



LOGIX

EDITION 05

**LOGIX
NEWS**

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FREQUENTLY ASKED QUESTIONS TO OUR PRETORIA OFFICE

Dr Helena Theron

QUESTION 01:

SHOULD I HAVE MY ANIMALS GENOMIC-TESTED?

Yes, it is the future. It will be more advantageous to have your animals represented in the breed's genomic dataset. For example, this is very beneficial for future parentage determinations. It is not necessary to test all animals immediately, start off with the herd bulls and test other animals over time. Benefits include the following:

100% ACCURATE PARENTAGE DETERMINATION

Existing parentage tests have one of only two possible outcomes: the parentage is impossible, or it might be possible. It is sometimes impossible to identify the correct sire, for example when multiple sires are related (half-brothers, father-son combinations). Genomic parenting uses over 50,000 markers. The parents can therefore be identified 100% accurately - also for example if the neighbour's bull (unknowingly) is actually the correct sire (provided that the correct sire has of course already been genomically tested).

POLLED / HORNS AND OTHER SINGLE GENES

Polled status (purebred or carrier of the horn gene) is also indicated.

DOUBLE MUSCLING

The animal's Myostatin status which determines whether the animal is a carrier of one of the double muscling genes is also determined. If, for example, all your cows were carriers and you use carrier bulls, 25% of your calves will be double muscled. The size of double-muscled calves carrying two copies of the nt821 or Q208X myostatin alleles increases the chance of calving problems. A double-muscled cow carrying these alleles is also over-muscled with an underdeveloped pelvis that makes her birth canal smaller. Therefore, these double-muscled cows can't calve naturally and can't be accommodated in the herd. Note that the F93L allele does not cause birth problems even though the animals are double-muscled. If only clean bulls are used, no double-muscled calves will be born. Therefore, carriers of one of the double muscling (Myostatin) genes (nt821 or Q208X) should not be used as breeding bulls and one should at least know the status of your breeding bulls.

GEBVS

Breeds that receive GEBVs or Genomic breeding values (Bonsmara, Beefmaster and Drakensberger) automatically receive GEBVs for genomically tested animals, where markers on the animal's DNA serves as an additional source of information to increase the accuracy of breeding values. All traits are included, such as growth and milk, also post-weaning growth, fertility and RTU. This is especially advantageous for younger bulls, as they receive more accurate breeding values for traits such as milk and fertility at an earlier stage and potential young bulls can therefore be identified sooner. If your breed does not yet receive GEBVs, the inclusion of more animals in the reference population will also allow the breed to receive GEBVs soon.

PRICE

A genomic test costs R777.00 for beef cattle. Please send a hair sample to Elsa at SA Stud Book in Bloemfontein. Her email address is elsa@studbook.co.za if there are any queries.



QUESTION 02:**WHY DO SOME OF THE ANIMALS ON MY AUCTION CATALOGUE NOT HAVE BREEDING VALUES / COW VALUES / STARS?**

Animals that do not have breeding values / Cow Values / stars in the breeder's genetic report or on the auction catalogue have too little information on the Logix database to estimate their breeding values. Information used in the estimation of breeding values include recorded and measured family (parents or offspring) and the animal itself should be measured for at least weaning weight or birth weight, but preferably for as many traits as possible. If some components of the Cow Value are not there, e.g. the cow was not weighed when the calf was weaned, and her close relatives were also not measured, the Cow Value cannot be estimated, nor does the animal get stars. The amount of information available for breeding value estimation is indicated as the Accuracy. If the accuracy of the breeding value is too low, that means there was no information to estimate a breeding value or the estimated breeding value is so low that the breeding value does not mean much to the buyer or the breeder. Breeding values are based on facts (Also see the article on Paper Cattle later in this edition).

Basic Guidelines for beef cattle to receive breeding values:

	RECORDING	BENEFITS
1	Record parentages and birth dates	Pedigrees, fertility information of cows
2	Weigh calves within 3 days of birth (optional)	Birth weight
3	Weigh ≥ 3 weaners of ≥ 2 sires on the same day	Weaning weight and Milk of cows
4	Weigh the dams when weighing the calves	Mature weight and Maintenance
5	If at least 3 heifers from the previous year are still on the farm, weigh them too when weighing the weaners	18-month weight, post-wean breeding value

Start with steps 1 and 3 and expand as you can. Steps 1 to 4 will ensure Cow Values and Stars for the animals.

