; Friendship Farms, GA; ABS Global, Inc., WI

Trait	CED	BW	WW	YW	RADG	DMI	YH	SC	DOC	HPG	CEM	Milk	Hd/Dts	MW	MH	CW	Marb	REA	FAT
EPD	+5	+2.5	+102	+185	+50	-.08	+1.2	+2.00	+23	+9.6	+7	+26		+61	+1.1	+93	+93	+1.18	-.010
Acc	.40	.76	.71	.64	.21	.21	.37	.40	.49	.18	.39	.38	1	.30	.35	.46	.40	.41	.40
RANK	65%	75%	1%	1%	1%	25%	1%	2%	20%	60%	65%	35%	13	10%	1%	1%	10%	1%	20%

Trait	\$EN	\$W	\$F	\$G	\$QG	YG	\$B
Index	-43.22	+87.86	+204.12	+48.94	+44.30	+4.64	+242.46
RANK	95%	1%	1%	10%	10%	45%	1%



29AN2078 KEYSTONE

LANDFALL KEYSTONE K132 (AI)

(AMFU-NHFU-CAFU-DDF)

Owned by Archer Landfall.

Comments on Calving Ease at Landfall

3 calves assisted out of 74 born at Landfall to date.

33.5kg average birth weight on 74 born to date.

Comments on dam line-

Out of a really powerful Front Runner daughter with plenty of length. Grand dam is the great X Landfall herd. A quality female pedigree in my opinion.

Weaners are presenting with added length and growth. The heaviest use sire at Landfall in last X9 had two sons Commander C47 ...450 progeny and G699 17 head in Landfall herd

AND THEN EXTENDING BACK ON DAMS SIDE

Lots of New Trend, New Design 323, Max and Scotch Caps bloodlines

Joyle C22 and Archer C170 were two of the iconic cows at Landfall some 25 years ago

Angus Breeding Index	Lower Profitability																			Greater Profitability
Domestic Index	Lower Profitability																			Greater Profitability
Heavy Grain Index	Lower Profitability																			Greater Profitability
Heavy Grass Index	Lower Profitability																			Greater Profitability
Calving Ease Direct	More Calving Difficulty																			Less Calving Difficulty
Calving Ease Dtrs	More Calving Difficulty																			Less Calving Difficulty
Gestation Length	Longer Gestation Length																			Shorter Gestation Length
Birth Weight	Heavier Birth Weight																			Lighter Birth Weight
200 Day Growth	Lighter Live Weight																			Heavier Live Weight
400 Day Weight	Lighter Live Weight																			Heavier Live Weight
600 Day Weight	Lighter Live Weight																			Heavier Live Weight
Mat. Cow Weight	Lighter Mature Weight																			Heavier Mature Weight
Milk	Lighter Live Weight																			Heavier Live Weight
Days to Calving	Longer Time to Calving																			Shorter Time to Calving
Scrotal Size	Smaller Scrotal Size																			Larger Scrotal Size
Docility	Less Docile																			More Docile
NFI-P	Lower Feed Efficiency																			Greater Feed Efficiency
NFI-F	Lower Feed Efficiency																			Greater Feed Efficiency
Carcase Weight	Lighter Carcasse Weight																			Heavier Carcasse Weight
Eye Muscle Area	Smaller EMA																			Larger EMA
Rib Fat	Less Fat																			More Fat
Rump Fat	Less Fat																			More Fat
Retail Beef Yield	Lower Yield																			Higher Yield
IMF	Less IMF																			More IMF

MID JULY 2018 ANGUS GROUP BREEDPLAN EBVS

INDEX VALUES

	CE-DIR	CE-DT	GL	BW	200D	400D	600D	MCW	MILK	SS	DTC	CWT	EMA	RIB	RUMP	RBV%	IMF%	DOC	A/BREED	DOM	H/GRAIN	H/GRASS
EBV	+5.4	+3.1	-9.5	+1.4	+50	+94	+123	+104	+16	+1.4	-7.7	+81	+6.1	+1.7	-0.7	-0.4	+2.8	+8	+\$145	+\$125	+\$164	+\$135
Acc	74%	59%	97%	95%	93%	88%	86%	79%	66%	84%	53%	76%	74%	77%	75%	71%	73%	77%				

BLACKHAUGH TIME F610 (S1307)



BLACKHAUGH TIME F610

Pedigree: Right Time X TC Stockman X 0

Breed: AA

Qty: Each unit is one straw of frozen bull semen

Delivery: Delivery to your own farm flask, if DIY AI licence, or to your local AI Technician. Delivery usually 1-2 weeks

Bull Description

Blackhaugh Time is a well-shaped bull with a great temperament, passing both characteristics to his offspring.

