

THE VALUE OF CENTRAL (PHASE C) AND ON-FARM (PHASE D) PERFORMANCE TESTS

Leslie Bergh

ARC-Animal Production Institute, Private Bag X2, Irene, 0062 South Africa • Tel. +27 (0) 12 672 9145, Mobile +27 (0) 82 801 2026, E-mail: leslie@arc.agric.za

PHASES OF THE SCHEME

The National Beef Recording and Improvement Scheme (the Scheme) of the Agricultural Research Council (ARC) of South Africa makes provision for testing of beef cattle in various phases, namely:

- **Reproduction and Herd Testing (Phase A):** This phase is the basis of the Scheme and also by far the most important phase as it is the phase where the economically most important traits in the production process are evaluated. These traits include reproduction (fertility), ease of calving, pre-wean growth and cow efficiency. Phase A is the only phase of the Scheme which is mandatory to participate in from the ARC's side. However, most breeders' societies compel their breeders also to participate in Phase B.
- **On-farm post wean testing (Phase B):** In this phase the post weaning growth-rate of young heifers, bulls and oxen is evaluated under normal farm conditions through their weights at 12 - and 18 months of age.
- **Central performance tests (Phase C):** In this phase, bullocks are tested immediately after weaning under intensive (feedlot) conditions at a central testing station under standardised conditions.
- **On-farm performance tests (Phase D):** In this phase, bullocks are tested after weaning on the farm in an ARC-monitored test.

INTENSIVE OR ON THE VELD?

Although there are still disagreements about the role of intensive and extensive post wean performance tests, most scientists believe that it is ideal for animals to be tested under the same conditions under which they are to produce offspring. Some people will now immediately say that the answer is very simple: Bulls must be tested under field conditions because cattle in South Africa produce on natural pasture. But is the answer really that simple?

In South Africa almost all weaners are produced on natural pasture (veld). In contrast, about 75% of all beef produced in South Africa comes from feedlots. This means that most weaners are grown and rounded off for marketing in feedlots. When one also considers that the arrival weight of calves are approximately doubled during the feeding period in a feedlot, it is clear that feedlots play a huge role in the provision of high quality [by high quality I mean A-grade beef with the optimum amount of fat, e.g. A2] beef to the South African consumer.

For the foreseeable future this situation is likely to remain the case, as SA does not have sufficient capacity to produce enough beef for the market from natural pasture.

The reason for this is simply that the national cow herd will have to be drastically reduced to make room for the production of young animals, post weaning, on the veld. This will inevitably have the result that far fewer weaners will be produced.

Despite the abovementioned, there is a growing awareness, especially among sophisticated consumers, about the benefits of veld-produced beef mainly because of health and ethical considerations. It is expected that this market will continue to grow in the foreseeable future, especially if such beef is available at competitive prices. It is, however, with the information now available to us, very unlikely that this trend would mean a massive swing away from feedlot-produced beef to veld-produced beef. Therefore we can with reasonable certainty predict that feedlots will in the future remain a very important link in the beef chain. In future, bulls' daughters will therefore still be required to produce and reproduce on natural veld and their calves, at least until weaning, as well. But after weaning the same calves should be able to adapt to feedlot conditions and grow fast and efficiently to the point of marketing. On this basis, we are of the opinion that there is a place for both intensive and on-veld testing of bullocks, post wean.

To further put Phase C and Phase D intensive tests in perspective, one should remember that these phases are only a small portion of the total testing of bulls, since they are kept and tested under extensive conditions up to weaning and also after the completion of Phase C or D tests. Heifers are kept and tested under extensive conditions both pre-wean and post-wean and the same goes for cows during their productive life. The evaluation of adaptability traits under extensive conditions thus receives enough attention in the Scheme.

PHASE C TESTS

Test Procedure

As mentioned above, bullocks in Phase C are tested immediately after weaning under intensive (feedlot) conditions at a central testing station. Phase C1 tests are conducted at four ARC Phase C centers (Irene, Vryburg, Glen and Cedara) and Phase C2 tests at one of the many private Phase C test centers, overseen by the ARC. As no minimum number of bulls per breed per test is required in Phase C1 and C2 tests, meaningful evaluations within a particular test is not necessarily possible, especially where there is only one or a few bulls in a particular test. In order to overcome this problem, all Phase C tests are standardised in terms of nutrition, management, test length as well as arrival weight and age of the bulls. This makes it possible to evaluate bulls across tests.