QUESTION 03:**HOW DO I KNOW WHICH ARE THE TOP 10 BULLS ON COW VALUE IN MY BREED?**

Go to www.SABeefBulls.com . (Ignore the Login block, as this search is for free). Click on Group Search. When the next screen opens, fill in the details. You can also construct your own selection value, if desired. Further requirements can be set by clicking on Filters, such as bulls between two and four years old, as well as further breeding value requirements. Click Search and slide the screen down to see results.

To save the results, right click anywhere on the screen, and choose Print. From the Destination Drop Down List, choose Save as PDF. To start a new search, go back to the beginning.

QUESTION 04:**I RECEIVED THE PREVIOUS GENETIC REPORT AGAIN INSTEAD OF THE LATEST ONE?**

Download the document again. If this is the previous report, press the F5 key on your computer. It should then download the latest report. Some computers store downloaded documents. Should you want to download the document again, the stored one is simply recalled instead of downloading it again.

QUESTION 05:**I WOULD LIKE TO KNOW THE MILK BREEDING VALUES OF MY BULL'S ANCESTORS?**

Go to www.SABeefBulls.com and click on Individual Animal Search. Ignore the Login box, it's free! Enter the bull's information on the screen that opens. You only need to enter either the Registration Number, or the Name or ID. The ID usually works best. Click the blue Animal Name on the screen that opens. (If the screen is blank, there is no such animal on the database and the information was entered incorrectly). Scroll down the screen and click on the red 'Show Pedigree' box. The animal's pedigree with breeding values and inbreeding appears on the screen. To enlarge the screen, press CTRL + and to reduce the size, CTRL-.



PRESERVATION OF BIOLOGICAL MATERIAL CURRENTLY AT CLINOMICS

Sherri van Zyl

Clinomics (as part of the Clinvet Group) has in the past provided services related to molecular genetic analyses of, among others, farm animals. This mainly involved parentage determination and identification of carrier animals for certain traits affected by single gene inheritance. Clinomics provided these services directly to breeders. As part of a business decision, Clinomics / Clinvet, in partnership with Inquaba Biotech, founded a company to provide the services on behalf of Clinomics. This company is known as Zoonomics.

As part of Clinomics policy, excess biological material used for molecular analyses has been preserved for possible future use. This excess material is in the form of hair (with hair roots), blood, semen, ear cartilage, mucosal smears and extracted DNA. At the request of Clinomics, Studbook is prepared to take over the excess material as part of the Biobank which currently holds hair for individual breeders (and some Breeders' Societies). Furthermore, Studbook is prepared to keep the biological material currently in custody at Clinomics at NO COST for the relevant breeders and / or Breeders' Society for possible future testing. Approval for such testing will be obtained from the relevant Breeders' Society.

Biological material can only be transferred from Clinomics to Studbook's custody with the permission of the Breeders' Society. Breeder's societies are urged to return the necessary information to Sherri van Zyl (sherri@studbook.co.za) so that it can be sent collectively to Clinomics, if it has not already been done.



SMALL STOCK BLUP COURSES

Several BLUP courses for beef cattle and small stock were presented in the past months. These courses involve some theory as well as practical aspects of breeding. Courses will be held again next year. Please contact Elsa at elsa@studbook.co.za if you are interested.

BELOW Small Stock course in Bloemfontein, 24-25 May 2019



ABOVE Small Stock course held in Upington, 30 -31 July 2019

BEEF CATTLE BLUP COURSES



ABOVE Beef Cattle BLUP course Pretoria 13-14 June 2019



ABOVE Beef Cattle BLUP course, Bloemfontein 21 - 23 May 2019



TOP Andries Riekert, SA Stud Book Technical Advisor, discusses a Hugenoot bull which has finished a Intake & Growth test.



TOP Mnr Meyer, Beefmaster breeder and winner of the Elite Beef Herd of the Year being interviewed by PlaasMedia on his farm.

LOGIX AND DATA INTEGRITY

Herman Labuschagne

According to Wikipedia, the definition of data-integrity is as follows: 'Data integrity refers to maintaining and assuring the accuracy and consistency of data over its entire life-cycle, and is a critical aspect to the design, implementation and usage of any system which stores, processes, or retrieves data. Data integrity is the opposite of data corruption, which is a form of data loss. The overall intent of any data integrity technique is the same: ensure data is recorded exactly as intended such as a database correctly rejecting mutually exclusive possibilities, and upon later retrieval, ensure the data is the same as it was when it was originally recorded. In short, data integrity aims to prevent unintentional changes to information. Data integrity is not to be confused with data security, the discipline of protecting data from unauthorized parties. Any unintended changes to data as the result of a storage, retrieval or processing operation, including malicious intent, unexpected hardware failure, and human error, is failure of data integrity.'

