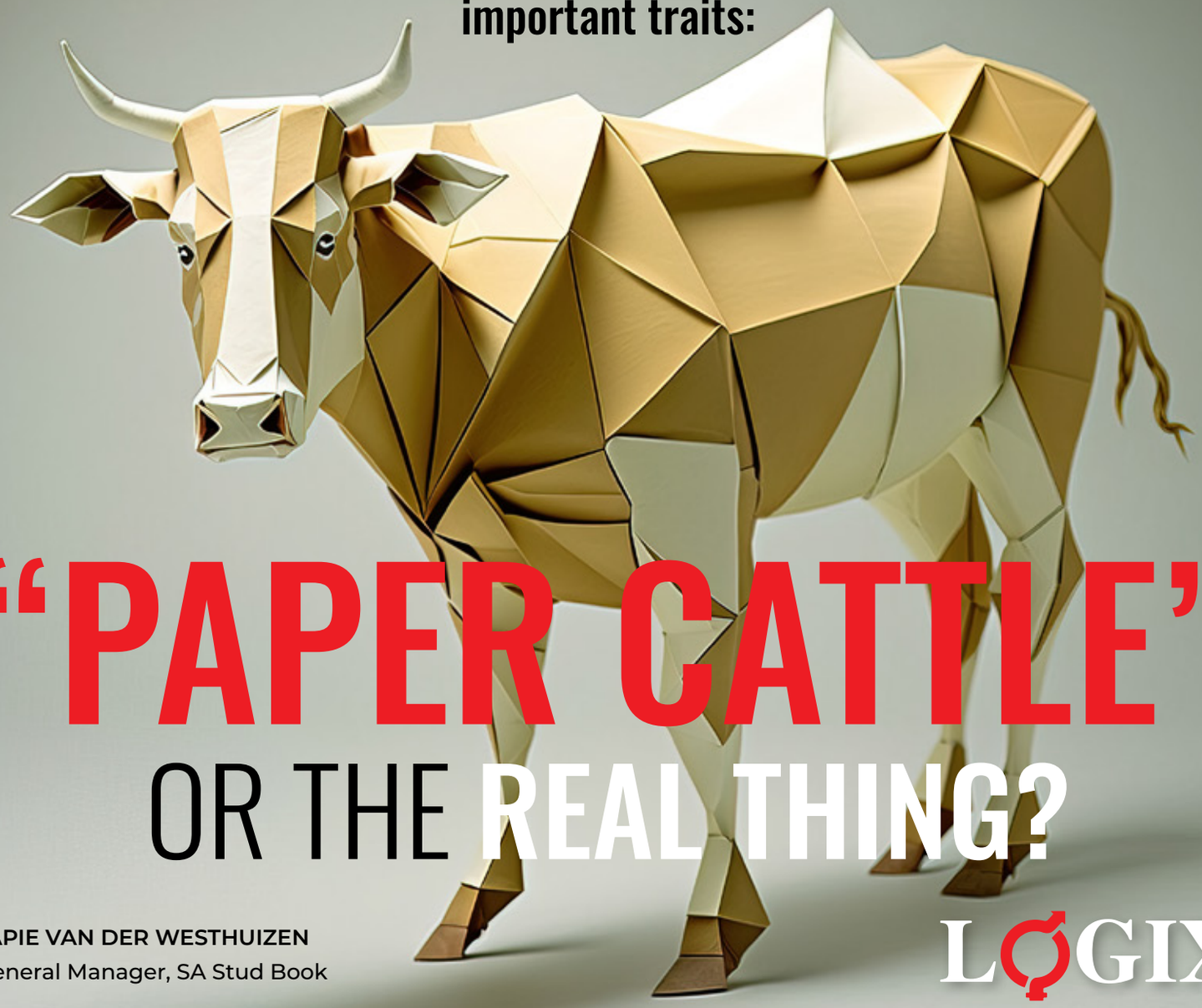
Selection with a clearly **formulated breeding goal,**

based on objective measurement and breeding values for economically important traits:



"PAPER CATTLE" OR THE REAL THING?

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LOGIX

A civil engineer is trained thoroughly in the properties of materials, the tensile strength and load-bearing capacity of the materials that structures are made of, and possibly also the aesthetics of these structures that must come to light through his or her input. These designs are thoroughly worked out on a computer (and perhaps on paper) and calculated so that the structure meets the functional requirements. Of course, it must be safe and provide a long service life. When the bridge (or other structure) is built and in use, no one mentions a "paper bridge" anymore. Bridges differ and look different, but their functionality is the precursor to their appearance.

Trained and registered scientists, who specialise in breeding and genetics, are properly trained in the operation and biology of genes and how their operation can affect the anatomy and physiology, and of course, the production and functionality of breeding animals and their offspring.

