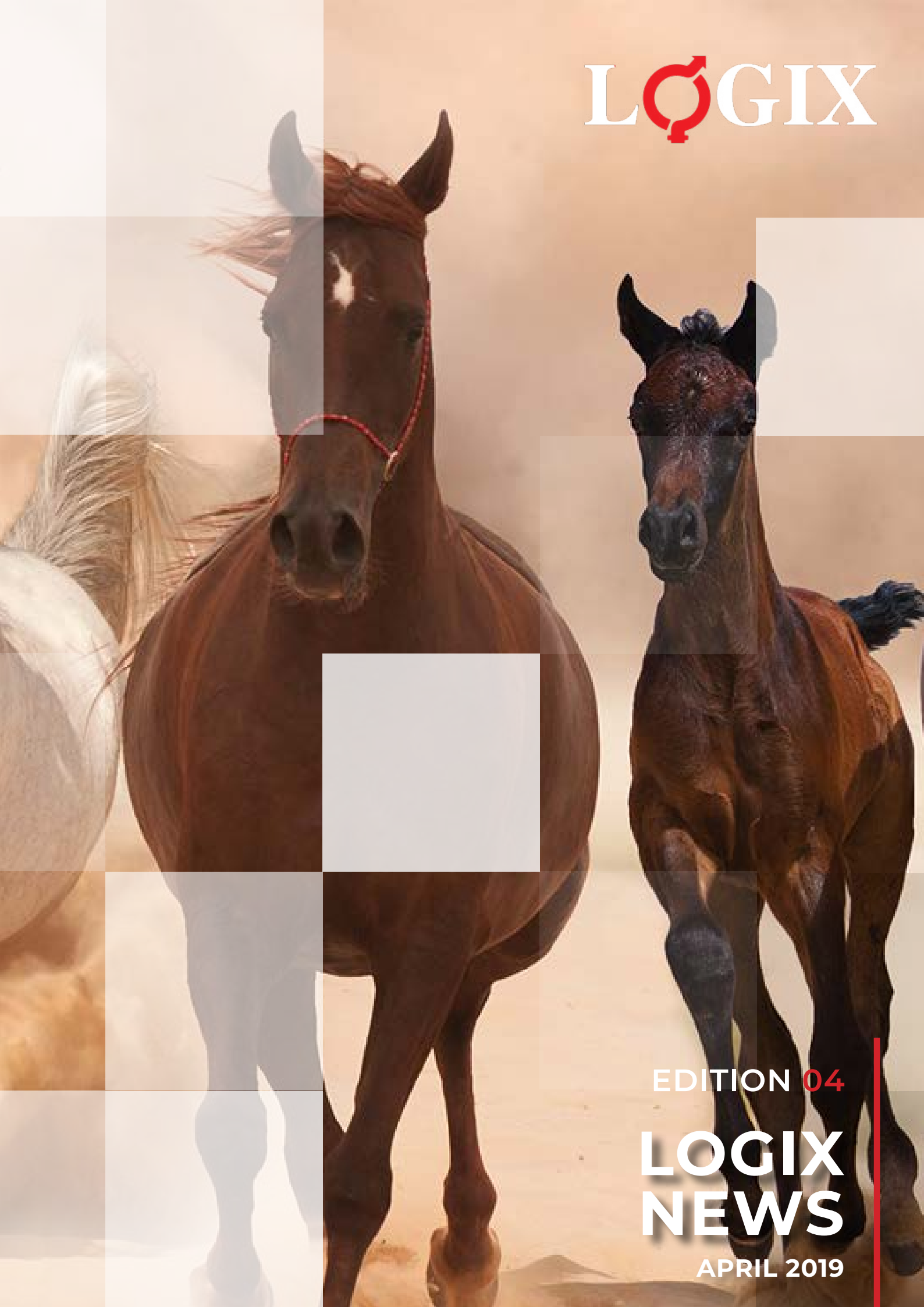


The background of the entire page is a composite image of horses, overlaid with a grid of semi-transparent squares in various shades of beige, cream, and light brown. The horses are shown in motion, with some appearing to gallop or trot. The colors of the horses range from dark bay to light chestnut. The grid pattern is most prominent in the upper half of the image.

LOGIX

EDITION 04

LOGIX NEWS

APRIL 2019

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FROM LEFT TO RIGHT Juho Kyntäjä (Employed by Mtech Digital Solutions, Finland and member of ICAR's Audit Group) and from SA Stud Book: Herman Labuschagne (Manager: Recording and Data Services), Dina Victor (Senior System Developing and Programming), Dr Bobbie van der Westhuizen (Manager: Genetic and Advisory Services), Dr Japie van der Westhuizen, General Manager of SA Stud Book, and Nico de Jager (Manager: Computer Services).

THE SUCCESSFUL RENEWAL OF SA STUD BOOK'S INTERNATIONAL CERTIFICATION

Dr Japie van der Westhuizen

Stud Book is proud to announce that the Association's International Committee for Animal Recording's (ICAR) Certificate of Quality has been renewed. The renewal is valid to April 2024.

ICAR is the international body drafting the guidelines for the recording of animals, especially production animals. The body consists of sub-committees, like the well known Interbull (carrying out international genetic evaluations for dairy cattle from the Interbull Centre in Sweden), working groups (like Interbeef, Milk Recording, Use of DNA technologies, Functional traits recording, etc.) and Task Forces (working on specific projects like the current Task Force on the use of Sensors for the recording of animal production). ICAR also renders a service to its members to evaluate them on the international guidelines for animal recording and other related practices. This is known as the ICAR Certificate of Quality (CoQ). Due to the comprehensiveness and improvement of animal recording, many fields of activities can be evaluated, based on the main business of the organisation applying for the CoQ. SA Stud Book renders such a very comprehensive service, from the correct identification of animals to the adherence of the recording requirements of individual member Breeders' Societies (according to their constitutions), the application and precise calculation of production data and the prediction of genetic breeding values. Stud Book therefore makes certain to be evaluated for each of these activities by ICAR when the renewal of the Certificate of Quality is up for consideration.

It is required to renew the Certificate of Quality every five years when one or more of the ICAR auditors visits the applicant after a comprehensive questionnaire, with the necessary attached documentation as proof, has been completed. An update by means of another comprehensive questionnaire, to confirm adherence to the guidelines, takes place after two and a half years.