The term – Data Integrity - can be used to describe a state, a process or a function – and is often used as a proxy for “data quality”. All characteristics of the data must be correct – including business rules, relations, dates, definitions and lineage – for data to be complete. Data integrity is imposed within a database when it is designed and is authenticated through the ongoing use of error checking and validation routines. As a simple example, to maintain data integrity numeric columns/cells should not accept alphabetic data.

As a process, data integrity verifies that data has remained unaltered in transit from creation to reception. As a function related to security, a data integrity service maintains information exactly as it was inputted, and is auditable to affirm its reliability. Data undergoes any number of operations in support of decision-making, such as capture, storage, retrieval, update and transfer. Data must be kept free from corruption, modification or unauthorized disclosure to drive any number of mission-critical business processes with accuracy (Wikipedia, 2016).

HOW DOES LOGIX COMPLY WITH THIS DEFINITION OF DATA INTEGRITY?

Logix have built-in features to ensure the accuracy and consistency of data over its entire life-cycle. Data is sent in to Logix from different sources such as online Logix, farm software packages and data capturing programs. All data input files are in a standard format for different transactions such as birth notifications, cancellations, transfer of ownership, production recording, etc. This ensures on-farm validation of data when it is captured. Cattle birth notifications for example are captured on farm software and send to Logix in the standard format where it is captured electronically without human interference. Birth notifications captured on Logix are also validated online while it is captured. Logix and compatible farm software packages only accept valid inputs. Options from dropdown lists ensure that the correct selections are made. Validations include for example only male animals to be selected as sires and females as dams. The ownership of the sire and dam is also validated against the database to ensure only owners of parents can register new births. Only valid values that comply with biological norms can be captured. Weights are also checked against breed specific parameters within age range. Minimum and maximum values for certain traits are also checked.

Logix is based on the principle of editing data before it is allowed on to the database. For this reason, error lists of records

not complying with standards and/or logical- and biological checks are sent back to the breeder for correction. Breed specific parameters according to the breed's constitution are also checked and applied in Logix.

Editing of records is strictly controlled and restricted to only a few persons with access to a specific breed's data. The data clerk working with the breed has limited editing rights, such as sex changes. Changes such as reinstatements and birth date changes are only allowed with written permission from the Breed Society. No editing is permitted by the breeder or the Society and all changes are done by the data clerk responsible for the breed.

HOW CAN THE BREEDER ENSURE DATA INTEGRITY?

In most cases errors originate at the initial capturing of the data. To ensure data integrity is in place on the farm start with recording the service information correctly. This is the record of the possible sire of the offspring. The next step is to record the birth correctly and as soon as possible after the event to ensure the correct dam is connected to the calf. Cows sometimes swap calves if they calve close together, which can lead to incorrect pedigrees being recorded. Make sure the calf is marked with a permanent method of identification as soon as possible. Tattooing is the best permanent method of identification, as ear tags tend to get lost. The correct recording of the sex of a calf is of utmost importance because of many correction factors applied to the sex of an animal. If the sex is altered at a later stage, all calves in the contemporary groups' calculations needs to be recalculated as well as the calves in the opposite sex groups.

The recording of the correct contemporary groups and the correct weights is important because it impacts on the calculation of breeding values. The breeder needs to make sure the correct measurement is taken and that the instrument like the scale or measuring stick is correct and calibrated at all times. If measurements are taken within a group make sure the group received the same conditions in feeding and management. The calf of a show dam cannot be evaluated together with the rest of the calves on the farm because they were not treated the same.

Integrity of data on Logix starts on the farm and the system will sort out the rest. The Logix recording system has received the ICAR (International Committee on Animal Recording) Stamp of approval, and therefore complies with international standards of beef cattle recording.



INTAKE & GROWTH TESTS FOR BEEF BULLS

By D.J. Bosman *Pri.Sci.Nat. (Veekunde), Kranskop, KZN*

In South Africa, feedlots play a prominent role in the provision of beef. Most beef (85%) consumed by South Africans in the cities is produced in feedlots. Moving cattle into feedlots makes more space for cows on the veld. The industry still does not have enough breeding cows as some 230 000 weaner calves are imported from Namibia annually.