In addition, animal scientists, trained in genetics and breeding, are usually also trained in aesthetics or appearance, especially regarding the function of breeding animals.

Breeding values take all known information into account, namely the measurement (or weight or objective observation) of each animal and their genetic links (all relationships). Breeding plans take all traits into account, and the most sought-after breeding animals are determined through computer processing (no longer on paper!)

When animals are offered as selection candidates based on their genetic merits, some in the industry refer to them as "paper animals." This is probably simply because the magical value of choosing animals based on their appearance and thus linking them to their actual genetic merits is now something of the past.

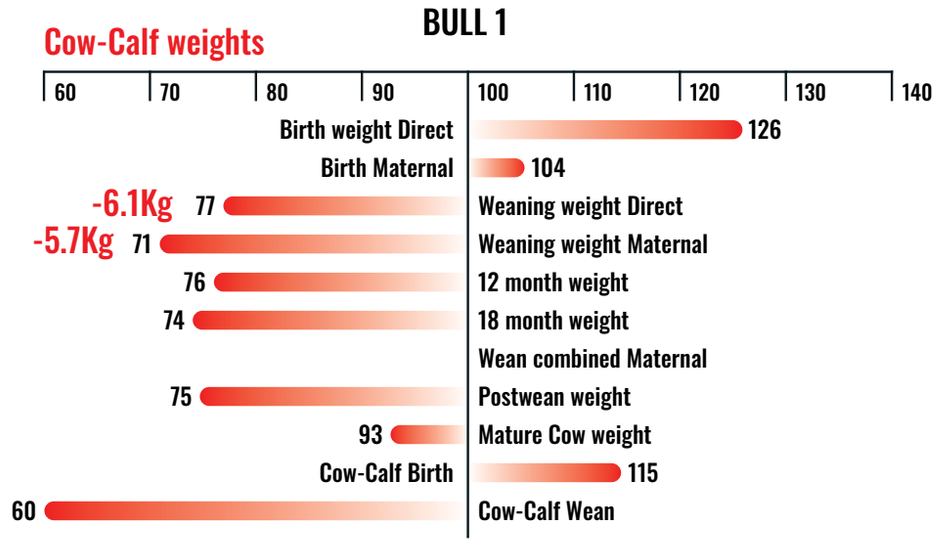
Animals with the same genetic values that breed profitable progeny often differ in appearance. However, how they look is still an indication of their functionality.

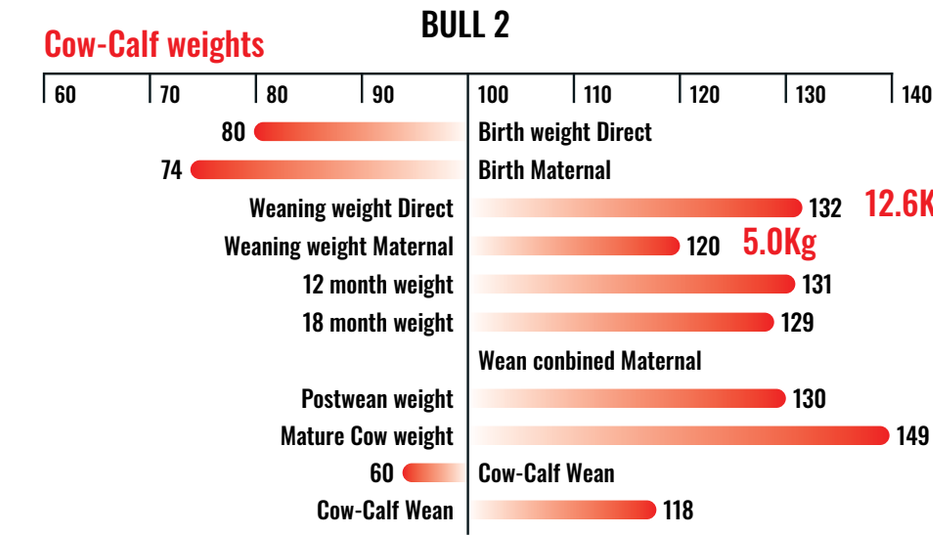
All genetic merits are based on actual measurements and performance, not the other way around. In other words, the actual weight, measurement, objective observation, or description within groups, where each animal is offered an equal opportunity to show its mettle, clearly indicates whether it is better, weaker, shorter, longer, taller, smaller, and more or less profitable than the others that also had this equal opportunity. Commercial buyers who want to make a living from their cattle, and clearly distinguish between breeding animals that can, or cannot achieve this, want cattle with actual measurements.

If it works, is there a difference in the performance of the progeny of a bull with high breeding values compared to another with lower breeding values?