After the visit and evaluation on 18 to 21 March 2019 by Juho Kyntäjä, the appointed ICAR auditor, it was concluded that Stud Book conforms to these international guidelines and therefore to renew its Certificate of Quality.

The activities of conformance are as follows:

- Animal identification in cattle and other species;
- Milk recording in cattle and other species;
- Beef recording in cattle and other species;
- Production recording of other traits;
- Data processing;
- Herdbook (Stud Breeding Recording);
- Genetic evaluation in dairy cattle, beef cattle and other



FROM LEFT TO RIGHT: Juho Kyntäjä, conducted the SA Stud Book audit, with Mr Freddie Wasserfall, President and Dr Japie van der Westhuizen, General Manager of SA Stud Book.

Prior to the Audit the Auditor, Juho, requested a comprehensive report from INTERBULL to evaluate Stud Book's Genetic Evaluations for Dairy Cattle. The INTERBULL report concluded with the following words:

"South Africa (Stud Book) has a dynamic genetic evaluation system that adapts continuously to the new scientific findings."

The Audit also had an added advantage as it allowed the management and personnel of Stud Book to take stock of our system, efficiencies of operation and appropriateness of our services and products with regards to the livestock industry. Stud Book prides itself in rendering good services to the Southern African livestock industry and to adhere to the highest international standards. The Association's goal is to see it that livestock farmers and breeders of animals, making use of Stud Book's services and products, remain

NEWS FROM THE REGIONS



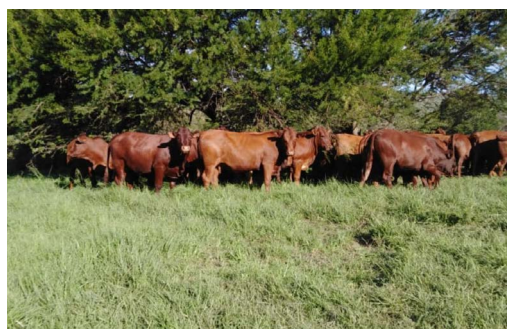
ABOVE Angus cattle of Christof Marais during the Angus Western and Southern Cape Road Show, December 2018 (Chanelle Steenekamp).

BELOW Dairy study group in Oudtshoorn, August 2018 (Chanelle Steenekamp).

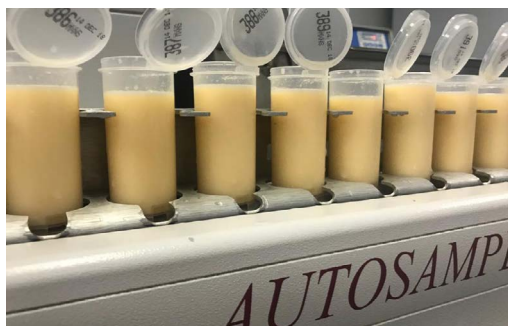


ABOVE FROM LEFT TO RIGHT Lukas Eksteen, Willem and Sarie Pieterse, Jannie Ungerer and Kerneels Jansen van Rensburg. Willem's Beefmaster bull won the floating trophy in the Buffland Intake Growth Test. The bull with the highest ADG wins, provided its FCR index is above 100, it meets breed standards and points 8 or 9. This is an interbreed award if at least 10 bulls were tested (Andries Riekert).

FAR RIGHT Young Bonsmara bulls after an extensive farm growth test at David Cock near Queenstown. They were 18 months old. The heifers right were also 18 months old (Gerdus de Klerk).



BELOW Milk samples being tested for protein and butterfat content (Thalia Brameld).



LEFT Jersey x Ayrshire cross calf (Suretha Francis)



RIGHT Some of the hair samples that are to be sent of to Weatherby's in Ireland for genomic testing. (Suretha Francis)

LEFT Upcoming rain on a farm in the Tsitsikamma (Ruann Kruger)





SOUTH AFRICA & HOLSTEIN INTERGENOMICS

Dr BE Mostert, SA Stud Book

Small Holstein populations, like that of South Africa, have been searching for cost efficient solutions to implement genomic selection. InterGenomic Genetic Evaluations, therefore joint Genomic Evaluations of different countries based on shared genotypes, have been successfully implemented for the Brown Swiss Breed by INTERBULL (the International Bull Evaluation Service) in Sweden, a few years ago. This led to the idea of implementing the same methodology for small or other Holstein populations.

	2017 PILOT RUN	2018 PILOT RUN
NO OF COUNTRIES	6	8
NO OF TRAITS	27	31
NO OF COUNTRY-TRAITS	105	148
	NR OF TRAITS PER COUNTRY	
CROATIA	5	5
IRELAND	26	30
ISRAEL	0	8
KOREA	0	24
PORTUGAL	23	26
SLOVENIA	24	27
URUGUAY	5	5
SOUTH AFRICA	22	23

TABLE 1 Size of the InterGenomic Evaluation for the Holstein breed for the 2017 and 2018 Pilot runs.

Interested countries participated in the first pilot run in May to August 2017. South Africa also expressed interest in taking part and SA Stud Book, on behalf of the SA Holstein Society, submitted animal information and genotypes obtained by their own Genomic Selection Service for the first Pilot run. For the second Pilot run (May to July 2018), SA Stud Book submitted all genotypes obtained through the Dairy Genomics Program.

In the following table, the size of the InterGenomic Evaluation are indicated for the 2017 and 2018 Pilot runs. From this table it can be seen that eight countries participated in the 2018 Pilot run, with South Africa participating in the Production (3 traits), Udder Health (1 trait), Fertility (2 traits), Longevity (1 trait) and Conformation (16 traits) trait group evaluations.

The following table indicates the number of genotypes submitted by the different countries participating in the 2017 and 2018 Pilot runs. Ireland submitted by far the most genotypes, followed by Israel. The addition of the genotypes from the Dairy Genomics Program increased the submitted genotypes by South Africa from 86 in 2017, to 725 in 2018.

TABLE 2: Number of genotypes submitted per country for participation in the 2017 and 2018 Pilot runs.