Feedlots finish about 1.5 million animals a year. With an average increase of 200 kg weight per calf, the total beef addition is about 300 million tons. Add the weaning calf weight of 220kg and the total production is 630 million kg of beef. It is therefore an important production phase that requires animals that can adapt in a feedlot environment and have sufficient growth and a favourable feed conversion ratio. With an increasing number of cuts being exported, the quality of meat also becomes important. Breeds and breed combinations that do not meet feedlot requirements will simply receive a lower price for a weaner or the calf will not be purchased.

HISTORY

Growth test centres have been established since 1963 at Departmental Research Stations in South Africa. Stud breeders used these facilities to test post-wean growth of young bulls. Private testing centres were later also approved and incorporated into the performance testing program. The key objectives were to determine genetic differences for post-wean growth (ADG) and feed conversion ratio (FCR). Reproduction was addressed by measuring scrotal circumference and skeletal development by measuring body measurements. Adaptability traits under intensive nutritional conditions were an important addition.

Initially, a powdery ration together with 2 kg of hay per bull per day was fed during growth tests in 1963. Feed companies in South Africa did not have a pelleting machine that could make a pellet with sufficient roughage. The ration caused a lot of problems especially bloating, laminitis and claw growth. It was soon clear that bulls were picky eaters and that a pelleted ration with about 35% roughage was needed. A feed company in Pretoria acquired a pelleting machine in 1970 which was a significant improvement. Currently bulls are fed a growth ration with 14-16% crude protein and not a feedlot finishing ration. The purpose of the ration is to promote muscle growth.

Traits that are important to the feedlot are muscling and post-wean gain (ADG), feed conversion ratio, meat quality and feedlot adaptability, and these are the traits that receive attention with intensive growth tests. In the early years of intensive growth tests, claw growth, laminitis, bloating, rumen disorders and respiratory disease (especially in winter) caused significant problems mainly in the indigenous and indicus breeds. Such animals performed poorly and were slaughtered. During the first 20 years (1963-1983) of intensive growth tests, bloating with a genetic basis caused problems. These lines were identified and the problem was systematically eliminated. All breeds benefited from the intensive tests over time because unfavourable genes were identified and removed from the gene pool.

The test length was initially 140 days and later shortened to 112 days in 1991 and again to the current 84 days in 1999. This made the test a lot cheaper and greatly alleviated the pressure of an intensive environment. Indigenous breeds in particular have improved significantly in terms of muscling, growth, feed conversion ratio and feedlot adaptability. The progeny of these bulls were functionally stronger under field conditions. The slaughter of rejected and slaughter clause bulls was to the benefit of these breeds and the meat industry as a whole.

THE VALUE OF GROWTH TESTS

Growth tests have value when growth is measured effectively. If sufficient growth occurs during the test, genetic differences can be determined effectively. It was found that an average growth of 550g per day had no effect on bull prices at an auction. An average growth of 1260g per day during the finishing period had a 34 percent effect on the auction price, followed by scrotal circumference with a 24 percent influence. A minimum growth of 500 to 700g per day has no economic advantage on bull prices because the muscle growth waves on the animal's body are incomplete.

The different parts of the body are subject to change according to the nutrition received by the animal. The frame (bone structure) of the animal grows maximally early in the animal's developmental phase, followed by muscle and fat. The body parts that develop later are significantly influenced by the available nutrition. The deposition of muscle consists of growth waves in the body that terminate at the loin and rump. The breeder prefers and selects bulls with a better loin and rump development because the muscling is visible. If the bull is tested at a low nutritional level, the loin and rump are only partially developed and the animal cannot be properly evaluated. This is why breeders finish bulls for auction at 30-36 months of age as the body is fully developed.



“ROLLS ROYCE” COWS

The late Prof Jan Bonsma bred laying hens in his backyard in Pretoria. Soon his chickens won the South African egg laying competition. What was his secret? He selected hens that could lay at least 250 eggs in 336 days AND gain at least 250g in weight. If not, they are culled. He indirectly selected for feed conversion ratio: The laying hens that could best convert their food into eggs and weight were the best producers and the winners.

