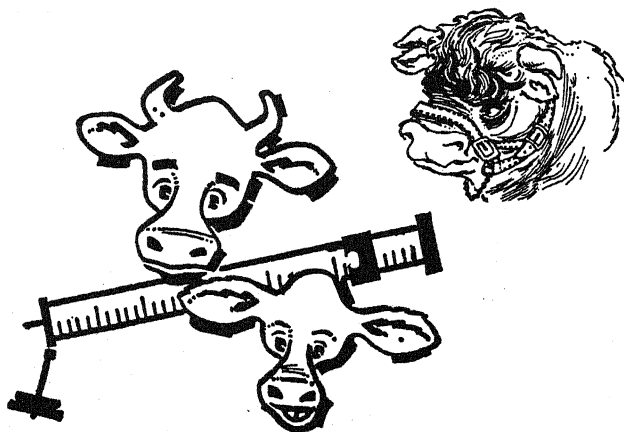


*Ohio*

Bulletin 503

# **BEEF CATTLE PRODUCTION TESTING PROGRAM**



A new modernized program featuring speed, accuracy, and more complete information through electronic data processing

**Cooperative Extension Service  
The Ohio State University**

# OHIO BEEF CATTLE PRODUCTION TESTING PROGRAM

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The Ohio Production Testing Program for beef cattle is designed to assist Ohio beef cattlemen to realize larger profits from their cow herds. The program is a new approach designed to improve the quantity and quality of Ohio beef cattle through selective breeding. To do this, the progeny of the herds is evaluated on an individual basis. For such an evaluation, consideration is given to such factors as fertility, ability to gain, efficiency of gain, body conformation, milking and mothering ability, and general carcass desirability.

A method of incorporating those traits that make the greatest contribution to total herd income is by the use of a selection index. This index is comprised of the 205-day weight ratio and the type score ratio for weaning calves, and the 365-day weight and type score ratios for yearlings. Thus it provides a single figure by which quality and quantity of an animal can be combined and then compared for replacement and culling purposes. The producer must, however, consider and evaluate both quantity and quality separately before incorporating them into an overall index.

## PURPOSE OF PRODUCTION TESTING

The purpose of a beef cattle production testing program is to assist the purebred and commercial beef cattle breeders in locating the best producing cows, bulls, and replacements within their herds. This program is not a contest, comparing one herd against another, but should be used as a "tool" to assist the breeder in improving his own herd by identifying superior animals within his herd or other herds from which he is seeking replacements.

Production testing can be especially important to the purebred breeder for selection of replacement stock. Also, nearly all bulls used in commercial herds come from purebred herds. Bulls with good individual performance will sire fast-gaining calves with desirable type for the commercial breeder and will mean repeat sales for the purebred breeder.

Production records for the commercial producer are just as important, since he will want to use them to help him decide which heifer calves to save as replacements and which cows to cull.

## INFORMATION NEEDED

Only a little information is needed for a production testing program. This includes identifications, dates, sex of calf, age of dam, weaning

weight, and grade. For post weaning, the date of weighing, 365- or 550-day weight and grade are all that is needed. The more accurate and detailed the record, the more valuable the whole program will be to the producer.

## METHOD OF PROCEDURE

**1. Enrollment:** Herd enrollment may be made through your county Extension agent, agriculture, area Extension agent, animal science; or by direct contact with the Cooperation Extension Service and Department of Animal Science, The Ohio State University.

**2. Identification:** To be able to evaluate an individual animal's production we must first be able to identify the animal. Most purebred breeders already have this job done. Any form of identification will be acceptable to the program as long as it is accurate and an easy way of identification.

It is suggested that, where a tattoo is used, some other form of identification be used that coincides to the tattoo, as some breeders have problems in reading a tattoo after a period of time. Some suggested means of identification are neck chains, leather straps, plastic straps, nylon rope, ear tags (large enough to read), hot branding, chemical branding, or freeze branding.

**3. Birth dates of calves:** This information can be conveniently recorded by means of a small pocket field record book, provided by the program. It is important to write down the date and sex along with identification of the calf and dam. This information can later be transferred to the field data sheet (Form 11). Do not try to remember them—this will only lead to guessing and incorrect records.