Qty
1

Star Rating (Within breed)	Economic Indexes Sep '18	€ value per progeny	Index Reliability	Star Rating (Across all beef breeds)
★★★★☆	Replacement	€104	52% (Average)	★★★★★
★★★☆☆	Terminal	€63	62% (Average)	★★☆☆☆

Star Rating (Within breed)	Key Profit Traits	Index Value	Trait Reliability	Star Rating (Across all beef breeds)
Expected Progeny Performance				
	Calving Difficulty (%3 & 4)	3.2%	67% (High)	
	Gestation length (days)	1.26%	53% (Average)	
★★☆☆☆	Docility (1-5 scale)	-0.03	57% (Average)	★★☆☆☆
★★★★☆	Carcass weight (kg)	8 kg	71% (High)	★☆☆☆☆
★★★★☆	Carcass conformation (1-15 scale)	0.63 scale	59% (Average)	★☆☆☆☆
Expected Daughter Breeding Performance				
	Daughter calving difficulty (%3 & 4)	7.03%	41% (Average)	
★★★★★	Daughter milk (kg)	10.1kg	66% (High)	★★★★★
★☆☆☆☆	Daughter calving interval (days)	-2.75 days	37% (Low)	★★★★★

BLUP Sep '18	Muscle	Skeletal	Functionality
	99	107	95
Reliability	31%	27%	6%

Angus bull sold for a record R140 000

By Siyanda Sishuba July 26, 2017 1:36 pm

Mequatling Smokin' Jo (WB 15 306), a Black Angus bull, was sold for R140 000, a new SA record for the breed, at the recent Mequatling Red and Black Angus 50th production auction in Clocolan in the Free State.



Mequatling Smokin' Jo (WB 15 306), a Black Angus bull, was sold for a new SA record price of R140 000.

Photo: Simon Hughes

If cost and accessibility aren't limiting:

Which sire would be best suited to help you reach your breeding goals?





Genetic evaluation of beef cattle: a changing world



- Increasing complexity
- Increasing frequency
- Increasing global context
- **BREEDPLAN:**
 - most widely used service for multi-trait beef cattle genetic evaluation
 - across-country evaluations for ~20 years
 - large-scale multi-country evaluations for ~10 years



BREEDPLAN EBVs

Growth	Fertility/Birth	Carcase	Other
Birth Weight Growth: <ul style="list-style-type: none"> ▪ 200 Day ▪ 400 Day ▪ 600 Day Maternal (Milk) Mature Cow Weight	Scrotal Size Days to Calving Gestation Length Calving Ease★ <ul style="list-style-type: none"> ▪ Direct ▪ Daughters 	Carcase Weight Eye Muscle Area Fat Depth: <ul style="list-style-type: none"> ▪ Rump ▪ Rib Intramuscular Fat Retail Beef Yield	Docility★ Net Feed Intake Flight Time Shear Force Structural★ Soundness

★ Separate analyses

**Recent additions: objectively-measured marbling traits (Wagyu)
male & female reproductive traits (Brahman)**



Trans-Tasman Genetic Evaluations for *Bos Taurus* and Euro breeds using BREEDPLAN have been routine for over 20 years



Angus
Charolais
Devon
Shorthorn
Simmental
South Devon
Salers
Gelbvieh
Blonde d'Aquitane