Can these principles apply to beef cattle? Certainly. Select bulls with an excellent feed conversion ratio. Select cows that wean relatively heavy weaners and that do not lose weight in the process. This will require the cows to be weighed with the calf at birth and weaning. And the cow will have to be pregnant again. It is the Rolls-Royce cows of the industry that can use and produce feed efficiently.

GROWTH TEST RESULTS FOR DRAKENSBERGER BULLS

The Drakensberg breed has been participating in Departmental growth tests since 1965. In the beginning, less than 10 Drakensberger bulls were tested annually. With the establishment of private testing centres, more than 100 Drakensberger bulls were tested per year since 2015. The results of intensive growth tests for Drakensberger bulls are shown in Table 1.

TABLE 1: Results of Drakensberger bulls in growth tests

YEAR	TEST LENGTH (days)	NUMBER	END WEIGHT (kg)	ADG (g)	FCR
1965-90	140	539	466	1383	7.42
1991-98	112	257	438	1544	6.85
1999-2017	84	1252	395	1611	5.92

Source: Departmental, ARC and Stud Book Yearly reports

Although it is not possible to directly compare bulls tested at different test lengths, the post wean growth (ADG) and feed conversion ratio (FCR) of the Drakensberger breed have shown a beneficial improvement over the past 52 years. The establishment of the Rouvus test centre ensured that many more Drakensberger bulls from different herds and breeds were also tested. The result is shown in Table 2.

TABLE 2: Growth test results from 2013 to 2017

YEAR	NUMBER	END WEIGHT (kg)	AVG ADG (g)	VARIATION (g)	AVG FCR	VARIATION
2013	48	393	1533	1208-2011	6.10	4.97-8.06
2014	55	386	1563	1200-2111	5.97	4.93-7.79
2015	52	389	1627	1100-2147	5.92	4.35-7.67
2016	55	422	1692	1371-2100	5.69	4.23-7.27
2017	45	412	1853	1443-2475	5.37	4.16-6.67

Source: SA STUD BOOK

Selection can be improved as the variation has moved to a higher level each year. The average ADG in 2013 was 1533g per day. It has improved by 20.9% to 1853g per day in 2017. The average FCR in 2013 was 6.10kg per kg increase. It improved by 13.6% in 2017 to 5.37. The bulls with the best FCR improved from 4.97 to 4.16 in 2017, an improvement of 19.5%. The ADG and FCR variation clearly shows what makes such growth tests significant. Poorly performing bulls are slaughtered apart from a “nice” appearance.

DOES FEED CONVERSION PROMOTE REPRODUCTION EFFICIENCY?

The two reproduction traits for which breeding values are determined may provide an answer. These two traits are cow fertility (CF) and longevity (LL). Cow fertility (CF) is a breeding value determined from the inter-calving period taking the first 4 calves of a cow into account. A lower breeding value is more advantageous because it indicates a shorter ICP. Longevity (LL) is the retention of a cow or bull's sons and daughters up to the age of 10 years. If a bull or cow's daughters are kept in a herd, longevity will be higher.

TABLE 3: Genetic correlations between cow fertility traits and growth traits in the Drakensberger data base. Take into account that lower FCR (less feed consumed per kg increase) and lower CF (shorter ICP) breeding values are more advantageous, while for all other traits higher breeding values are better, except perhaps Mature Weight, which could be intermediate)

TRAIT	CF	LL
ADG	-0.28	0.47
FCR	0.25	-0.41
Mature wt	-0.24	0.62
Height	-0.07	0.35
Length	0.00	0.35

Source: SA STUD BOOK



From Table 3 it is clear that cow fertility has a favourable correlation of 0.25 with FCR. As it is not a high correlation it shows that other factors also play a role. The correlation with longevity is much higher at -0.41 and a good indication that FCR has a beneficial effect on reproduction.

Interestingly, a higher mature weight positively influences longevity with a genetic correlation of 0.62. This means that the heavier, longer cows (not necessarily late maturing cows) have a reproduction advantage. Height and height in the Drakensberger have no effect on CF while it does benefit longevity. The conclusion that follows is that FCR positively influences reproduction in the Drakensberg breed. Cows with a better FCR have a lower ICP and a beneficial longevity. In the Rouvus herd it seems that selection for FCR does improve reproduction in terms of longevity.

