



# Wagyu Beef Genomics Program

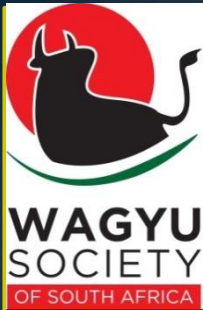
9 August 2018



## BGP Population wide progeny improvement scheme

1. A number of registered (stud) herds practising TOTAL TESTING
2. Participating contemporary groups not less than 10 for same sex using large variety of bulls (participants choice) with linkage sires (Program choice) between herds
3. Maintaining of linkages between test groups
4. Consistent measurement discipline and sound practices throughout
5. Ensuring sufficiently large management groups for all traits measured
6. Duration required to collect sufficient data for female fertility
7. Avoiding selection bias
8. Avoiding group effects/ group test effects

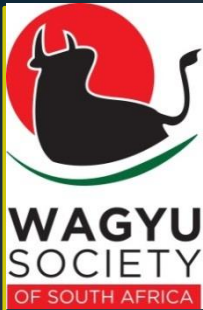




## Programme funding

- The Technology Innovation Agency (TIA) of South Africa funded the programme for R29 831 580 for three years starting in April 2015 (R10 m/annum except for first year)
- TIA is considering an application for R 12 250 000 per annum for a second round of three years
- The Programme is substantially co-funded by industry





## BGP : phase 1 intent

- Accurate measurement of phenotypes of all traits of economic importance in Southern Africa
- Combination of the phenotypic data with genomic data to enhance breeding values of the Southern African beef herd
- Use of the enhanced breeding information to increase the competitiveness of the industry.



# BGP Impact assessment

Summary of Impact Measures	
Total Benefits (PV)	R2 651 240 385
Total Input Costs (PV)	(R834 141 765)
Total Usage Costs (PV)	(R27 246 756)
<b>Economic Net Present Value (ENPV)</b>	R1 789 851 863
<b>Economic Internal Rate of Return (EIRR)</b>	18.70%
<b>Benefit Cost Ratio (BCR)</b>	3.08





# Fundamentals to BGP



# The pillars of a sustainable genomics program



A Breed Society defines it's own detailed plan considering the alternatives available and it's product/market position

Initial reference population representing the diversity of the population

Access to international genotypes of Breed

Read across from other breeds genotypes

Links to international reference populations

Introduction of Single Step in collaboration with Service Provider

Continuous refreshment (update) of reference population **Phenotypes & Genotypes**

Own population **phenotype** data base for all traits, including difficult to measure traits and maternal traits