ADG (Average Daily Gain) and FCR (Feed Conversion Ratio) indices are therefore calculated on the cumulative rolling average of all bulls of that breed, which have been tested over the past 10 years at that particular Phase C center, regardless of how many bulls there were in a particular test.

For all Phase C tests a standard feed mixture, which was specifically formulated for Phase C, is used. All bulls should be between 151 and 250 days old at the beginning of the adaptation period. The bulls should also be within certain weight limits determined by breed. The test lasts 84 days after an adaptation period of 28 days. Each bull's feed intake is individually measured during the test so that the bull's efficiency of feed conversion (kg of feed needed for one kg in weight gained) can be calculated.

Unlike Phase C1 and C2 tests where there is no minimum number of bulls required, at least 10 bull calves of the same breed which do not vary more than 100 days in age and which fall within certain weight limits per breed, are required for Phase C3 tests. Because a minimum number of bulls per breed per test are required, meaningful evaluations can be done within a particular test and therefore performance indices are calculated within a Phase C3 test.

The importance of feed efficiency

Production efficiency is a function of inputs and outputs. In a beef production system the biological efficiency is determined by the amount of nutrients used to produce one unit (kilogram) of edible beef. Feed intake and feed conversion efficiency is thus an important component of production costs. In extensive production systems it is practically impossible and/or very expensive to measure feed intake directly. Phase C is the only phase where feed intake (as a measure of biological inputs) is directly measured on individual animals and feed conversion ratio (FCR) subsequently evaluated. **The direct measurement of feed intake and calculation of FCR is the most accurate method to estimate breeding values for feed conversion efficiency.** Breeding values estimated for FCR, which are based only on the correlation between FCR and other traits, such as ADG, are inaccurate.

The value of Phase C tests

Besides the purchase price of calves, feed cost is the biggest cost in a feedlot. FCR is thus a very important trait determining the profitability of a feedlot. **By far the most important value of Phase C tests is that it is the only phase in the Scheme where FCR can be evaluated.**

Because Phase C tests are carried out under standardised conditions, it is the only stage where a bull's actual performance can be compared to bulls from different herds of the same breed and also between different years. Regarding the breeding value of animals, BLUP methodology of course now makes it possible to determine the genetic merit of animals across herds and years without the need to test them under standardised conditions.

Although all genetic evaluations in the Scheme are only within breed context, Phase C results make it possible to compare breeds in respect of the performance traits evaluated in Phase C tests.

Other benefits of Phase C are similar to the benefits of Phase D - see below.

PHASE D TESTS

Different types of Phase D tests

As mentioned before, calves can be finished after weaning for the market under different production systems and breeding objectives may vary accordingly. Therefore, the Scheme makes provision in Phase D tests for the testing of bullocks according to the producer's choice, namely under intensive-(feedlot), semi-intensive (e.g. on planted pasture) or extensive (natural pasture) conditions. The ARC is thus not prescriptive regarding the system under which these tests should be performed in order to accommodate the needs, circumstances and goals, which may vary from breeder to breeder.

For a Phase D test at least 10 bull calves of the same breed, which do not vary more than 100 days in age, are required. In order to limit pre-test effects to the minimum, it is preferable to start a Phase D test as soon as possible after the bulls are weaned, i.e. about 7-8 months of age.

To evaluate post wean growth rate accurately, it is important that a certain growth rate (ADG) and total weight gain is achieved. Intensive tests last, depending on the feeding level and subsequent growth rate, 84 to 112 days after an adaptation period of at least 21 days. Semi-intensive tests usually last 112 to 140 days. The main benefit of intensive tests is that the bulls' adaptability, growth ability and, indirectly, efficiency of growth under feedlot conditions are evaluated.

With extensive tests, the tests usually only start at the beginning of the next rainy season after the calves were weaned and the bull calves are about 12 months old. The maximum age at which a bull can start a Phase D test, is 425 days (14 months). Extensive tests can run up to a maximum period of 270 days (nine months). Usually these tests are done during the summer growing season of the veld, when the bulls are in a growth phase. The main advantage of veld tests, except for the fact that this could be cheaper than intensive tests, is that the adaptability (including tick resistance) and growth potential of bulls are evaluated under veld conditions. The main potential drawback of veld tests is that the growth rate is largely determined by rainfall and that it can be erratic and very low. As a minimum growth rate (see below) is required, this could mean that there is always a risk that a test may be canceled if the growth rate is not adequate, especially if feeding is not an option to sustain a certain growth rate.