	2017 PILOT RUN				2018 PILOT RUN			
	FEMALE	MALE	TOTAL	UNIQUE	FEMALE	MALE	TOTAL	UNIQUE
CROATIA	72	0	72	72	173	0	173	173
IRELAND	10 102	3 285	13 387	13 387	9 523	3 166	12 689	12 689
ISRAEL	0	0	0	0	3 974	2 194	6 168	6 168
KOREA	0	0	0	0	1 444	605	2 049	2 049
PORTUGAL	0	831	831	830	0	831	831	830
SLOVENIA	267	343	610	603	720	383	1 103	1 088
URUGUAY	581	251	832	832	2 790	363	3 153	3 153
SOUTH AFRICA	0	88	88	86	491	326	817	725
ALL	11 022	4 798	15 820	15 778	19 115	7 868	26 983	26 711
IMPUTATED	11 056	4 656	15 712	15 712	17 206	7 173	24 379	24 379
IMPUTATED ANCESTORS	40	120			69	106		

In Table 3, the size of the reference population for the InterGenomic Pilot runs is indicated with regards to protein yield. MACE EBVs are used as phenotypes for the estimation of Direct Genomic Values (DGVs) and parent averages are blended with the estimated DGVs to obtain Genomically Enhanced EBVs (GEBVs). In the table it can be seen how many of the genotyped bulls also have MACE EBVs available and on what information parent averages are based.

TABLE 3 Size of the Reference Population implemented for the InterGenomic Pilot runs with regards to protein yield.

RUN	PARENT AVERAGE BASED ON					
	WITH OWN MACE EBV	WITHOUT OWN MACE EBV	SIRE + DAM	SIRE	DAM	NO EBV OR PARENT AVERAGE
2017	1 432	3 224	125	2 889	2	208
2018	3 142	4 031	271	3 396	19	345

In the following table the expected gain in reliability with inclusion of genomic information in the estimation of breeding values is indicated for protein yield (based on the Irish population). An increase in the reliability of 20.8% can be expected, with the younger bulls benefiting more (26.4%), compared to the older bulls (13.7%).

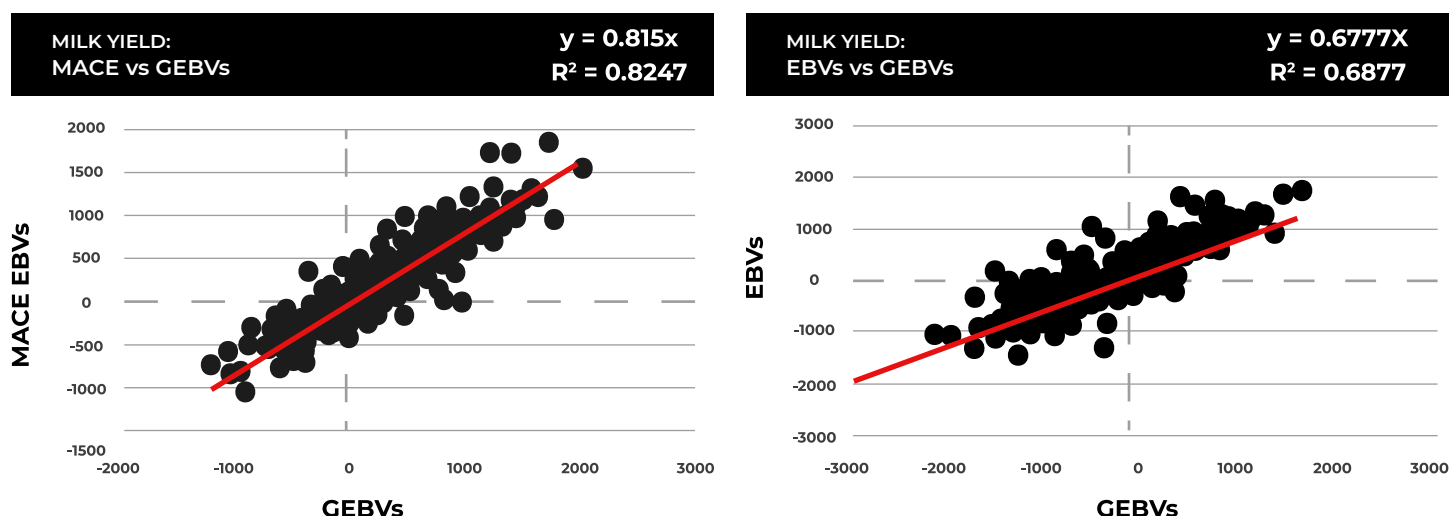
TABLE 4 Expected gain in reliability with the inclusion of genomic information in the estimation of breeding values from the 2018 InterGenomic Pilot run.

BULLS	MACE EBV RELIABILITY		GEBV RELIABILITY		GAIN
	MEAN	SD	MEAN	SD	
ALL	45.1	19.09	65.94	10.42	20.84
OLD	60.89	18.68	74.63	10.43	13.73
YOUNG	32.78	5.53	59.16	1.92	26.38

COMPARISON TO BREEDING VALUES CURRENTLY PUBLISHED IN SOUTH AFRICA

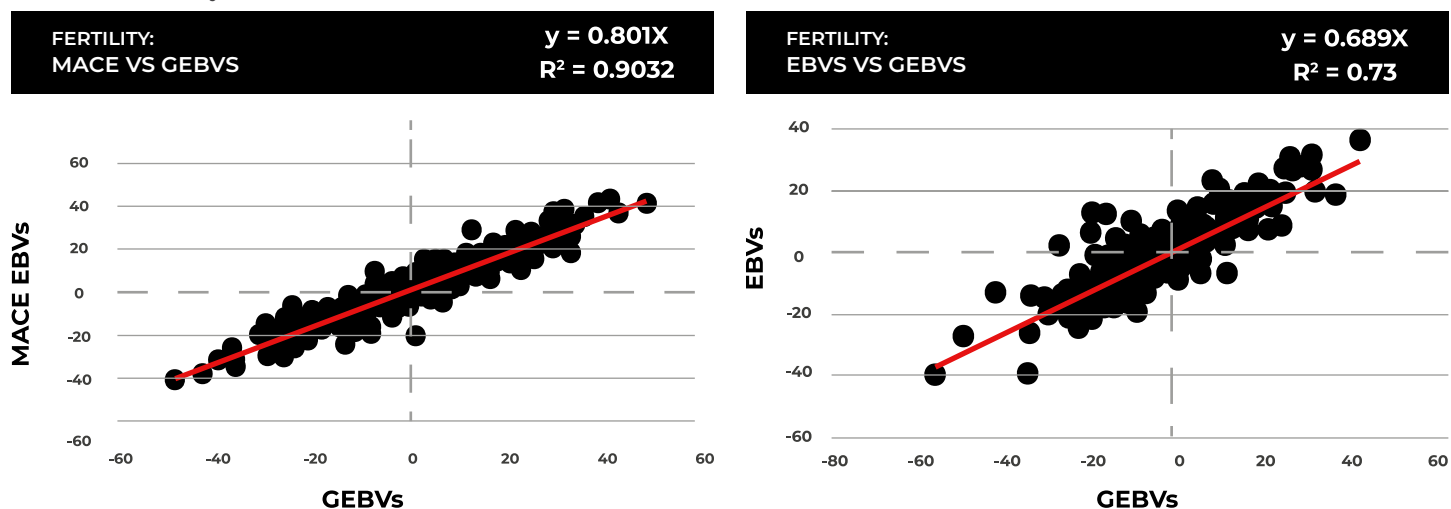
For milk yield it was found that the correlation (R or $\sqrt{R^2}$) between MACE breeding values (international breeding values on the South African scale for bulls with daughters in at least 10 herds in their country of birth) and GEBVs from the 2018 InterGenomic Pilot run, is 90.8%. An average increase of 16.7% in the reliability is obtained with the inclusion of genomic information.

