Postweaning Evaluation Programs for Beef Bulls

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Seedstock producers are constantly striving to identify individuals with superior performance. Parents are selected to produce offspring that will perform in a particular environment. The seedstock producer is not only eager to identify cattle to use in his or her breeding program, but the producer must also meet the demands of the commercial bull buyer. Performance testing programs provide objective measures of genetic worth to fulfill these goals.

There is no one method of evaluation for every seedstock producer. Both central and on-farm bull tests can provide valuable information. These tests may use either high-grain diets or high-forage diets. As long as bulls of similar background and age are given equal opportunity to express their genetic ability to perform, valid comparisons can be made.

The decision of the seedstock producer to use a particular type of testing program will depend on such factors as: 1) availability of feed, 2) market demand for bulls of a particular age, 3) availability of feeding facilities, and 4) ability to merchandise bulls. Some producers will choose central test stations while others will prefer on-farm tests. Conducting an on-farm testing program while also sending some bulls to central test stations may be a viable option for many seedstock producers.

Test Stations

Central bull test stations are used in many parts of the country to evaluate postweaning performance of bulls under uniform conditions. The first test stations were used to demonstrate performance concepts and improve growth rate in many breeds of beef cattle. With the development of national cattle evaluations conducted by many breeds today, central test stations are now used by seedstock breeders as an additional source of performance records on their bulls. Also, central test stations may serve as a demonstration of how to conduct an on-farm performance test. OSU Fact sheet F-3155 describes the details about the Oklahoma Beef Incorporated (OBI) central bull test.

Central test stations demonstrate postweaning gain performance and provide educational opportunities for prospective bull buyers. Also, the stations serve as a good source of bulls for commercial and seedstock herds. The test station not only provides a seedstock producer with a place to market individual bulls, but it also gives the producer an opportunity to advertise the breeding program by placing some of his or her bulls side by side with bulls from other breeders. This side by side comparison can give a new breeder a quick gauge, either good or bad, of how his or her cattle compare with those of established breeders.

On-farm Performance Testing

On-farm performance testing of bulls is becoming increasingly popular in the purebred sector. These tests may be confinement- fed, a forage test, or a combination of the two. The success of any on-farm program depends upon the uniform testing procedures and attention to records by the breeder. Animals need to be managed under uniform conditions. Large contemporary (or testing) groups are beneficial when they are possible to maintain. The breeder should have a goal of whole-herd testing, by including all eligible bulls in the testing group rather than testing only selected bulls. This approach gives a better picture of the performance of the herd. The on-farm testing program relies on accurate records as well. Care should be taken to insure scales are in good working order and reporting of weigh data is accurate.

For a good genetic evaluation, give equal treatment to all bulls. If any bulls receive special attention, your performance data will by biased. For example, it is not valid to compare an embryo transfer calf out of a Holstein recipient to other calves in the herd.

One of the most essential parts of functional herd performance information is the correct identification of contemporary groups. A contemporary group is a group in which animals of a given sex and age, having been under similar management, are given an equal opportunity to perform under similar conditions (Beef Improvement Federation (BIF) Guidelines, seventh edition, 1996). The basis of sound performance testing relies on correct identification of contemporary groups. Thus, group definition is critical. Accuracy in estimating genetic differences within a group of animals is dependent on the accuracy of the grouping. Seedstock producers should take special care in reporting these on-farm contemporary groups to their respective national breed association for calculating expected progeny differences (EPD).

A weaning contemporary group includes calves within a common sex, calving season, management group (creep, no-creep, pasture differences), and weaning date. A yearling contemporary group includes calves from the same weaning contemporary group that have received the same treatment

after weaning. Ideally, there should be less than 90 days difference in age of calves in the same contemporary group.

The objective of an on-farm bull test is to make comparisons. On-farm tests work best when they are used in conjunction with breed association record programs. Good planning will allow completion of both an on-farm test report and breed association records with very little additional work. For example, if bulls are started on a 112-day gain test at about eight months of age, the final test weight can be used for the yearling weight. Look over your breed association's record requirements before you plan an on-farm test.

Methods of Feeding

Bulls may be fed a variety of diets. As long as all bulls in a test group receive the same treatment, valid comparisons can be made. High-grain tests (e.g., as fed NEm 79.7, NEg 51.7, 72% TDN, 13% protein) are usually necessary if bulls are to be sold at one year of age. On high forage diets, bulls are usually 18 months to two years of age before they are marketable. From a practical standpoint, the major factors that determine the best type of test are available feed resources, marketing program, and sale age.