BREEDPLAN: Southern Africa



Separate data bases

Brahman

Brangus

Santa Gertrudis

Single data base

Simbra

Simmentaler



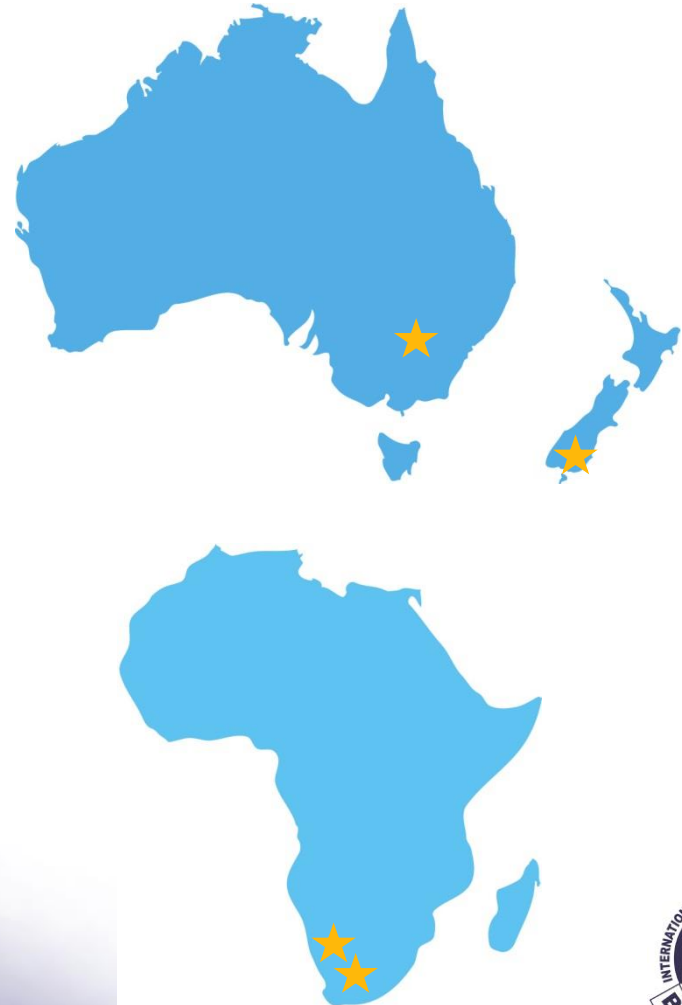
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Research Institute



BREEDPLAN: Southern Hemisphere



Hereford
Limousin



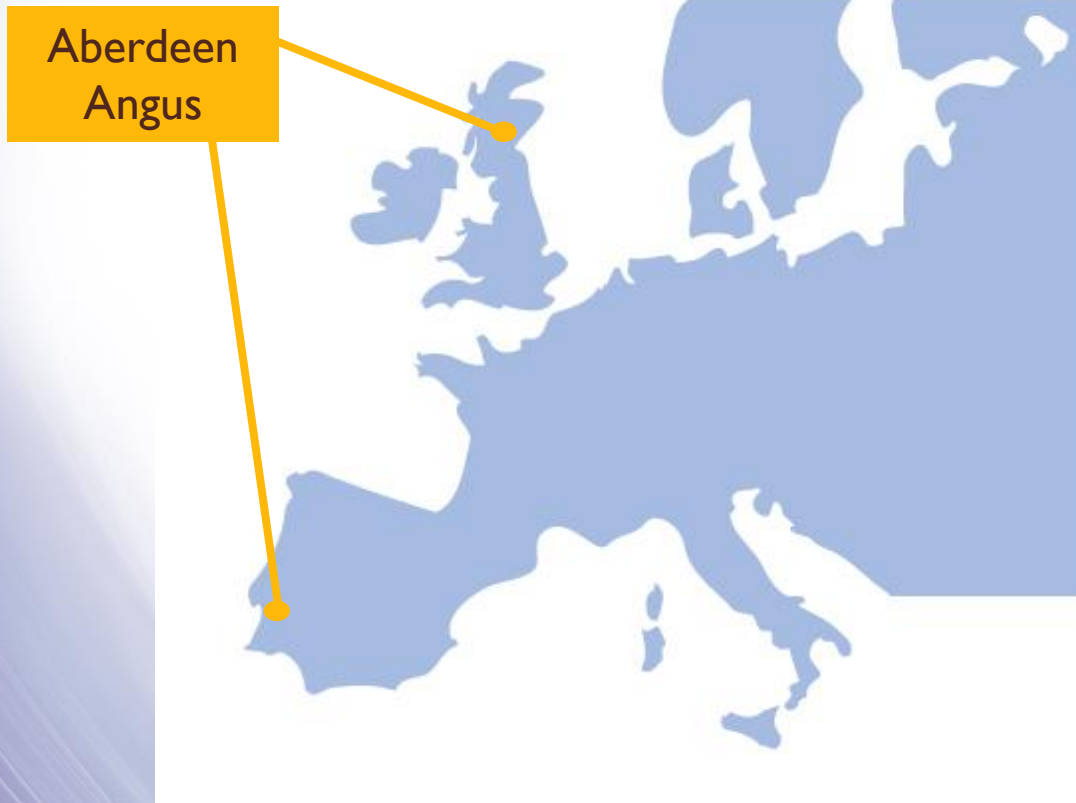
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BREEDPLAN: Europe