FIGURE 1 For bulls with EBVs based on South African daughters, the correlation (R) between EBVs and GEBVs is 83%, with an average increase in reliability of 10.7% for bulls with reliabilities less than 80%.



With regards to traits of low heritability, e.g. fertility, the following were found: the correlation (R) between MACE breeding values (international breeding values on the South African scale for bulls with daughters in at least 10 herds in their country of birth) and GEBVs from the 2018 InterGenomic Pilot run, is 94.9%. An average increase of 18.9% in the reliability is obtained with the inclusion of genomic information.

FIGURE 2 For bulls with EBVs based on South African daughters, the correlation (R) between EBVs and GEBVs is 85%, with an average increase in reliability of 15.8%.

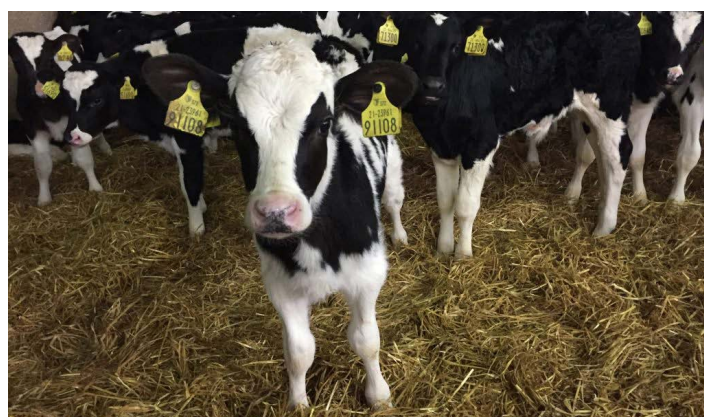


CONCLUSION

INTERBULL who conducted the InterGenomic Evaluation, found that the Reference Population was large enough for many of the traits. They furthermore reported a reasonable gain in reliability with the inclusion of genomic information in the estimation of the breeding values and that an adequate number of bulls are available for validation.

Information distributed to the participating countries is useful and enable countries to have the choice to use the GEBVs as estimated from the GBLUP estimation, or to use the DGVs and blend it to mid-parent values as estimated from their national genetic evaluations. Furthermore, SNP effects are also received which can be used to estimate DGVs for newly genotyped animals in-between InterGenomic runs. This therefore seems to be a viable option for releasing GEBVs to the South African industry, based on a much larger Reference Population than what is currently possible within South Africa.

Reference : Jorjani, H., 2018. International Genomic Evaluation of eight Holstein populations. 2018 INTERBULL Workshop, 25-26 August 2018, Dubrovnik, Croatia.



GENOMIC TRAITS FOR DAIRY CATTLE

Dr Bobbie van der Westhuizen

Genomics refers to the study of an animal's genetic composition. The term genomics can range from the determination of a single gene, to thousands of markers, to the full mapping of an animal's genetic code. This technology already has practical farm application for the selection of future breeding animals.

Genomics are already used in various ways in animal breeding. However, there must first be a reference population for the particular breed. The reference population describes the genetic composition of the breed, as well as how different animals in the breed's genetic code differ. It needs to be determined how certain pieces of genetic code correspond and differ between animals in context of different levels of performance, and especially the part that causes differences in progeny performance. Genomics, however, involves more than just genomically enhanced breeding values. With genomic data, parentage determination and traceability can be done with greater accuracy.

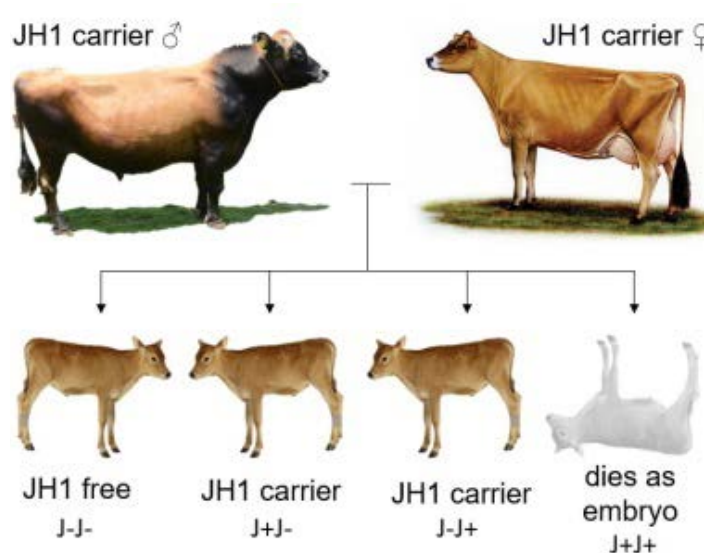


FIGURE 1: Inheritance of Jersey Haplotype 1 (JH1)

SINGLE GENES

Many markers for single gene traits have also been identified on the genome, which can indicate whether an animal is positive or negative for certain genetic disorders. Not all genetic disorders are undesirable, for example the gene for polledness. Polledness is an "alternative" genetic form to horns. Polledness is determined by a single gene and is not affected by the environment at all. It is more beneficial to breed hornless animals from an animal welfare and management point of view. Other single genes of interest include BLAD, DUMPs, Yellow Fat, as well as the DGAT gene involved in the expression of butterfat production.