**4. Birth weights (optional):** Birth weights may be secured by different methods. A suggested method is the use of a set of dairy scales with a harness or sling straps to weigh the newborn calf. Estimating weights—large, medium, or small—will be of some value. Average birth weights for breed and sex of the calf will be used if birth weights are not obtainable. A high correlation has been found between birth weights and mature weights; however, precaution must be taken in relation to extremes. Small calves sometimes do not develop to a satisfactory size at maturity while calving problems may be experienced with calves that are too large.

**5. Weaning weight:** All calves are weighed just prior to weaning where practical. Recommended age limitations for taking weaning weights are from 160 to 250 days of age; however, it is suggested that weights be taken as close to 205 days as possible. Average daily gain growth rates from birth to the date on which the weights were taken shall be obtained and adjusted for age of dam and plane of nutrition. The adjusted growth rate and type score, graded at time of weighing, will be used to calculate an adjusted 205-day weight, 205-day weight

ratio, type score ratio and index value for each calf. For convenience, it is suggested that type scores be placed on calves as they leave the scales. Producers should handle cattle as gently as possible before weighing. Weights of calves can also be changed if they are held too long in holding lots before weighing.

6. **Type score:** A standard grading guide is used for the program, using grade designations of Prime, Choice, Good Standard, and Utility. Each grade is subdivided into a top, middle, and bottom third. In order to obtain average type scores, a numerical system for scoring animals has been adopted. Type scoring (grading) should be done by someone qualified to pass judgment in the field of cattle evaluation (often, this can be the breeder). Preweaning grades should be used as indicators. Post weaning grades (grades placed on cattle at one year or 18 months) will give a better indication of type for replacement animals going into the herd. The following grading guide is used:

## CONFORMATION SCORE DESIGNATION

CONFORMATION SCORE	DESCRIPTION OF BREEDING CATTLE	
PRIME	+ 17	Cattle eligible to receive these scores have no more than minor faults in any of the major items of conformation. Cattle in this category are basically correct in their skeletal and muscular structure, are outstanding in muscular development, and have optimum outside fat considering the manner in which they have been developed. Beef character in abundance describes cattle in this series. The top end of this series describes beef cattle of basically ideal conformation. Bulls in this series are strictly herd bull prospects from a conformation standpoint and females eligible for those scores possess the conformation desired for outstanding herd replacements.
	O 16	
	— 15	
CHOICE	+ 14	Cattle eligible to receive these scores have no more than moderate faults in their muscular and skeletal structure. Their muscular development is usually less than outstanding but is average to superior. Skeletal structure is basically sound. Cattle in this category should include a relatively high percentage of the animals in the better purebred herds. The top end of this series represents the lowest end of herd bull prospects and the top end of commercial bulls from a conformation standpoint. The top end of this series describes superior female replacements for purebred herds, the middle of this series describes good female replacements, while the bottom end describes the females that are no more than satisfactory as replacements in the purebred herds. The score of 14 describes good commercial bulls; and 12 describes satisfactory commercial bulls from a conformation standpoint. The top end of this series represents the practical top of commercial cattle. The lower end of this series includes a reasonably high percentage of the better commercial replacements.
	O 13	
	— 12	

CONFORMATION SCORE		DESCRIPTION OF BREEDING CATTLE
GOOD	+ 11	Cattle in this category may have moderate to severe faults in some items of skeletal and muscular structure. Muscular development is usually average to inferior. Females in this category should be sound enough to their skeletal structure to perform their function. A high percentage of the female replacements from average commercial herds would be in the middle and top scores of this series. The lowest score in this series describes poor female replacement for commercial replacements.
	0 10	
	- 9	
STANDARD	+ 8	Cattle in this category are usually decidedly lacking in beef character, may have serious structural defects and may be definitely lacking in muscling. Represented here are the extreme bottom end of beef cattle. Stockyard's candidates.
	0 7	
	- 6	
UTILITY	+ 5	Extremely thinly fleshed cattle. Represented here are the thinnest of dairy cattle. Stockyard's candidates.
	0 4	
	- 3	

## ADJUSTMENT FACTORS

Adjustment of performance data should be kept to a minimum and used only for major effects. Before replacing a producing cow with a younger one, the breeder should be reasonably certain that the younger animal is superior. If adjustment tends to over-correct, it may lead to disappointment. Corrections should be made only when the influence is real and large enough to over-balance random errors in measurement. Data from experienced breeders who have kept records will justify making an adjustment for the age of the dam.