# The pillars of a sustainable genomics program



Strategic management and ownership by Society

Program management  
by the Society

International  
collaboration

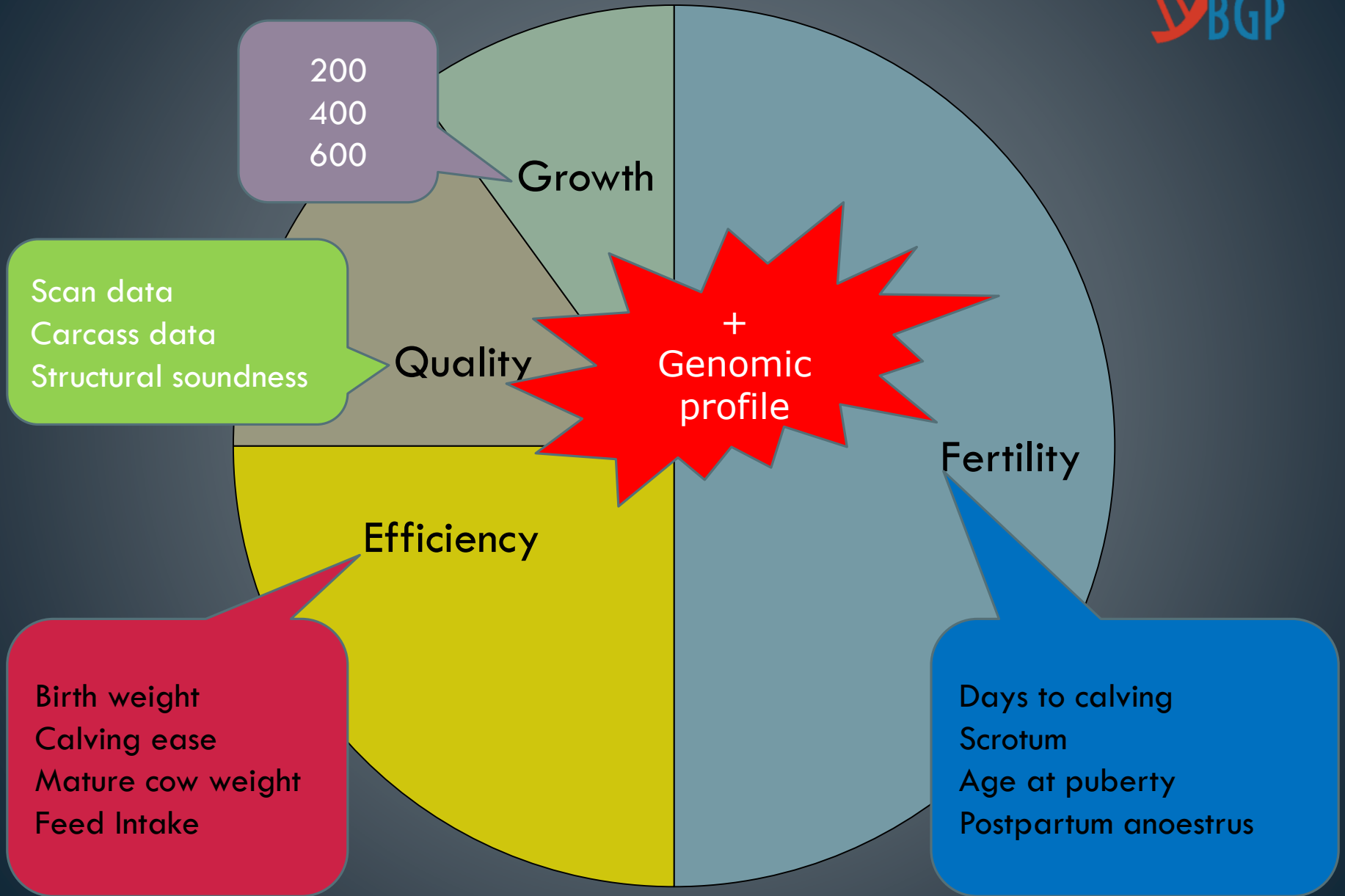
Research

Society culture of  
continues improvement

Core of Breeders committed to Total Performance Testing and  
International competitiveness



# Focused total testing



The presence of a **linkage sire** is **CRUCIAL**

# Effective data



Number of calves from same sex born within age slice

Number of sires	8		12		16		20	
	Calve EBV	Sire EBV	Calve EBV	Sire EBV	Calve EBV	Sire EBV	Calve EBV	Sire EBV
6	88%	83%	92%	83%	94%	83%	95%	83%
5	88%	80%	92%	80%	94%	80%	95%	80%
4	88%	75%	92%	75%	94%	75%	95%	75%
3	88%	67%	92%	67%	94%	67%	95%	67%
2	88%	50%	92%	50%	94%	50%	95%	50%
1	88%	0%	92%	0%	94%	0%	95%	0%