Several genes for infertility, known as haplotypes, have been identified in the Holstein, Jersey, Dairy Swiss and Ayrshire breeds. If the foetus receives both unwanted copies of the disorder from his / her parents, it is fatal to the foetus. It is therefore important to only use bulls that do not carry these genetic defects.

ZINC AND PHOSPHOR

Zinc is an important component of milk. It is also an essential trace element in the human diet, especially for babies. Some cows produce milk with an above average zinc percentage. These cows can be identified by DNA testing. Milk from such cows is therefore valuable for baby food producers, as it is a niche product. Cows also genetically differ how effectively their phosphorus can be processed. Some cows can therefore absorb and use minerals more efficiently. A mineral deficient cow may show deficiencies that can lead to health problems and lower production and reproduction. In future, genetic data will help predict the differences between cows' mineral needs.

A2 MILK

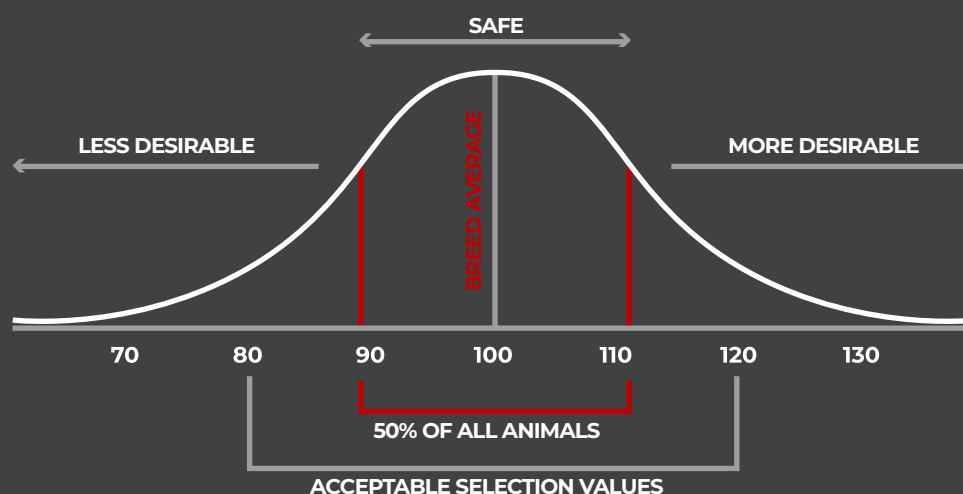
The way the protein molecules in milk are linked is genetic in nature and thus differs between cows of the same breed. Initially, all dairy cows and goats produced the A2 milk protein, after which a mutation occurred in southern Europe and the A2 protein changed to an A1 protein. This mutation is found in most dairy cows in southern Europe, but the northern breeds more often carry the original A2 protein. The A1 protein is responsible for the formation of a specific peptide which, according to medical circles, causes digestive discomfort and symptoms similar to lactose intolerance in some people. The A2 protein is also closer to that of human breast milk, goat, buffalo and sheep's milk. According to researchers, the biological composition of the A2 milk protein is more stable than the A1 compound, which in turn makes it more beneficial for food processors. With a single genomic test, it can be determined whether a cow produces A1 or A2 milk or is a carrier. It is also important to identify bulls that will breed such cows.

MILK COMPOSITION

By applying genetic knowledge and using markers on the genome, special types of milk can now be identified more effectively for people with specific needs and allergies. It is not only important for the consumer, but also for the milk producer as higher profit margins might be achieved. Although all cattle produce "white milk", the composition of milk varies between breeds as well as between cows within a breed. Milk fat consists of more than 100 different fatty acids with differences in the percentage composition of fatty acid between cows.

BEEF CATTLE BREEDING VALUES IN A NUT SHELL

1. SA Stud Book uses INTERNATIONALLY certified Breeding Value estimation methods.
2. Start with a BREEDING GOAL: which type of animal is adapted and profitable in your environment? Select on selection values, not on single traits.
3. Breeding values and selection values are expressed as indices for EASY INTERPRETATION



4. ACCURACIES indicate how much information were available for breeding value estimation (pedigrees, own measurements and progeny measurements; lower for younger animals; higher for older animals with more information)
5. Animals should be FUNCTIONALLY EFFICIENT– in other words fertile, healthy and without visual defects. Breeder Societies inspect stud animals for functional efficiency.

WHY MEASURE THE WHOLE BREED?

Dr Bernice Mostert

As producers are exposed to extreme economic pressures, it is essential that herds are genetically as strong and problem-free as possible. Of all the inputs that a producer can make in his herd, genetics is the only one that will make a difference in the next generation.

Breeding values are the most accurate way to identify animals within a herd that are either superior and therefore next-generation parents, or inferior and are therefore culled. If genomic information is included in the estimation of breeding values, genomically tested animals can be selected at a much younger age with significantly greater reliability.

In a genetic breed analysis, all animals included in the pedigree of the breed are placed in a genetic order for each trait for which breeding values are estimated. This means that all animals with measurements, their ancestors as far back as their pedigrees are captured on Logix, as well as all young bulls and heifers registered on Logix on the day the data is downloaded for genetic analysis, are placed in a genetic order within the breed.

The big advantage of a large percentage of participation in a genetic analysis is that the bulls' breeding values can be predicted more reliably at an earlier stage. Bulls are not measured themselves for some traits - their genetic merit is determined by the measurements of their daughters

and other female relatives. The more measured female relatives a bull has in different herds, the more reliable the bull's breeding values will be estimated. It is also necessary that for a bull that is truly superior, many daughters should be measured in different herds, so that BLUP (the genetic methodology with which breeding values are estimated) can utilize the full variation of the bull's superiority.

The irony of a BLUP analysis is that if data from only superior herds (or only the superior cows of a herd) are included in the genetic analysis, the full variation of the breed (or herd) is not taken into account then BLUP will predict breeding values that deviate less from the groups averages than is actually the case.

SA Stud Book therefore recommends that data of as many herds as possible should be included in the Logix Genetic Evaluations, even if herds are not interested in receiving breeding values and genetic reports, because the genetic ranking estimated for the breed will be more accurate, bulls will receive reliable breeding values at an earlier stage and genetically superior animals can be easily identified.