**Agricultural Business
Research Institute**



Murray Grey combines data across 5 countries

- Data from Australia, New Zealand, USA, Canada & UK is sent to ABRI for evaluation and results are sent back to individual Associations.
- This represents virtually the entire gene pool of Murray Grey internationally.



European Developments: Interbeef



Weaning Weight
Calving Ease
Carcase (weight + fat)
Fertility (no. calvings)

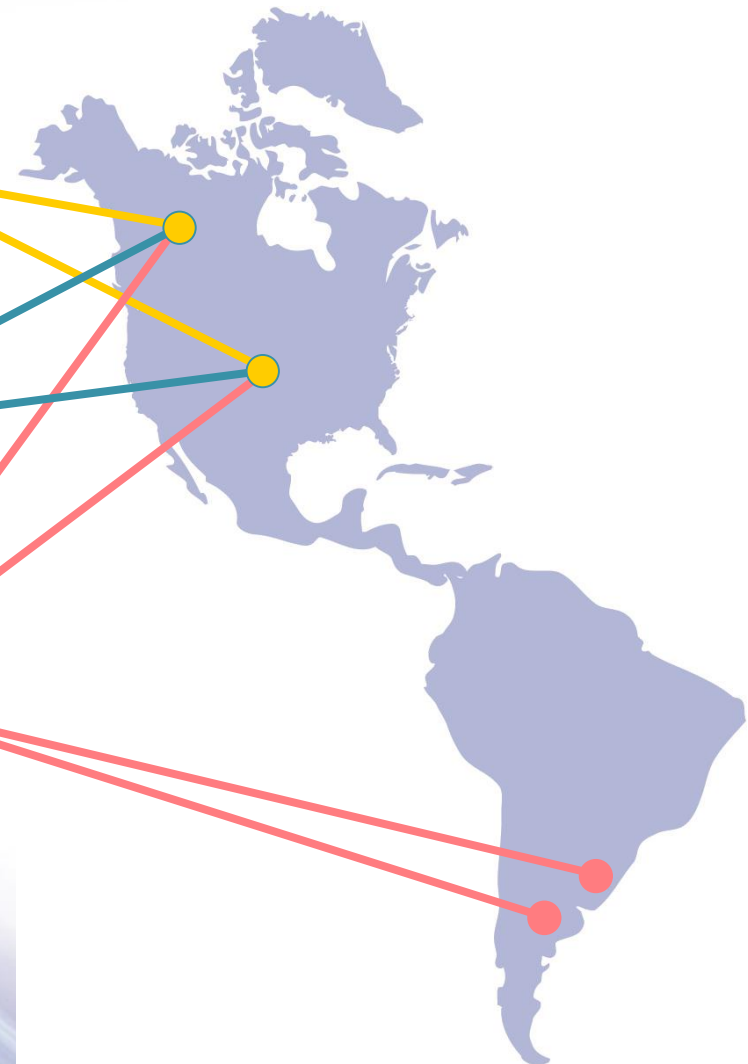
North and South America



Black Angus
(AGI)

Charolais
(AGI)