Creep feeding is also considered in computing weight adjustment factors as is the use of nurse cows. Type score differences due to environment are not large enough to justify correcting.

**Age of Dam:** A very important variation in the growth rate of a calf can be associated with the differences in the age of the cows. The program considers cows to be mature between the ages of 5 and 10 years of age. The following adjustment factors are applied to dams not in this mature equivalent bracket:

### Age-of-Dam Adjustment Factors

2 years old.....	average daily gain $\times$ 1.15
3 years old.....	average daily gain $\times$ 1.10
4 years old.....	average daily gain $\times$ 1.05
5 thru 10 years old.....	no adjustment
11 years old and over.....	average daily gain $\times$ 1.05

**Creep Feeding:** To place all calves on an equal basis, so the growth rate of calves creep fed can be compared to calves not exposed to the creep, the factor of .97 is applied to creep-fed calves. Adjustments are applied to calves that have received any other feed except milk and grass. Calves must have been exposed to creep for at least 6 weeks before they are considered creep fed.

**Nurse Cows:** Calves receiving milk from cows other than their own mothers will be considered nurse fed, except calves adopted by foster mother cows of the same breed or type. They will be compared with other calves in the herd not on nurse cows. Total gain is decreased by .3 lbs. per day for the number of days that the calf was on a nurse cow with a maximum of 240 days.

**Sex:** No adjustment is made for sex of calf. The computed print-out lists all calves of the same sex together. The only exception is where bulls and steers are grouped together under a sire summary. A 5 percent difference is used in this case when actual average daily gain is calculated to determine the adjusted 205-day weight. Weight and type score ratios are used to determine group averages.

## TERMINOLOGY OF COMPUTATIONS

**Method of Listing:** Each breeder receives two listings of his records for both 205 days and 365 or 550 days. These listings include (1) a listing by sire groups (all cows mated to a sire are summarized together) and (2) a listing of potential replacements by bull calves and heifer calves. These replacement listings relist the same information on all bull calves as a group and all heifer calves as a group, listing them numerically in relation to their herd identification number. These listings permit the breeder to evaluate all potential replacements without sorting through all the data. Steer calves are not relisted.

**Average Daily Gain:** The average daily gain is actual with no adjustments. The formula involves the actual weight minus the birth weight divided by the number of days of age.

**Adjusted 205-Day Weight:** Since it would be impractical to obtain the weight of all calves exactly on 205 days, it is suggested to group them together as much as possible. Try to weigh all calves between 160 and 250 days of age. The formula for computing this measurement is:

$$\text{Adjusted 205 Day Wt.} = \frac{\text{Actual Wt.} - \text{Birth Wt.}}{\text{Age in Days}} \times 205 + \text{Bir. Wt.} \times \text{Adj. Factor}$$

**205-Day Weight Ratio:** Weight ratios within sex groups are calculated by dividing each individual's 205-day weight, adjusted for age of dam and nutrition plane, by the average of its group and expressed as

a percent of its sex group average. Weight ratios make it easy to rank individuals of each sex in making selections.

$$100 \times \frac{\text{205-Day Weight of Individual}}{\text{Average 205 Day weight of Sex Group}} = \text{205-Day Wt. Ratio}$$

Example:  $100 \times \frac{500}{424} = 118$

This means that this individual's 205-day weight is 18 percent above the average of this sex group of calves.