Phase D tests with bulls of the same owner are called Phase D1 tests. Where two or more owners' bulls are tested together it is called a Phase D2 test. The requirements, including the maximum permissible weight variation between the bulls, for Phase D2 are stricter than for Phase D1 tests.

It is important to take note that veld bull tests done under the auspices of Veld Bull SA only qualify as an official Phase D test of the ARC if the club applied for the test to be done as an official Phase D test and provided that the test and all animals in the test adhere to the applicable Phase D requirements.

The test should also be ended and validated by an ARC officer. Please note that only official Phase D test data is recorded and processed on the INTERGIS and printed in the official INTERGIS/Stud Book sale catalogs. This means that data only processed by Veld Bull SA (in other words not as an official Phase D test recognised by the ARC), has no official status.

The value of Phase D tests

Phase D testing offers many advantages over Phase B testing. Although Phase D is essentially a growth test, it offers the breeder the opportunity to evaluate many more traits. This data is then available to both the breeder and bull buyers.

- All Phase D tests are planned and executed under the supervision of a technician approved by the ARC Animal Production Institute, which verify that the test is performed according to the stipulated guidelines and rules applicable to Phase D tests of the Scheme.
- The ARC technician is personally present at the end of the test to weigh the bulls and record other measurements. This ensures inter alia that the test and all relevant traits evaluated, meet the scientific principles of performance testing. In addition to this, the validation of the test by an independent institution gives additional credibility to the results of Phase D tests.
- A minimum of 10 bulls per test is required to ensure that a meaningful evaluation is possible. Most breeders use breeding seasons and all the bull calves that are weaned (except perhaps the very weakest) are usually tested together. This ensures that contemporary groups are usually much larger than the minimum of 10 bullocks, which of course, ensures a more meaningful comparison of the bulls.
- A minimum average growth rate and minimum total weight gain is required during the testing period to ensure that growth rate can be evaluated effectively. A minimum ADG of 500 - 550g per day and a minimum total weight gain of 110 - 120kg is, for example, required for medium frame breeds.
- The bulls in a Phase D test are weighed regularly during the test to monitor their growth rate and for early identification of potential problems.
- The scrotum circumference of the bulls is measured at end of the test by the ARC technician present. This ensures that this important fertility trait is evaluated in all Phase D tested bulls. Furthermore, the testicles are also examined for any abnormalities, such as hypoplasia, swellings or other injuries.

- Shoulder height (or hip height, depending on the breed) and body length of the bulls are also measured by the technician (optional) at the end of the test. These measurements give information on the frame type of the bull.
- Real Time Ultrasound (RTU) scanning of the bulls is also done (optional) at the end of the test. Subcutaneous fat thickness, intramuscular fat deposition (marbling) and eye muscle area are the traits that are measured. These measurements are used to calculate traits such as estimated slaughter percentage and red meat yield. Only RTU measurements of accredited technicians are accepted, as these measurements require specialised technical skills and equipment.
- Pelvic measurements (pelvic opening height and width) of the bulls can also be measured (optional) at the end of the test by a veterinarian or other accredited person. These measurements are used to select bulls that will breed heifers with a sufficiently large pelvic opening for easy calving.
- In extensive (field) Phase D tests the number of ticks on each bull (counted in certain areas on the animal) can be recorded or scored on a regular basis during the test. These tick counts or scores are processed at the end of the test in an index indicating which of the animals are more tick resistant. With dips becoming more expensive and ticks becoming more resistant to dips, this is a trait that should enjoy more attention. (By the way, breeders can do tick counts or scoring themselves on animals tested in Phase B).
- The growth test data, body measurements, etcetera of bulls tested in Phase C and D tests are included in the BLUP analysis that the ARC provides for the applicable breed (if, of course, sufficient data is available) and in this way these bulls get reliable breeding values for the traits evaluated in Phase C and D tests. This means that both breeders and bull buyers have reliable breeding values at their disposal to use for selecting their animals.

CONCLUSION

Depending on an individual breeder or breed's specific circumstances, needs and breeding objectives, Phase C and D growth tests provide several options for the testing of bullocks after weaning.

The main benefit of Phase C and D tests is that it is done under direct supervision and control of an independent body, namely the ARC, and consequently the performance test data from these phases are highly regarded in the industry in terms of accuracy, reliability and credibility. Phase C has the added advantage that FCR, economically speaking a very important trait, is evaluated.