Hereford
(ABRI / Theta Solutions)

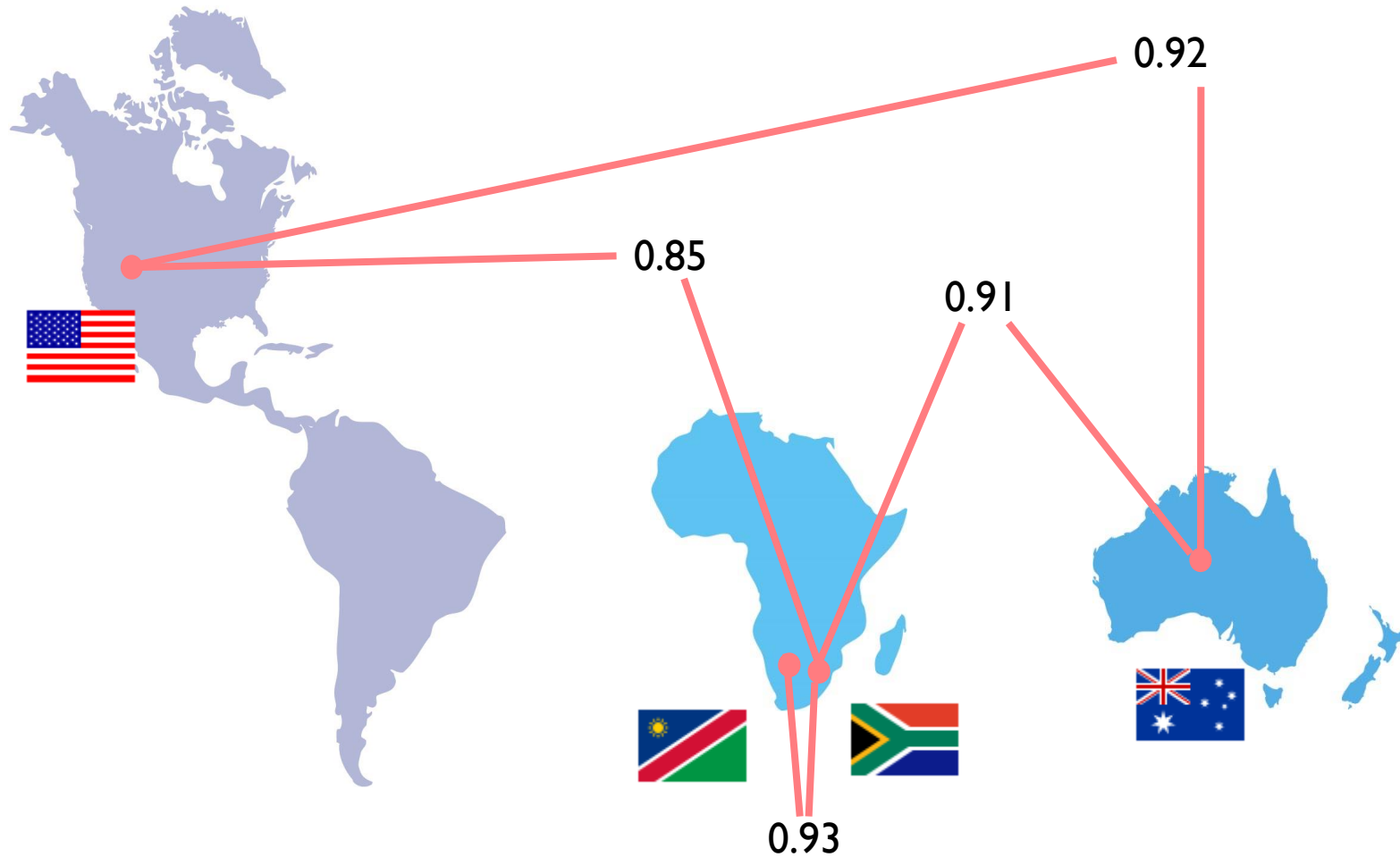


Multi-country BREEDPLAN developments

Breed	Countries
Hereford★	AUS, NZ, UY, AR, UK, NAM
Brahman★	AUS, USA, RSA, NAM
Simmental	AUS, NZ, RSA
South Devon★	AUS, NZ, UK
Charolais	AUS, NZ, UK, HUN