CORRELATIONS BETWEEN TRAITS

Correlations are indicative of the relationship between two traits. If the correlation is high (0.7 to 0.9), selection for one trait will similarly improve the other trait. A low correlation (0.1 to 0.2) indicates a lesser influence. A high negative correlation (-0.7 to -0.9) indicates that selection for one trait will affect the other trait in the opposite direction. ADG and FCR are correlated negatively (-0.65 to -0.75) which in this case is a beneficial negative correlation.

TABLE 4: Genetic correlations for different traits

TRAIT	FCR	HEIGHT	LENGTH	WEAN MAT.
ADG	-0.68	0.69	0.81	0.29
FCR	-	-0.59	-0.64	-0.16

Source: SA STUD BOOK

The following is clear from Table 4: ADG and FCR are high (-0.68) and advantageously correlated with each other. The correlation is not complete, which means that 32% of the bulls will be exceptions where ADG may be beneficial, but not FCR. This highlights why it is beneficial to measure both traits. The genetic correlation between ADG and height (0.69) and length (0.81) are both high. It is therefore easy to select for growth and muscling and breed larger animals. It is more advantageous in the SA field conditions to limit height (size) but to select length. FCR is -0.64 correlated with length. Obviously, longer animals measure a more beneficial FCR. The length-to-height ratio of Drakensberger bulls was 11% longer than high in growth tests in the 1960s and 1970s. With the selection emphasis on ADG and FCR from intensive and even extensive growth tests, this ratio changed to 20% longer than high. Thus, with the measurement and testing, the shape of the Drakensberger changed systematically. This will continue in the future. After years of selection in Europe, the bulls today are 26% longer than they are high.



TABLE 5: Phenotypic correlation with profit

TRAIT	PROFIT
ADG	0.25
FCR	-0.79
Begin weight	-0.45
Fat %	-0.14

During 1991, 27 oxen were fed individually, slaughtered at the same level of fatness and carcass analysis. The ADG and FCR of each ox were determined in order to determine individual profit or loss. It is clear that profit is correlated higher with FCR (-0.79) than with ADG (0.25). In this study, it was three times higher correlated with profit than post-weaning growth (ADG). In other similar studies, FCR was two times higher correlated with profit. It therefore makes more sense to place the selection emphasis on FCR than on muscular and post-weaning growth (ADG).

Breeders tend to overemphasize growth and muscling with the selection of breeding bulls. The result is a well-muscled but sometimes dry musculature that gives rise to conformational weaknesses such as a round butt, straight legs, shorter rump and smaller scrotum.

SUMMARY

- The evaluation of feed conversion ratio in beef cattle in South Africa certainly deserves more attention. It is more closely linked to profit than growth rate. It also promotes a lower inter-calving period in the cow herd.
- It is gratifying to learn from Studbook that intensive growth test centres are being set up on farms and that existing farm test centres are being enlarged.
- The advantage of intensive growth tests is that the full developmental potential of the young calf is expressed and the bull can be evaluated more visually. The expensive cuts of a carcass like the rump and loin develop last. With intensive growth tests, these parts of the body are fully expressed and visual evaluation will be correct.
- About 90 percent of the beef sold in cities is produced in feedlots. FCR has a significant impact on profit in the feedlot. Larger animals tend to favour FCR. In the selection of breeding bulls, size must be limited because the female offspring must perform in a sub-optimal environment. The variation for FCR and size makes it possible.
- Will feedlots pay more for weaner calves that come from a herd selecting for FCR? It needs to be negotiated. At the Sernick feedlots, animals can be finished on contract. The advantage is that the performance of a breeder's own group of animals is available. In a recent contract, one breeder's group of weaner calves increased 2.4kg per day and another breeder's group only 1.5kg per day. This is a result that will influence future selection decisions.

SKIN THICKNESS IN CATTLE

Dr. Helena Theron

The thickness of the skin plays an important role in the adaptation of the animal to its environment, as body heat is regulated by blood flowing into the skin where heat radiation occurs. Thicker skin has a higher blood supply and can therefore better regulate heat. Flies also find it more difficult to drill through thick skins to lay eggs, while ticks are more often found in the areas on cattle where the skin is thinner. Although tick resistance is an economic trait, it is difficult and time-consuming to count ticks on animals. The thickness of the skin is a physical barrier that impairs perforation by ticks. It should therefore be possible to indirectly improve tick resistance and heat adaptation by selecting for thicker skins.



