AN OVERVIEW OF THE *Performance* of SANTA GERTRUDIS BULLS during intensive feed tests over 20 years

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BACKGROUND

Due to a continuous rise in the population that is associated with an increased demand for protein, sustainable beef production is also becoming more important to ensure the demand is met over the long term. Together with the rise in the population, the natural resources are also under pressure and beef producers need to produce the proverbial "more from less". In South Africa livestock production contributes substantially to food security. The livestock sector is also a major role player in the conservation of biodiversity through a variety of well-adapted indigenous and non-indigenous breeds, as well as rare game species. The South African beef industry is challenged by globalisation, increasing volumes and competition, strong industrialization of the value chain, shortage of skilled staff and pressures to meet changing customer needs.

Over the past years, the beef supply chain has become vertically integrated. This is where the producer, feedlot, abattoir and wholesaler are linked together. There are different value and supply chains. The direct participants who play a role in delivering the product to the market are the producers (farmer), feedlot, abattoir, wholesaler, processor, distributor and retailer. There are also other participants and contributors in the beef value chain such as providers of hides and skin, meat processors, imports and exports, spices, packaging, etc. The supply chain is also determined by the characteristics of the beef product and is very competitive. The partners and role players in this chain are highly dependent on each other. In South Africa, like in other countries, the beef industry contributes to food security and the nutritional well-being of the population. The slaughtering, processing and preservation of meat are key components of the value chain of the meat industry. The combination of decreasing hectares available for crop production, increased utilization of grain for fuel, increased input costs and an increase in feed costs are some of the key factors that highlight the changing dynamics of agriculture.

Due to the high feed costs, it is important to have a positive feed margin. A positive feed margin can be influenced by the feed price and the efficiency of growth (gain/kg feed consumed). This can be achieved by improving the average daily gain (ADG) and reducing the feed costs by breeding animals that utilize feed more efficiently. Feed costs amounts to 55% – 70% of the total production cost, and a 10% improvement in feed efficiency of animals may result in a feed cost saving of several hundred million rand per annum for the industry as a whole. Measuring efficiency

will assist in decisions that increase productivity without increasing costs of production and will result in greater profit margins. Feedlot studies in the USA demonstrated that a 10% improvement in ADG as a result of a 7% increase in intake improved profitability by 18%, whereas, a 10% improvement in feed efficiency returned a 43% increase in profits. By improving feed efficiency, it will thus significantly contribute to a more sustainable and profitable production system.

Feed conversion ratio (FCR) is defined as the amount of feed needed to gain one kilogram of live weight completion at the end of all Phase C tests at ARC test centres. Bulls consume on average 3% of their body weight in feed per day and the average FCR in SA is 4.5 kg – 7.5 kg, which depicts the actual feed consumed to gain one kg in live mass. The less feed consumed by a bull to gain mass, the more efficient it becomes.

There is a highly negative (favourable) correlation between ADG and FCR (-0.60). The better the growth of the animal, the more efficient (lower) the FCR will be. When the feed intake of the animal increases, the rate of growth of the animal will also be enhanced, causing the correlated response in ADG. Genetic improvement in feed efficiency can be achieved through selection and in general, correlated responses in growth and other post weaning traits will be minimal. As feed efficiency is important to improve profitability, the feed efficiency in young animals may differ from the efficiency of older, fatter cattle on a high-energy feedlot diet. Feed efficiency is heritable and genetic improvement is thus possible through selection.