Across-country genetic correlations for weaning weight: Brahman



Brahman: weight traits

	AUS	USA	RSA	NAM	Total
Birth	18,964	125,100	158,954	49,836	352,854
Weaning	193,381	116,292	105,805	37,260	452,738
Yearling	96,112	25,108	58,391	29,686	209,297
Final	100,383	-	50,040	27,067	177,490
Mature cow	17,194	-	19,402	12,655	49,251

1,123,683 animals in total























Brahman: other traits

	AUS	USA	RSA	NAM	Total
Scan EMA	19,987	2,130	1,085	10,385	33,587
Scan Rib	17,385	2,017	1,091	10,389	30,882
Scan P8	17,840	2,098	1,092	10,378	31,408
Scrotal	25,856	2,340	8,143	4,441	40,780
Flight time	7,423	-	437	-	7,860
Docility scores	-	35,811	18,960	11,442	66,213



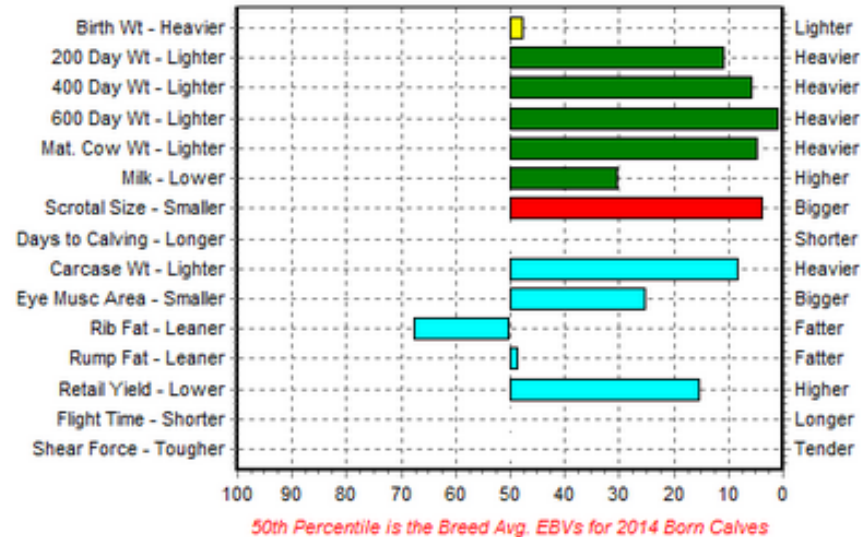
Results

Animal is a Published Sire, Birth Wt. (kg) \leq 2.2, 200 Day Wt. (kg) \geq 20, 400 Day Wt. (kg) \geq 28, 600 Day Wt. (kg) \geq 38,