Number of sires

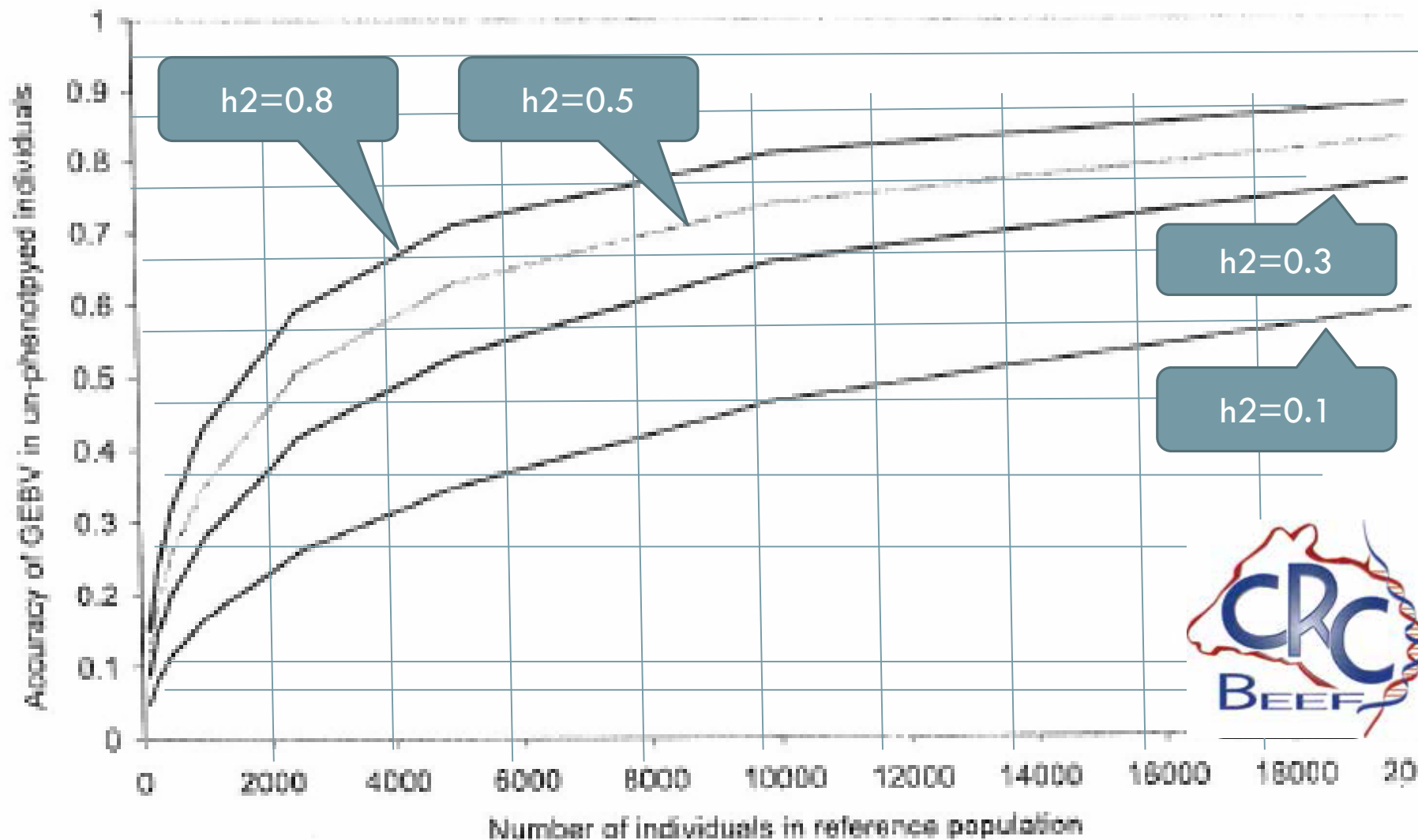
Strong design group size of 20 or more with 5 or more sires including a link sire and minimum of 4 progeny per sire

Balanced group size of 16 with 4 sires including a LINK SIRE (minimum of 4 progeny for any sire)

Absolute minimum group size of 8 with 2 sires and a minimum of three calves per sire

BGP recommended group size of 12 with 3 sires including a link sire, minimum of 4 progeny per sire

# Effect of number of individuals on accuracy of prediction equation



# Wagyu SA planned reference population size



Trait	data gathered to date (June 2018)	Minimum target # data required for phenotypic reference population	Minimum target # data required for genomic reference population
Birth weight	4500	3000	3000
200 days/ wean weight	1400	3000	3000
400 days/ year weight	1200	3000	3000
600 days/ 18 month weight	700	3000	3000
MW (mature cow weight)	100	3000	3000
Individual Feed Intake		1500	1500
Ultrasound scan data	4	1000	1000
Scrotal Data	15	1500	1500
Carcass data	0	1500	1500
Genotypes (50k)		3000	3000
Genotype (+700k)		300	300
DTC (days to calving)	0	3000	3000

# Guidance to BGP from Dr Rob Banks, Director of AGBU



Just having some animals phenotyped and genotyped – such as a bunch of sires with EBVs for say 400d weight, doesn't mean anything at all for any other trait, and very little for animals that can get a 400d weight themselves.

The economic challenge of getting 500-1,000 good phenotypes (and genotypes) on a sound sample of a breed per year, is an economic challenge beyond most breeds.

It's not a short-term R&D project – it is the price of being in the genomic selection game, and you have to pay it every year to play.

And nothing will change that – including pooling data from several breeds – if you don't have data on breed X, you cannot predict into that population.