Confinement-fed bulls

The BIF Guidelines for central test station bulls provide guidance for developing a confinement-fed on-farm test. The general guidelines include the following six items:

1. Age of the calves for the test should be between 180 and 270 days.
2. Contemporary groups should be age groups with no more than a 90-day age spread.
3. Breeders should record the following: sire of calf, calf birth date, age of dam, and weaning weight information.
4. An adjustment period of 21 days is needed prior to the beginning of the test period.
5. Test length should be at least 112 days.
6. Initial and final test weights may be either full or shrunk weights. If full weights are taken, initial and final weights should be an average of two weights taken on consecutive days, to minimize fill effects. If shrunk weights are taken, a single weight after a shrink of 12 hours is adequate. (BIF Guidelines, 1996)

Diets are usually 60 to 70% total digestible nutrients (TDN) and 13.5% crude protein on an as-fed basis and can produce rapid gains in bulls. Since the feed is consistent throughout the test, this test is more controlled than a forage test. As a result, heritability estimates for gain on grain are usually higher than heritability estimates for gain on forages. Care of bulls following the gain test is addressed in the OSU Fact Sheet (F-3254), Management of Beef Bulls.

Forage-tested bulls

Forage tests supply low to moderate levels of energy. Bulls are fed to gain 2.0 to 2.5 pounds per day. To develop a forage bull test program, plan a grazing program of high quality forages. This is possible on forages under the best conditions. Since forage production is greatly affected by weather conditions, have a back-up feed supply, such as silage, mixed feed, grain, or hay available. If the fresh forage supply starts to decline, limit grazing time and start feeding the back-up feed before the grazing forage runs out. If the change from grazing to another feed is made gradually over a two to three week period, performance should not be affected.

Many producers prefer to use a combined grain and forage test. Supplementing bulls with at least five pounds of grain per day should produce more consistent gains than forage tests without supplementation.

Bulls need two to three weeks to adjust to the forage and supplementation program before initial weights are taken. Increase the length of the test for slow-gaining bulls. Since bulls gain more slowly on forage programs, test the bulls for at least 168 days (24 weeks).

Records and Measurements

Several standard measures of performance are commonly reported in either on-farm or central tests. Formulas vary slightly depending on the breed and type of test. Breed associations often have formulas and adjustment factors that are developed specifically for that breed. These are given in the BIF Guidelines (1996).

Pre-weaning performance

Identification, birth weights, and weaning weights should follow recommendations of your breed association. Process weaning weights on calves in your herd as soon as possible. Use adjusted weights from your association in on-farm and central test reports. Since birth and weaning weight adjustment factors vary from one breed to another, standard formulas may yield results that are not consistent with your breed association reports.

Test weights

Take an initial weight as soon as bulls are accustomed to the feeding program. Central test stations usually take intermediate weights every 28 days. On-farm tests do not have to weigh bulls this often, but regular weights do help locate management problems. Take a final weight at the end of the test. An average of two weights is desirable at the beginning and end of the test period. Plan to weigh bulls at the same time of day. If initial weights are taken when bulls are full, final weights should also be taken when bulls are full.

Performance ratios

Each individual in a testing group should be compared with the average performance of his contemporaries. A ratio is a tool to assist in evaluating the individual relative to others in his group that was managed similarly. A ratio is computed as follows:

$$\text{Ratio} = \left[\frac{\text{Individual's performance}}{\text{Average of contemporary group}} \right] \times 100$$

An animal that is average will have a ratio of 100. Above average animals will have a ratio above 100, and below average individuals will have a ratio less than 100. A bull with a ratio of 105 is 5% better than average of the group from which he was tested. Ratios can be used for any of the traits measured. These values only have meaning relative to the testing group on which the ratios are based. In many cases, the highest ratio individual may not be the best choice for your

herd and production environment. Consider the complete breeding program and management resources when using ratios in a selection program.

Test ADG

Average daily gain (ADG) on test is calculated as follows:

$$\text{Test ADG} = \frac{\text{Final weight - Initial weight}}{\text{Days on test}}$$

Adjusted yearling weights

Most breed associations report adjusted 365-day weights. On-farm tests use the following formula:

Adjusted 365-day wt. =

$$\left[\frac{\text{Actual final wt. - Actual weaning wt.}}{\text{Number of days between weights}}\right] \times 160 + \text{Adjusted 205-day wt.}$$

Since weaning weights are from different ranches, central tests use the following formula:

Adjusted 365-day wt. =

$$\left[\frac{\text{Actual final wt. - Birth wt.}}{\text{Age in days}}\right] \times 365 + \text{birth wt.} + \text{Age of dam adjustment}$$

Adjusted 365-day weights work very well, but final weight should not be taken at less than 330 days of age for any individual animal. For forage test programs, take a 365-day weight before the end of test for breed association records. If bulls finish the forage test at around 15 months of age, a 452-day adjusted weight can be used in on-farm records. The formula is:

Adjusted 452-day wt. =

$$\left[\frac{\text{Actual final wt. - Actual weaning wt.}}{\text{Number of days between weights}}\right] \times 247 + \text{Adjusted 205-day wt.}$$

For very long forage tests where bulls finish at around 18 months of age, an adjusted 550-day weight is sometimes reported. The formula is:

Adjusted 550-day wt. =

$$\left[\frac{\text{Actual final wt. - Actual weaning wt.}}{\text{Number of days between weights}}\right] \times 345 + \text{Adjusted 205-day wt.}$$

Scrotal circumference

Research indicates that bulls with large testicles tend to sire daughters that reach puberty at an early age; therefore, scrotal measurement should be part of the postweaning test program. Measure scrotal circumference at one year of age or when yearling weight is taken. The BIF Guidelines have printed adjustment factors for scrotal measurements. Some breed associations have adjustment factors for their specific breed. Report scrotal circumferences in centimeters. Scrotal measurement tapes can be purchased from several livestock supply companies. To measure, grasp the scrotum above the testicles and fully distend the testicles. Then wrap the tape around the widest portion of the scrotum and take the reading.