LIVESTOCK BREEDING AND ANIMAL WELFARE

Dr Helena Theron & Dr Bernice Mostert

It is widely known in livestock breeding that selecting animals on one trait – for example maximum production, will inevitably cause unforeseen changes in other traits due to genetic correlations between traits. The obvious solution is not to select for single traits, but to combine traits into a selection index and select for many important traits at the same time. For many species, welfare traits are already part of the breeding index (e.g., lameness in dairy cows and faecal egg count in sheep). The key is to select for optimum production, rather than maximum production. Quantitative gene action is also affected by the environment – the genetic potential of the animal can only be reached in a suitable environment, for example selecting dairy cows for high milk production. These cows need a very specialized feeding system to realize their genetic potential. Approaches where we adapt the animals by genetic selection should always be combined with approaches to optimize the environment of the animals.

The intensity of selection differs between different livestock species, thus influencing genetic progress that has been achieved, for example the challenge of phenotyping traits for selection under extensive conditions. While past selection decisions, such as an increased lambing rate, may cause a reduction in lamb survival, breeding-related welfare challenges are most commonly associated with the highly selected dairy and pig sectors.





DAIRY CATTLE

Milk yield per cow has more than doubled in the previous 40 years and many cows now produce more than 20,000 kg of milk per lactation. The genetic improvement of dairy cattle is an example of selection for maximum production that caused many unforeseen results, as well as a complete turnaround in selection goals, leading to a different type of dairy cow in production today. Milk production is easy to measure, is moderately heritable and economically important. Consequently, strong selection for production or maximum output, led to a phenomenal increase in milk production per cow. However, farmers had to cull most of these high producing cows during or shortly after their first lactation, mainly because of health-, fertility- and udder problems, which were animal welfare concerns. A complete turnaround in selection goals of dairy bulls were made by placing emphasis on body conformation traits (e.g. udder, feet and legs, size, etc), health traits (somatic cell counts indicating mastitis), fertility and longevity. Currently, selection for milk production traits (output) comprises a small proportion of breeding objectives in dairy cattle. Around 30% emphases are placed on longevity and health traits, 30% on conformation traits, which also improve longevity, and only 40% on production traits. Milk production of the modern dairy cow is still high, but she is more balanced and her body is able to produce high volumes of milk.

BEEF CATTLE AND SMALL STOCK

Beef cattle and sheep farming in South Africa are mainly extensive in nature therefore adaptability is important in breeding goals. Animals will genetically shut down growth and especially reproduction if the environment is too harsh and there is not enough energy available in the system. A female that is for example not adapted to a hot environment, will lose energy to heat dissipation, while staying close to water or in the shade, making her more susceptible to ticks and lowering her resistance to disease. This will for example also happen if her frame size is too large for the environment, as her energy requirements for body maintenance will be higher. Negative emphasis is thus currently placed on mature body weight in the South African beef cattle selection value, the Cow Value, to favour smaller sized cows. An adapted female can therefore be easily identified – she will be able to calve or lamb regularly for many years and reach a high age. Most countries, including South Africa, estimate breeding values for longevity. Traits that are regarded as unwanted due to welfare concerns and are selected against are horns in beef cattle and sheep, as well as double muscling in beef cattle.



Are animals being bred to suit human needs at the cost of animal welfare?

PIGS

Behaviour and welfare traits are important for farm animals that are kept in group housing systems, where behaviour of individual animals has an impact on the performance of the whole group. Mixing pigs into new social groups is a routine procedure experienced several times during the life of most commercial pigs. This triggers aggression that can result in the accumulation of large numbers of superficial skin lesions. Furthermore, aggressive behaviour compromises the rate and efficiency of weight gain, meat quality, and carcass grading. Tail biting in pigs has also been shown to be correlated with genetic selection for lean meat, an example of where selection for increased production may also have led to an increase in undesirable behaviour. Selection for social behaviour, rather than against aggressiveness, is also a possibility. Genetic selection should focus on successful groups as well as successful individuals.

Breeding and genetics has played and will continue to play an important role in the welfare of domestic animals. Sustainability of genetic improvement can be assured by defining breeding objectives with biological efficiency goals instead of economic efficiency goals. A multi-trait selection programme in which improving health, fertility and other welfare traits are included in the breeding objective, and appropriately weighted relative to production traits, are currently adopted by most breeding organisations in the world and in South Africa as well. Currently, we are at the start of the genomics era, where specific traits can be mapped to the genetic code of individual animals. Genomic tools could also facilitate selection for complex behavioural and welfare traits, which are frequently impossible to measure on a large number of animals. Once the genetic fingerprint for such complex phenotypes is available, these welfare issues could be addressed by targeted genomic selection approaches.

POST-WEAN GROWTH TESTS FOR BEEF CATTLE BULLS

Helena Theron & Siebert Vermeulen

It has been estimated that the economic effect of a 5% improvement in feed efficiency is four times higher than a 5% improvement in growth (ADG).

As feed costs make up to two-thirds of the cost of beef cattle farming, it makes sense to improve feed efficiency. This does not only apply to animals in feedlots, but also to the cow herd on the farm, where more than 70% of feed is used to support cows for most of the year.

In all breeds there are genetic variation in feed efficiency - there are animals that are genetically geared to grow better with a lower intake, just as there are individuals who grow less and eat more, with all possible combinations in between. The challenge is therefore to correctly identify genetically outstanding animals, especially bulls, and to distribute their genetics through the breed. Intake on the veld, especially of producing cows, is very difficult to measure accurately. Growth and feed intake are therefore measured on young bulls in growth tests. This information is then used during genetic evaluation to estimate breeding values for cows as well. There are two types of growth tests which measure growth and efficiency, namely Farm Growth Tests, where bulls are usually fed extensively on the field or in a camp, and Feed Intake Growth Tests, where bulls are fed at a central testing centre with a standardized growth ration. In the Feed Intake Growth Test each bull's intake is measured individually, making it possible to accurately measure feed efficiency. In addition, in all tests, traits such as scrotal size and body measurements are also taken. Carcass traits on the live animal are measured with RTU scanning.



FIGURE 1: Bulls in a circular crush.

TYPES OF TESTS

Farm growth tests aim to determine the genetic potential for growth efficiency of beef bulls as accurately as possible under farm conditions. It's important to know that the goal is not to pursue maximum growth, but to measure genetic differences in growth potential.