# Lessons learnt through implementing Breedplan Single step,

Dr Rob Banks, Director of AGBU



<b>Wagyu</b>		
<b>Trait</b>	Average increase in accuracy for animals with 0% prior accuracy	Average increase in accuracy for animals with 30% prior accuracy
200 D	25%	15%
IMF (Marbling)	25%	15%

# Lessons learnt through implementing Breedplan Single step,

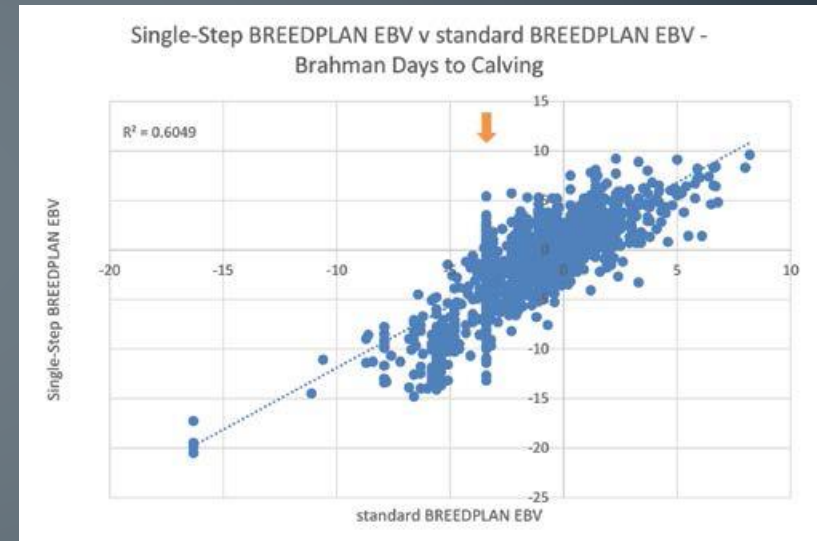
Dr Rob Banks, Director of AGBU



**Genotyping identifies an accurate distribution of genes from each parent and thus corrects the “mid-parent value assumption for a trait to the actual genes as inherited from each parent**

A very useful feature of the Single-Step BREEDPLAN analysis :

There are a number of animals whose Days to Calving EBV would all be -7 under the standard BREEDPLAN analysis, that now have a spread of Days to Calving EBVs from +10 to -14 under Single- Step BREEDPLAN (shown by the orange arrow in the chart).



These could be a group of animals with mid-parent EBVs - the Single-Step BREEDPLAN analysis drills into their genes more closely, and spreads their EBVs apart. These animals are likely to be a group of full-sibs without their own performance record.



# BGP: How does BGP affect the Breeder?







## What is in it for the Breeder?

- Increased accuracy of EBV's
- Selection data earlier in life of animal
- Reduced cost of genotypes
- Subsidised cost of feed intake and meat quality tests
- GEBV's for traits of economic importance
- Local, regional and international collaboration
- Competitive position for breed





## What is expected of the Breeder?

- Commitment to performance measurement according to Breed Society BGP plan
- Well structured management groups
- Submission of genotyping samples
- Submission of animals for meat quality, feed intake tests
- Availability of meat samples for meat quality
- Funding of own value gained



Genomic Tests	<b>WAGYU SA- DNA SERVICES</b>	Total price <b>excl. VAT</b>
BGP genomic profile (50k)		490.00
Parentage Verification		Included
<b>(50KSNP must be completed to allow any of the following additional testing)</b>		
Wagyu Genetic Condition Test (WGCT)	5 conditions (CHS, L16, B3, F13, F11)	240.00
Full Genetic Test Panel	WGCT & SCD (Stearoyl-CoA desaturase)	340.00
Coat Colour		80.00
Myostatin (9 variants)		130.00
Homozygous Poll		130.00
Single Genetic condition test	Any one of CHS, L16, B3, F13, F11 or SCD separately	240.00
Tenderness		240.00
Crossbred Wagyu test		80.00

**Royalty fees subject to confirmation**



## BGP Phase 2



# Long-term benefits

- Improved rates of genetic gain (Holstein)
- Sex-limited traits can be estimated
- Affordable genotyping extended to population once reference is established
- Increases in fertility
- Increases in feed efficiency
- Long-term: increases in meat quality
- Increased collaboration



## Phase 2 planned outcomes

- Useful data for research
- High impact research outcomes from overarching, multi-breed research
- Data provided by the Breed Society to Breedplan for the development of the EBV's/GEBV's and economical indexes.
- GEBV's, including the difficult-to-measure traits.
- Improved genetic selection tools available to the industry.
- Improved meat quality and objective measurements for meat grading and classification.
- A cost effective genetic test for the Seedstock and Feedlot industry.
- Improved feed efficient animals for both the feedlot as well as cows on pasturing realising a significant saving in feed consumed.





Thank you