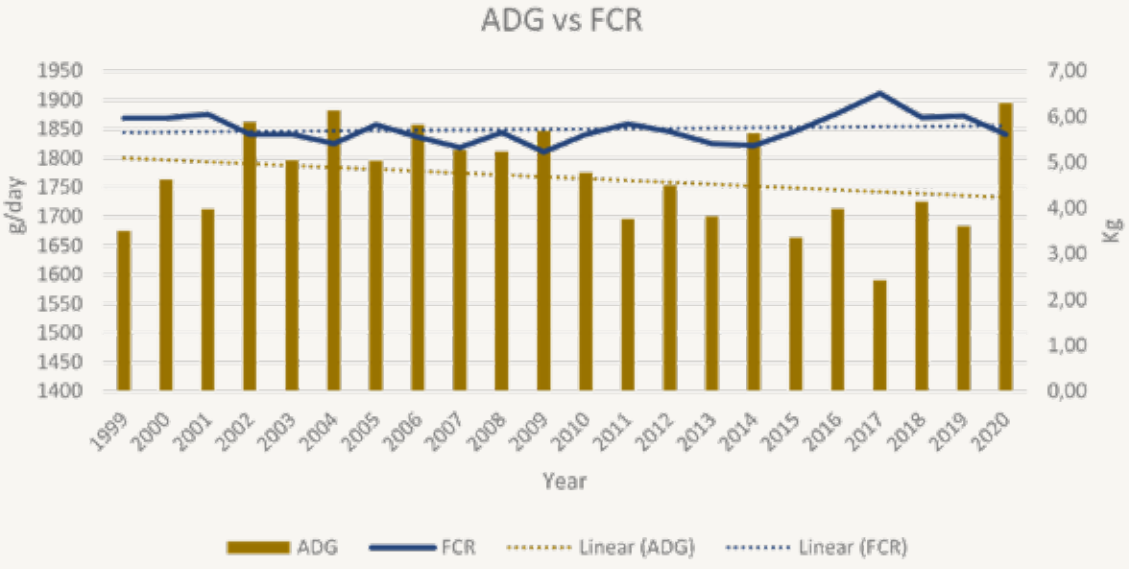
It should however be mentioned that when selecting for a low FCR and high ADG, over time your animals will become bigger, requiring more feed for gaining weight, growth and for maintenance. Since growth is of economic importance, e.g., weaning weight has a direct monetary value; farmers select for this trait to improve their profitability. Care should however be taken when selecting for higher weaning weights since growth traits are highly correlated. Care should also be taken to avoid heavier calves at birth since it may result in calving difficulties while heavier mature weights will require an increase in maintenance requirements. The feedlot industry produces approximately 75% of all beef produced in South Africa. This is approximately 1.35 million head per annum. Most of the meat consumed from the formal markets in SA, is produced from cattle in a feedlot system. A 1% improvement in feed efficiency has the same impact as a 3% increase in rate of weight gain. Improvements in

efficiency of beef production are vital and necessary to sustain the cattle industry. The purpose of this study was to determine how the growth and efficiency of Santa Gertrudis bulls has changed over 20 years.