These tests are done under farm conditions under the following feeding levels:

- Extensive - veld with a lick
- Semi-extensive - veld or planted pasture with a supplement
- Semi-intensive - sufficient concentrates with ample roughage in a large pen
- Intensive - Concentrate (growth ration) in a feeding pen

Feed intake growth tests aim to determine the genetic potential for growth and feed efficiency of beef bulls as accurately as possible in a controlled environment. Accurate determination of feed efficiency requires that individual feed intake, as well as growth, be measured on potential breeding bulls. The measurement of individual feed intake requires specialized apparatus and is measured at several accredited testing stations. Feedlots are already paying preferential rates to growers with more profitable calves.

If half-brothers and other family members are measured in feed intake growth tests as well as in farm growth tests, genetic ability for traits such as feed conversion ratio (FCR) can be determined by the genetic correlations between traits, due to genetic ties between related animals. The relationships are traced to cows, so that genetic ability for traits for which they have not been measured, are determined.

REQUIREMENTS FOR ANIMALS TO BE TESTED

Animals of Stud Book breeds must be recorded on Logix and be the progeny of registered bulls to participate in Growth Tests. For meaningful comparisons during breeding value estimation, calves of the same breed in the same test should be the progeny of at least two sires.

FARM GROWTH TESTS: At least 10 animals from one or more herds of the same breed must complete the test, ensuring large contemporary groups for more accurate breeding value estimation. Comparable animals younger than 14 months and differing less than 100 days in age ensure that genetic differences between bulls are easily identified. There are also maximum weight limits according to breed.

For **FEED INTAKE GROWTH TESTS**, the contemporary groups may be smaller - at least 3 animals (but preferably more) of the same breed that are the offspring of at least 2 registered bulls, should be tested together if breeding values are required. Comparable animals between 5-9 months, which differ by less than 100 days in age and less than 50kg in weight, are tested together. Bull- and heifer calves are accepted because some breeders want to measure feed efficiency on their entire herd, which includes heifers. As heifers are tested separately from bulls. Test at least 10 heifers between about 5 to 10 months of age, but preferably the whole weaner group. As heifers deposit fat earlier than bull calves, they receive a different ration and are on test for only 56 days, compared to 84 days for bull calves.

GROWTH TESTS

Before a growth test, there is an adjustment period of 1 to 3 months in which animals are gradually fed the same ration as during the test, to ensure that rumen microbes are present in the desired populations for the given ration. Growth tests can therefore only begin when bulls start to gain weight. The standard test length for intake growth tests is 84 days for bulls and 56 days for heifers, and animals are weighed every week. The average FCR (about 5 to 6) and ADG (1.6-1.8 kg / day) of the tested group should match breed average.

Farm growth tests lasts between 84 and 270 days (± 3 to 9 months) and animals are weighed every two to four weeks. An average minimum increase of 90 to 130 kg and a minimum growth rate of between 400 and 600 g / day, depending on breed, are required during the testing period. SA Stud Book's technical advisor (or representative) concludes the test. Measurement of weight, scrotal size, shoulder or hip height and body length is mandatory, while measurement of ultrasonic (RTU) measurements and skin thickness is voluntary. The pulling of tail hairs for genomic testing is also optional.

Actual and corrected body measurements and corrected scrotal circumference, as well as ADG (Average Daily Gain or growth on test) and GDA (gain per day of age) are expressed in unit of measurement as well as an index within the contemporary group. The information is used for inspection purposes. FCR (feed conversion ratio) is only available in feed intake growth tests and measures kg feed consumed per kg weight increase. Breeding values for other growth efficiency parameters such as Residual Feed Intake (RFI), Residual Intake & Gain (RIG) and Residual Feed Utilization (RFU) are also estimated and are available on Logix. RFI is the deviation in animal feed intake from the expected intake.

A growth test receives official recognition if the test procedure was adhered to and the growth test evaluation is statistically acceptable. The SA Stud Book Advisor (or representative) is present at the completion of the test and takes the final weights and body measurements and processes the test results, which are made available to the participant(s) after the test. The test results are also loaded onto the Logix Beef Cattle System so that reports can be generated. The recorded data is included in genetic evaluations, provided the breed receives genetic evaluations by SA Stud Book.



FIGURE 2: Bulls that have successfully completed a feed intake test are branded with an approved Stud Book branding iron, if preferred. All the bulls are branded the same, no merits are awarded. The Stud Book brand is used with a letter / digit of the station where the bull was tested on the top, e.g. S for Sernick, B for Buffland, etc.

MANAGEMENT OF GROWTH TESTS

The bull test evaluations are strictly governed by ICAR (International Committee on Animal Recording) guidelines. The entire test procedure, rations and management, are thoroughly planned in advance with the SA Stud Book Technical Advisor. SA Stud Book therefore oversees the testing procedure, releases results and also gives official recognition to the test. Clean drinking water, a head clamp, crush with concrete floor and a reliable accurate cattle scale for weighing and taking of body and other measurements must also be available. For ultrasonic scanning (RTU),

reliable and stable single-phase power supply must be available and work facilities should preferably be under roof and dust free.

Feed intake growth tests are done at accredited testing centres. Feed and feeding stations are sheltered and covered. It is essential to have a reliable backup system and an additional power supply, to ensure that feed and water are continually supplied and feed intake measurements take place throughout.

GROUP INDICES, BLUP BREEDING VALUES & SELECTION VALUES

Dr. Bobbie van der Westhuizen

A lot is being written in agricultural media about BLUP breeding values. Statements are made such as that BLUP breeding values' time is over or BLUP breeding values are blamed for "changing" animals. This is simply not true because many concepts are intertwined by producers and the media and the term BLUP breeding values, which everyone knows, is being blamed on many different aspects. There is a difference between estimating BLUP breeding values, setting-up a breeding goal and correctly applying such a breeding goal. BLUP breeding values are merely a statistical procedure to analyse data as measured by the breeder or technical assistant in a meaningful way so as to rank animals of the same breed in terms of his or her genetic ability.