Hip height

Do not use hip heights as a replacement for other performance data. No one frame size is best for all producers, but hip heights or frame scores do provide supplemental information for the breeder and the bull buyer. Measure hip heights in inches directly over the hooks (hip bones) with the animal standing on a level surface. To make accurate comparisons, consider age when measuring hip height. For bulls on test, take measurements at the end of the testing period or when 365-day weights are taken. Calculate adjusted yearling hip heights (Adj. HH).

For bulls under 365 days of age:
Adj. HH = Actual height + (No. of days under 365 x .033)

For bulls over 365 days of age:
Adj. HH = Actual height - (No. of days over 365 x .025)

Since growth rate for forage-tested bulls is different from grain-tested bulls, report actual hip heights for forage bulls. Measure forage bulls as near 365 days of age as possible so that adjustments will not be necessary. Yearling height is a point of reference when comparing bulls from different herds or contemporary groups. Hip heights can be used to determine frame scores at anytime in a growing bull's life. Frame score charts are available in the Beef Improvement Federation Guidelines (seventh edition, 1996).

Adjusted or actual hip heights are usually reported in summaries. Hip height ratios are not recommended. In addition, some breed associations report EPDs for hip height. If your breed association adjustment factors differ from those above, use those approved by your association.

Fat thickness

Fat thickness is sometimes measured at the end of a performance test. Measure fat thickness between the 12th and 13th (last) rib, approximately five inches from the midline, with either ultrasound or a probe.

Weight per day of age

Weight per day of age (WDA) can be calculated any time bulls are weighed. It contains no adjustments for sex of calf or age of dam.

$$\text{WDA} = \frac{\text{Actual weight}}{\text{Age in days}}$$

Feed conversion

Some central test stations report feed conversion as pounds of feed per 100 pounds of gain adjusted for body weight. Collecting individual feed efficiency data is expensive and time consuming. This data collection is generally not practical for on-farm tests.

Breeding soundness

Bulls that are too fat or too thin will not perform as well as properly conditioned bulls; therefore, start a balanced nutritional program to develop good breeding stock. Even with good management, some bulls will have breeding soundness problems. For a breeder planning a production sale, breeding soundness examinations are recommended. Central test sales generally have a satisfactory breeding soundness exam as a

requirement for sales. This examination can be performed by your local veterinarian and should include a physical exam, a measurement of scrotal circumference, and a semen evaluation.

Index

Some test stations provide an index for each bull within a testing group. The index for a particular bull is a numerical value based on performance ratios for two or more traits. These traits are usually the cumulative average daily gain ratio, weight per day of age ratio, and adjusted 365-day weight ratio, although the choice of traits and the value placed on each trait varies. Some stations utilize more complex index calculations to include other traits. The index used may not include the most important traits for a particular herd. The high index bull at a test station is not necessarily the best.

Combining On-Farm and Central Test Data with Breed Association Records

The on-farm test is a valuable supplement to your breed performance program. A properly conducted on-farm test keeps the weaning contemporary group together after weaning. This results in improved accuracy for yearling EPDs calculated in a breed association's national cattle evaluation. Some of the information from on-farm tests, such as scrotal circumference, may not be included in breed association programs; however, the information may be a useful tool for evaluation and marketing. Reporting procedures for weights and measurements vary depending on breed and type of test. Check your breed association requirements for performance testing programs.

Also, central test stations can work well with breed association programs. If bulls from a weaning contemporary group are sent as a group to a central test, yearling EPDs can be calculated in most breeds. Unfortunately, bulls are often split up from their contemporaries to be sent to central tests. This can result in lower accuracy on yearling weight EPDs. As long as bulls are weaned at the same time as other calves in their contemporary group, weaning and milk EPD calculations will not suffer.

Most central test stations report EPDs along with adjusted birth and weaning weights in sale catalogs. Actual or adjusted birth or weaning weights can be misleading due to environmental differences between ranches. These environmental differences have been accounted for in calculation of EPDs. When comparing bulls within a breed at central test stations on birth and weaning performance, use the EPD, not the actual or adjusted weights.

Summary

Performance testing programs are a valuable part of the total performance program. On-farm tests can both improve and supplement breed association performance programs. Also, central test stations are used by breeders for a variety of reasons. Data collected on bulls at central test stations should be used to supplement the performance program practiced at the ranch, rather than being the sole source of performance information.

Related OSU Fact Sheets

ANSI-3271 Hip Height & Frame Score Determination
ANSI-3254 Management of Beef Bulls

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. 0607