RESEARCH ON SANTA GERTRUDIS BULLS UNDER INTENSIVE CONDITIONS

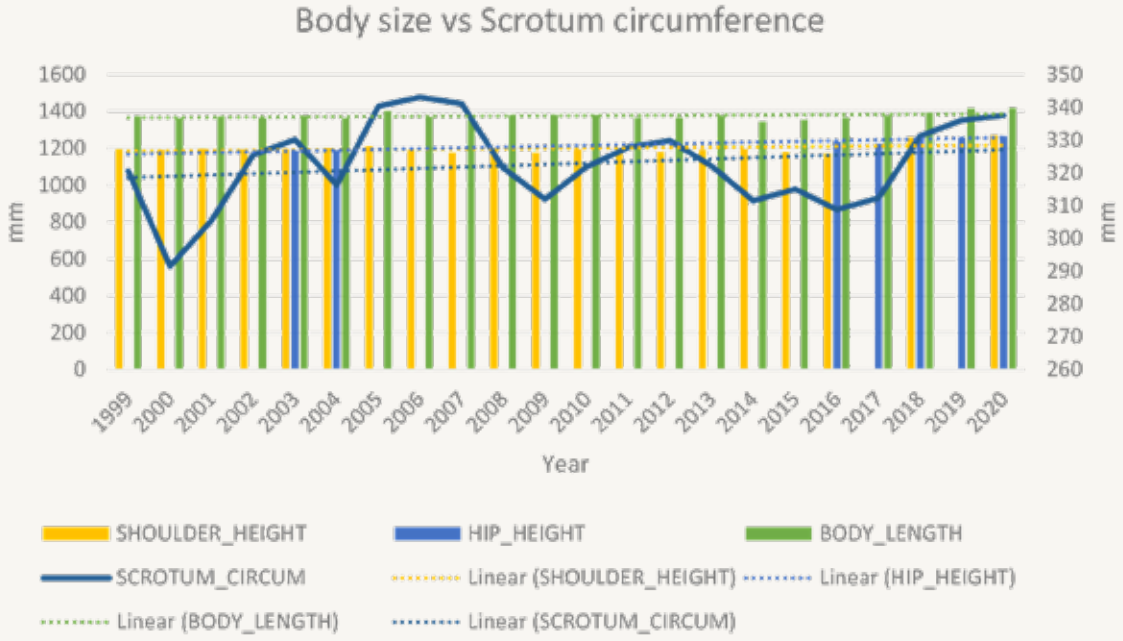
Bulls between the ages of 151 – 250 days are tested in a Phase C test. Performance data from four ARC centralized testing stations were analysed by the ARC in this study and Santa Gertrudis bulls tested during 1999 – 2020 were included. During the phase C test, the growth (ADG) and the efficiency (FCR) of bulls were measured. On the last day of the test, body measurements (body length, hip height, skin thickness and scrotum circumference are measured) were done. Breed inspectors also has to approve the bulls according to the breed requirements. Bulls are fed a standardized feed during the test period and receive feed *ad libitum*. Bulls were grouped according to the year within which their adaptation period of 28 days started. The reason why the bulls were grouped according to year was because most of them were not tested in groups. Data of 1 199 Santa Gertrudis bulls were analysed. The data was obtained from the INTERGIS. After the adaptation period of 28 days, bulls entered the intensive growth test stage for an 84-day period. At completion of the test, the results were compared to the 10-year rolling average for ADG and FCR per station and per breed. The 10-year rolling average, is the average of the performance of the bulls (within a breed) tested within the previous 10-year period. This is done to compensate for the environmental effect on performance. By comparing animals to the 10-year average the effects of the environment are eliminated from the results. In addition, the management and feed ration are also standardized at all the central ARC testing centres.

In Graph 1, below the comparison between ADG and FCR is illustrated.



Graph 1: The relationship between ADG and FCR is illustrated. From the above graph it must be mentioned that ADG and FCR both changed over this period. ADG decreased marginally from 1.800kg / day to 1.720kg / day while FCR increased from 5.8 – 6.0kg. No significant differences were found for ADG and FCR (P >0.05).

In Graph 2, the comparison between scrotum circumference, shoulder / hip height and body length are illustrated.



Graph 2: The relationship between scrotum circumference, shoulder / hip height and body length are illustrated. From this graph the body length, shoulder / hip height remained relatively unchanged. While the scrotum circumference increased in size (318mm – 324mm), it is 6mm increase in circumference. Scrotum circumference is highly positively correlated to fertility.

SUMMARY

During 2014, the Santa Gertrudis Society moved away from measuring shoulder height to hip height.

The global trend is however to focus more on RFI (Residual Feed Intake) since it is phenotypically independent of growth and body weight. The trait is also moderately heritable (18-49%) which enable us to improve feed efficiency by selecting for efficient animals. RFI is the difference between actual and predicted feed intake. The latter is an animal's maintenance requirements in relation to its body weight and growth. It is suggested that it may be more desirable to select for a trait such as RFI, since, by selecting for high ADG and low FCR, will result in bigger animals with higher maintenance requirements. Producers should take note that the frame size of the bulls remained relatively unchanged during this period. As the average FCR increase by only 200 grams, it must be taken into account that there might be other factors that may also have had an influence, such as genetics, feeding practice, environmental control or health status. Although there was a slight decrease in the ADG in the period assessed, it must be managed, because the faster an animal gains weight, the quicker it is ready for market, which can decrease input costs. The scrotal circumference that increased is however a positive outcome. Scrotal circumference is correlated with sperm motility and morphology and a good indicator of daily sperm production, especially in young bulls.

These results were obtained over a 20 year period from different bull test centres and are clear indicators of phenotypic trends for the different traits that are of economic importance.