GROUP INDICES

Before BLUP breeding values were available, breeders identified animals which outperformed their peers with reasonable accuracy by using group indices. Some breeders still use this method today (weaning or birth indexes). An index value is expressed around 100, where 100 is the average weight for that particular group. Animals can be genetically selected in this way, provided selection only takes place within that group. Group indices of animals cannot be directly compared across breeding seasons, years or farms. It is therefore not possible to use these figures to buy animals from other farms or environments based on performance. A below-average calf in his group has an index below 100. If the same animal was measured with genetically poorer animals in a group, he would have weaned above average, which would have caused the same animal to receive a group index of above 100. Therefore, an animal's in-group index is not only dependent on how well or poorly the animal has performed itself, but also how well or poorly the other animals in the group performed with respect to each other. When an outstanding ram or bull is only used on the top female animals in a herd, their offspring will outperform other progeny in their groups, while another even better bull or ram's progeny will perform poorly simply because their mothers are genetically poorer. It will give a misconception of which bull or ram is genetically the best.

BLUP BREEDING VALUES

Due to these shortcomings, the BLUP breeding value method was developed in the 1950s. BLUP breeding values use information recorded by breeders and integrate BLUP performance data with pedigree information to counteract the effect of preferential mating, as well as to take into account the genetic levels of all animals from all contemporary groups. It is essential to integrate pedigree and performance information so that BLUP breeding values of all animals in a breed can be directly compared to each other, to effectively rank animals on the basis of their genetic merit as breeding animals.

SELECTION VALUES

The dairy industry world-wide was one of the first industries to successfully implement BLUP breeding value methodology. Initially, the focus was on milk, butterfat and protein production. The selection pressure was high on production traits and as fertility and longevity traits were not taken into account, cows were bred with excellent milk and solid productions, but poor fertility and longevity. Breeders and geneticists quickly realized this and incorporated reproduction, longevity, and production traits into one selection value, known as a breeding goal. It was not the fault of BLUP breeding values that dairy cows' fertility had declined at the time, it was due to the wrong definition and application of an unsustainable breeding goal.

This concept also applies to beef cattle and sheep breeding. Select breeding animals that produce a good acceptable weaner calf or lamb each year, whose dam's maintenance needs are in line with the offspring's weaning weight and which can birth easily. SA Stud Book went through scientific consultation processes to develop a balanced selection value. Selection values are a balanced combination of available important traits. This value indicates the genetic ability of an animal to increase or decrease revenue per hectare. The selection values are known as the Cow value for beef cattle and the Logix Merit Index for small stock.

Commercial and stud producers use the values to select animals and / or to purchase genetics as breeding animals for the future. It is important to make sure that a potential breeding animal is genetically balanced. It is important to make sure that an animal's selection value is balanced and that the animal's breeding values are acceptable in most aspects of economic importance. It may be that an animal is "too" good in one economic trait which then disguises other weaker traits in a combined selection value. SA Stud Book publishes each building block of the Cow Value and Logix Merit Indexes, i.e. fertility, calving ease, wean growth ability, maintenance requirements and good maternal

ability (milk). Two animals with the same selection value can rank tops due to different economic characteristics. One animal can be exceptionally fertile but wean smaller offspring, while a second animal is less fertile but wean heavier animals. Animals should therefore be genetically selected on the breeding goal, but the sub-values should always be considered as well before a decision is made.

The success in using BLUP breeding values is embedded in the right formulation of a sustainable breeding objective made up of economically important traits unique to each production system. BLUP breeding values are there to select breeding animals for the next generation, as well as for the purchase of genetic material. The purpose of BLUP breeding values is not to sell animals, but rather to select animals.

BLUP breeding values are just another aid for breeding the perfect animal and should be used in context. If an animal has the best BLUP breeding values, but it is not functional or visually acceptable and does not meet breed standards, it has no value as a breeding animal.

BEEF CATTLE INFORMATION DAY

FRIDAY, 12 APRIL 2019 | 8H00 - 11H00 | RAMBLERS TENNIS CLUB, VRYBURG

INHERITANCE OF POLLEDNESS
BY RULIEN GROBLER (POLLED PROJECT, UP)

STUD BOOK ELITE REGIONAL AWARDS

Ticket includes coffee, tea and breakfast. Registration: R50 per person

TEL 082 660 3266 OR DOLF@STUDBOOK.CO.ZA

BLUP BREEDING COURSES FOR BEEF CATTLE & SMALL STOCK

You are cordially invited to our BLUP courses. These courses are informal and practically orientated. The courses are very popular. A manual (English or Afrikaans), lunches and a Certificate are included.

BEEF CATTLE PROGRAMME

DAY 1

8H00 - 9H00	Registration
9H00 - 13H00	Genetic principles: Genes, DNA, inheritance of traits and genomic selection
14H00 - 16H00	BLUP Principles: Contemporary groups, pedigrees, breeding values and selection values

DAY 2

9H00 - 13H00	Selection goals and Functional Efficiency
14H00 - 16H00	Information: Logix, Genetic reports, sales catalogues, SABeefbulls.com, Mating programmes.
16H00	Certificate presentation

DAY 3 (Bloemfontein course)

Practical exercise at a herd: the use of breeding values when mating animals.

SMALL STOCK PROGRAMME

DAY 1

8H00 - 9H00	Registration
9H00 - 13H00	Production Recording and the use of Logix
14H00 - 16H00	BLUP Principles: Contemporary groups, pedigrees, breeding values and selection values

DAY 2

9H00 - 13H00	Practical use of breeding values
14H00 - 16H00	Information: Genetic reports & sales catalogues
16H00	Certificate presentation

SPECIES	DATE	PLACE	LANGUAGE	REFERENCE NUMBER	COST (VAT EXCLUSIVE)
BEEF CATTLE	21 - 23 May	Bloemfontein	Afrikaans	BLUP1	R1950
	13 - 14 June	Pretoria	English	BLUP4	R1200
SMALL STOCK	21 - 22 May	Bloemfontein	Afrikaans	BLUP2	R1200
	23 - 24 May	Bloemfontein	Afrikaans	BLUP3	R1200
	30 - 31 July	Upington	Afrikaans	BLUP5	R1200

BANKING DETAILS

Name: **SA STUD BOOK**

Bank: **STANDARD BANK OF SA**

Account number: **041191358**

Branch code: **055534**

Branch: **BRANDWAG**

Reference: **COURSE REFERENCE NR AND MEMBER NR OR NAME**

Preference will be given to paid-up persons.

FOR MORE INFO & BOOKINGS, KINDLY CONTACT ELSA VAN DER BERGH

051 410 0900
elsa@studbook.co.za



ADRES

SA Stamboek, Henry str 18,
Bloemfontein, Vrystaat

POSADRES

Posbus 270,
Bloemfontein, 9300

KANTOOR

051 410 0900

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