Skin thickness has been measured for many years in South Africa during bull growth tests. Previous studies have already shown that breed, nutrition, sex and age all play a role in the thickness of cattle skin. For example, cows have thinner skins than bulls. The skin also thickens with age, stabilizes at about 5 to 6 years of age, and then thins again. Downward neck folds that lie together indicate a thin skin with less blood flowing to the surface, while folds that lie further apart and appear thicker indicate a thicker skin.

TABLE 1: Skin thickness of bulls in intensive and extensive growth tests in South Africa since 2013.

EXTENSIVE GROWTH TEST				INTENSIVE GROWTH TEST		
	NUMBER OF BREEDS	NUMBER OF ANIMALS	AVG SKIN THICKNESS ± SD	NUMBER OF BREEDS	NUMBER OF ANIMALS	AVG SKIN THICKNESS ± SD
Bos Taurus breeds	10	11348	13.6 ± 1.97	11	1119	14.14 ± 1.73
Sanga breeds	6	5963	14.30 ± 2.23	6	686	15.89 ± 1.95
Composite Sanga	3	50895	16.44 ± 2.61	3	2947	16.05 ± 1.66

From table 1 it can be seen that there is variation in average skin thickness in South Africa and also that skins tend to be thicker in intensive than in extensive tests due to better nutritional conditions. The more heat and tick-adapted Sanga breeds have on average thicker skins than the Taurus breeds. However, composite breeds originating in both Sanga and Taurus breeds, namely the Bonsmara, Huguenot and PinZyl, have on average the thickest skins. In a South American study on Nelore cattle, heritability for skin thickness was estimated as 0.12 ± 0.02.

Selection for thicker skins seems to be beneficial for heat regulation and adaptation, and may also reduce ticks and therefore tick-related diseases. Therefore, a study is planned in collaboration with UP in which the heritability for skin thickness in South African beef breeds will be determined, as well as the correlations with other production traits.

CATTLE MADE OF PAPER OR REALITY?

Dr Japie van der Westhuizen

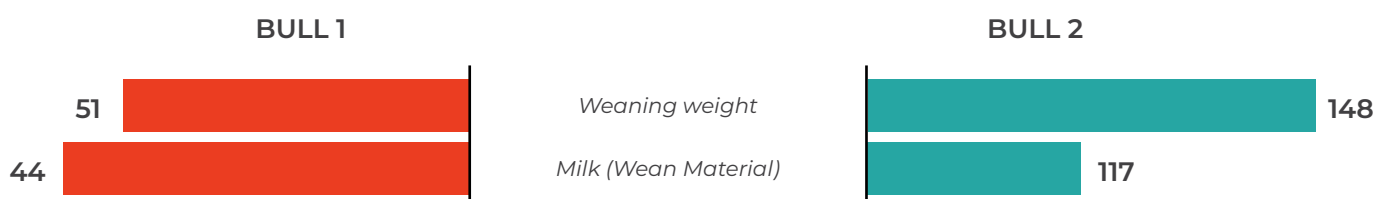
A civil engineer is thoroughly trained in the properties of raw materials, the breaking power and holding capacity of the materials of which structures are built and possibly also the aesthetics of these structures which are created. These designs are thoroughly thought through and tested on computer (and perhaps paper) so that the structure meets the functional and safety requirements and will provide a long service. When the bridge (or other structure) is in use, no one is talking about a "paper bridge". Bridges are not all the same and look different but their functionality is the precursor to their appearance.

Trained registered animal scientists, who specialize in breeding and genetics, are thoroughly trained in the operation and biology of genes and how their action can affect the anatomy and physiology as well as the production and functionality of breeding animals and their offspring. Mostly, animal scientists who are skilled in genetics and breeding are also trained in aesthetics or appearance, especially where they affect the function of breeding animals. Breeding values take into account all known information, namely the measurement (or weight or objective observation) of each animal and that which genetically binds them (all relationships). Breeding plans take into account all the traits and the most sought after breeding animal is determined by thorough computer processing (no longer on paper!). When animals are presented as selection candidates on the basis of their genetic merit, some in the industry today refer to them as "paper animals". Probably simply because the magical value of choosing animals based on their appearance and thus linking them to their real genetic merit is now a thing of the past. Animals with the same genetic merit that breed profitable offspring often differ in appearance. However, what they look like is an indication of their functionality.