As an example, the offspring of two Nguni bulls with different breeding values for weaning weight and milk (maternal weaning) were compared. Both were born in 2008. In other words, their daughters have already weaned calves.

Below is the graphic representation of the bulls' BLUP breeding values (as on www.Logix.org.za and www.SABeefBulls.com):





The next logical step now is to see whether the "paper values" reflect reality. Each bull had progeny with weaning weights measured against the calves of other bulls. Furthermore, daughters were also selected as breeding cows and in turn, weaned their own calves which were weighed together with the calves of other bulls' daughters.

Bull 1:

The weaning weight of Bull 1 was 16 kg lighter than the average of his weaning group of 133 weaner calves, not on paper, but on the scale. He sired 48 bull calves and 52 heifers, weighed in 12 weaning groups. The number of calves in the groups compared totalled 925. The bull's progeny weighs on average 20 kg LESS than their contemporaries (the average age of the mothers of their own calves is 62 months, compared to the average of 70 months measured for the mothers of the other bulls' calves).

At the time of the analysis, his daughters had already weaned 22 calves (thus grandchildren from his daughters), for which weaning weights were recorded in 3 weaning groups. A total of 112 calves were weaned (and weighed) in the 3 weaning groups. Thus, the daughters of other bulls who suckled their calves are practically compared directly with the daughters of Bull 1. The calves of Bull 1's daughters weigh on average 16 kg less than the calves of daughters of other bulls. Admittedly, the daughters of the bull were only 32 months old, as opposed to the other calves' average of 54 months.

Bull 2:

Bull 2's own weaning weight was 18 kg more than his weaning group's average. His mother was 47 months old, compared to the average cow age of 65 months of the other calves' mothers. As with Bull 1, he was physically weighed on a scale and not merely a paper entry.

Bull 2 is the sire of 35 offspring (at the time of the investigation) with weaning weights in 2 weaning groups of 103 weaner calves. His progeny weighs on average 8 kg more than the progeny of other bulls' calves. At the time of the investigation, his daughters produced 13 weaner calves and weighed in 4 weaner groups with 179 weaner calves. The average age of his daughters is 35 months old compared to the other cows' age of 46 months. His grandchildren, however, weigh on average 16 kg heavier than the calves of daughters of other bulls.

Based on the measured differences between the progeny of the bulls and the progeny of other bulls on the same farm with weaner groups exposed to precisely the same conditions (and calculated at the current weaner calf price of approximately R34/kg), the difference in yield between the bulls, based on the weight of their weaner calves and the weight of their daughters' weaner calves would be as follows:

Table 1: Difference in yield between the two bulls

	Progeny Bull 1 Loss in income per calf compared to the average of other weaner calves	Progeny Bull 2 Extra income compared to the average of other weaner calves
Own calves	- R680 per calf	+ R272 per calf
Calves of daughters	- R544 per calf	+ R544 per calf

The actual difference in production per weaned calf for the direct progeny of Bull 1 and Bull 2, compared to their contemporaries, is, therefore, R952 per calf. The difference between the calves of the two bulls' heifers is R1 088 per calf.

Both bulls were used as herd sires and thus passed tests based on appearance and functional conformation. Yet, mere visual appearance could not prevent making the wrong choice where the profitability of the progeny of such a sire was concerned.

Information underpinned by science and correct use of breeding values based on actual measurements are measures that can be used to clearly define the profit margins of two possible selection candidates and will make it possible for buyers to ensure profit. This is not only on paper but a reality.

A “Paper bridge”

A new road is being built, and a new bridge is needed to cross a ravine. The scientific civil engineer collects all his equipment. He carefully measures the distance that is to be bridged. He gathers all information on the raw materials, their characteristics, tensile strength, maximum and minimum holding power, and information on how everything will add to the functionality and lifespan of the planned bridge. His calculations, obviously, include costs, determining risks, and have guarantees, and he even has sketches of how the bridge will look and aesthetically fit into the environment. His entire report is on paper.

Then there are the road builders standing next to the ravine. They, however, take the easy way out by estimating the distance. They have built bridges before or have been involved in building bridges. Based on their estimation, they recommend the strength of the concrete reinforcement, the diameter of the supporting pillars, and the anchor cables. The design will ensure a beautiful bridge.

I would rather drive across the “paper bridge” since I know the design is based on scientific principles, is well-researched, and meets all international requirements for safety and functionality. Of course, to make it feel even safer to cross the ravine, the appearance of the bridge should exhibit functionality.

Postscript: The Cow Value (genetic value for Rand per hectare for its daughters) of Bull 1 is R39.05 (Breeding value index = 86 and receives two stars) and for Bull 2, it is R144.26 (Breeding value index = 128 and thus receives four stars).