Primary Country	Birth Wt. (kg)	200 Day Wt. (kg)	400 Day Wt. (kg)	600 Day Wt. (kg)	Mat. Cow Wt. (kg)	Milk (kg)	Scrotal Size (cm)	Carcase Wt. (kg)	Eye Muscle Area (sq.cm)	Rib Fat (mm)	Rump Fat (mm)	Retail Beef Yield (%)
Namibia 	+2.1	+22	+35	+55	+60	+4	+1.8	+28	+2.6	-0.4	-0.4	+0.7
USA 	+1.6	+22	+34	+38	+44	+4	+0.5	+28	+0.4	-0.1	-1.2	+0.3
Australia 	+1.8	+22	+34	+44	+52	+1	+2.3	+27	+1.5	+0.5	+0.3	+0.7
Australia 	+1.4	+22	+29	+43	+40	+6	+3.5	+20	+3.2	+0.3	-0.4	+1.0
Australia 	+1.4	+22	+34	+44	+43	+4	+0.5	+28	-0.7	+1.9	+2.1	-0.1
South Africa 	+2.0	+21	+30	+44	+39	+6	+1.5	+23	+2.4	-0.3	-0.5	+0.6
Namibia 	+2.0	+21	+28	+42	+39	+6	+0.1	+22	+3.7	0.0	+1.0	+0.5
USA 	+2.1	+21	+32	+39	+49	+4	+0.7	+18	+5.3	-1.2	-1.6	+1.3
Namibia 	+2.2	+21	+28	+41	+61	+6	+0.1	+24	+1.8	+0.4	+2.2	+0.3
USA 	+1.9	+21	+35	+42	+51	+2	0.0	+21	+5.8	-1.2	-2.2	+0.9
Australia 	+1.1	+20	+28	+45	+42	+2	+2.7	+16	+4.5	+0.3	+1.3	+0.7
USA 	+1.4	+20	+33	+42	+41	+2	0.0	+23	+4.6	-0.5	-0.8	+0.7
USA 	+1.8	+20	+36	+45	+55	+2	+0.1	+20	+7.5	-1.9	-2.4	+1.0
Namibia 	+0.8	+20	+31	+38	+47	-2	-0.4	+21	+4.7	-0.6	-0.2	+0.4
USA 	+2.1	+20	+35	+44	+45	-4	+0.8	+34	-1.1	-0.1	-0.4	0.0
Namibia 	+1.2	+20	+29	+44	+52	0	0.0	+24	+3.7	-0.3	-0.2	+0.5
Australia 	+1.6	+20	+29	+39	+47	+2	+1.3	+25	+0.8	+0.8	+0.5	+0.6
South Africa 	+1.5	+20	+30	+39	+49	+5	0.0	+30	+0.1	+0.7	+0.9	-0.3
South Africa 	+2.0	+20	+29	+42	+42	+5	+0.2	+26	+2.4	-0.2	-0.4	+0.3
Australia 	+1.7	+20	+30	+44	+47	-1	+2.0	+25	+1.5	+1.1	+2.7	+0.4



Results



Graph Explanation

2016 Multi-country Brahman GROUP BREEDPLAN EBVs

	Birth Wt. (kg)	200 Day Wt. (kg)	400 Day Wt. (kg)	600 Day Wt. (kg)	Mat. Cow Wt. (kg)	Milk (kg)	Scrotal Size (cm)	Days to Calving (days)	Carcase Wt. (kg)	Eye Muscle Area (sq.cm)	Rib Fat (mm)	Rump Fat (mm)	Retail Beef Yield (%)	Flight Time (secs)	Shear Force (kgs)
EBV	+2.1	+22	+35	+55	+60	+4	+1.8	-	+28	+2.6	-0.4	-0.4	+0.7	-	-
Acc	81%	80%	79%	79%	74%	49%	69%	-	66%	38%	38%	43%	34%	-	-
Breed Avg. EBVs for 2014 Born Calves Click for Percentiles															
EBV	+2.1	+16	+21	+29	+34	+3	+0.4	+1.1	+18	+2.0	-0.2	-0.3	+0.4	+0.01	+0.03

Traits Observed: BWT 200WT, 600WT, SS

Statistics: Number of Herds: 1, Progeny Analysed: 22,



Opportunities

- collaboration
- innovation
- data sharing
- linkage

Challenges

- competing priorities
- politics
- methodology
- linkage



Using multi-breed data



Brahman

Single-Step BREEDPLAN EBVs



Santa Gertrudis

BREEDPLAN EBVs

**Northern
Repronomics
Database**



Droughtmaster

BREEDPLAN EBVs



Belmont Red

BREEDPLAN EBVs



Northern Tropical Breed Single-Step BREEDPLAN analysis



Using multi-breed data



Limousin
BREEDPLAN EBVs



Simmental
BREEDPLAN EBVs



Charolais
BREEDPLAN EBVs



**Southern
Multi-breed
Database**

- Historic data
- Limited traits
- Limits of structure
- Limited linkage



IGS: North America



Simmental
Red Angus
Shorthorn
Maine-Anjou
Chianina
Gelbvieh
Limousin



Multi-Source Genetic Evaluations: considerations



- **Technical:**
 - effective linkage
 - traits & models
 - matching
- **Practical:**
 - computational
 - logistics
 - costs
 - education
- **Political:**
 - all or some?
 - winners & losers?



Questions