All genetic merit is based on actual measurements and performance, not the other way around. In other words, the actual weight, measurement, objective observation or description within groups where each animal is given an equal chance to show its merit clearly states whether it is better, weaker, shorter, longer, larger, smaller and more or less profitable than the others that also had this equal chance. Real cattle with real measurements that matter to commercial buyers who want to make a living with their cattle and clearly want to distinguish between breeding animals that can or will not be able to do it. In other words, is there a difference in the performance of the offspring of a bull with high breeding values compared to another with lower breeding values?

As an example, the offspring of two bulls with different breeding values for Weaning Weight and Milk (Maternal weaning) were compared. Both were born in 2009, in other words their daughters have already weaned calves.

Below is part of the graphic representation of the bulls' breeding values (as on www.SABeefBulls.com):



The logical step now is to see if the "paper values" reflect reality. Each produced offspring with weaning weights which were measured with the calves of other bulls. Furthermore, there were also heifers who were selected as breeding cows and in turn weaned calves which were weighed together with the calves of other bull's daughters'.

BULL 1

Bull 1's weaning weight was 212kg in a weaning group of 203 weaner calves with an average group weaning weight of 221.5kg (he weighed 9.5kg less than group average; not on paper, on the scale). His 71 bull calves and 52 heifer calves were weighed in 24 different weaning groups, the total number of calves in the all these groups is 925. Bull 1's offspring weighed on average 10kg less than their contemporaries. He therefore bred below average calves, which reflects in his breeding values.

At the time of the analysis, his daughters had already weaned 18 calves (thus grandchildren via his daughters) for which weaning weights were recorded in 8 weaning groups. A total of 592 calves were weaned (and weighed) in the 8 weaning groups. So the daughters of other bulls who suckled their calves are compared directly with his daughters. On average, Bull 1's daughters' calves weigh 17 kg less (average weaning weight of 182 kg) than the calves of daughters of other bulls (average 199kg).

BULL 2

Bull 2's own weaning weight was 170kg in a weaning group of 38 weaners with a group average weaning weight of 149 kg. He therefore weighs 21 Kg more than his group's average. Like Bull 1, he went over a scale and was truly weighed and not merely a paper entry. Bull 2 is the sire of 31 offspring (at the time of the investigation) with weaning weights in 6 weaning groups of 209 weaners. His offspring weigh on average 6kg heavier than the offspring of other bulls.

At the time of the investigation, his daughters produced 13 weaners who were weighed in 6 weaning groups with a total of 382 weaners. His grandprogeny weigh on average 4kg heavier than the calves of daughters from other bulls.

The difference in yield between the bulls can be calculated as follows (based on the difference in weight of their and their daughters' weaner calves in relations the other bulls' calves that were in the same weaning groups exposed to the same conditions at a weaning calf price of around R34 per kg):

	PROGENY BULL 1	PROGENY BULL 2
	Loss of income per calf compared to the average weaner calves in the group	Extra income per calf compared to the average weaner calves in the group
Own calves	- R340 per calf	+ R204 per calf
Daughters' calves	- R714 per calf	+ R136 per calf

The actual difference in production per weaner for direct offspring of Bull1 and Bull2, compared to their contemporaries, is therefore R544 per calf. The difference in weight from the calves of the two bulls is an average of R850 per calf.

Both bulls were used as herd sires and therefore passed the tests on the basis of appearance and functional conformation. However, mere visual appearance could not prevent making the wrong choice about the progeny of the offspring of such a herd bull.

Scientific basis and correct use of breeding values, based on actual measurements, gives rise to the reality of clearly defining profits between two possible selection candidates and making it possible for buyers to secure profits. It's not just paper, its reality.



PAPER BRIDGE

A new road is being built and it is necessary to cross a gap by building a new bridge. The scientist civil engineer gets all his equipment together. He carefully measures the distance needed to cross with the new bridge. He gets all the details of the raw materials, their properties, maximum breaking and minimum holding capacity and how the aggregation will contribute to the functionality and lifetime of the planned bridge. His calculations, of course, include costs, they determine risk and build extra guarantees and even have sketches of what the bridge will look like and fit aesthetically with the environment. His full report is on paper.

Experienced road builders take the easy way out by estimating the distance. They have already built bridges or were involved in building bridges. Based on their estimate, they recommend what the strength and reinforcement of the concrete should be, the thickness of the supporting pillars and the anchor cables. The design will create a very nice bridge.

I prefer to drive over the paper bridge because I know the design is based on scientific principles, well researched and meets all international standards for safety and functionality. Of course, the appearance should show the function of the bridge and then it feels even safer to drive across the gorge.

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