**Type Score Ratio:** The type score ratio is computed the same way as that of the weight ratio.

$$100 \times \frac{\text{Type Score of Individual}}{\text{Average Type Score of Sex Group}} = \text{Type Score Ratio}$$

Example:  $100 \times \frac{15}{13.4} = 112$  Type Score Ratio  
(or 12% above average)

**Calf Index:** The Calf Index combines the 205-day weight ratio and the type score ratio to give an over-all single figure combining quality and quantity.

$$\frac{3}{4} \times \text{205-Day Wt. Ratio} + \frac{1}{4} \text{ Type Score Ratio} = \text{Calf Index}$$

Example:  $(\frac{3}{4} \times 118) + (\frac{1}{4} \times 112) = 116.5$  Calf Index

## POST WEANING

Postweaning performance is the most important phase of an animal's life to measure. The calf is on its own and is not environmentally influenced by the dam; therefore, the post-weaning performance gives a more accurate indication of the individual's real growth potential.

The more interest a breeder develops in performance testing, the more detailed records he desires. Weight for age is a desired goal. Top quality and conformation in both cattle and carcass beef are also important goals.

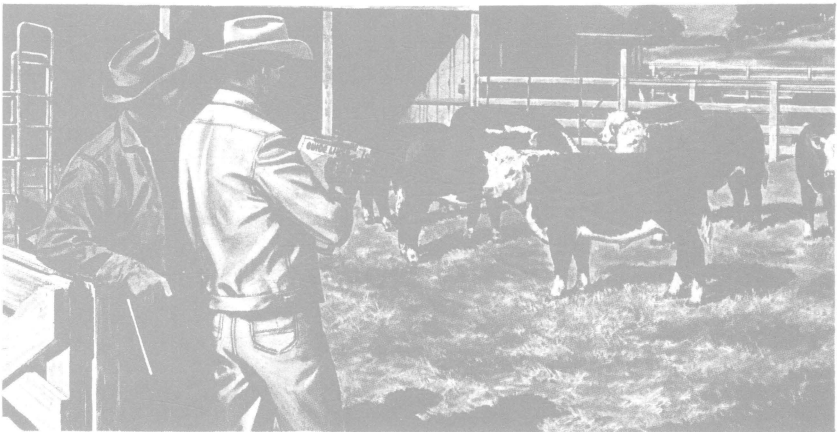
**Prelisting Sheet:** When the 205-day computed records are returned, prelisting sheets for each sex will accompany the records. These pre-listed sheets are to be used when the cattle are re-evaluated for post weaning (365 days or 550 days). Breeders should indicate at which age they want the records computed, 365 days or 550 days of age. Electronic data processing will adjust the weights to either of these age constants.

**365-Day Evaluation:** The postweaning period should start on the date weaning weights are obtained, (i.e., actual weaning weight is used as initial weight on test). Research results show that the age-of-dam effects on 365-day weight are of about the same magnitude as age-of-dam effects at weaning. For this reason, it is desirable to add postweaning gains in a 160-day postweaning period to the weaning weight, adjusted for age of dam, to arrive at the adjusted 365-day weight. The following formula is used for computing the adjusted 365-day weight:

$$\text{Adj. 365-day wt.} = \frac{\text{actual final wt.} - \text{actual wn. wt.}}{\text{number days between weights}} \times 160 \\ + \text{adj. 205-day wn. wt.}$$

The period between weaning and final weight should be at least 160 days and final weight should not be taken at less than 350 days of age. It is recommended that the number of days between weaning and final weight be the same for all animals of the same sex in a herd. By use of this procedure, it is necessary to obtain only weaning weight and yearling weight on each animal. Also, all periods in an animal's life are accounted for, i.e., no "loafing" periods.

**365 Days or 550 Days of Age:** The procedure of using adjusted 365-day weights as a measure of yearling weight will apply primarily to herds that develop bulls on a rather high level of concentrate feeding starting at weaning time. For herds that prefer to develop bulls more slowly, and with the lower level of feeding more generally practical and applicable for growing out potential replacement heifers, a long yearling weight is suggested as an alternative to adjusted 365-day weights. This is accomplished by measuring growth rate in a period of about 345 days postweaning with weaning weight and date being





initial weight and date of postweaning period. Breeders should indicate which feed code and animal experienced:

- 1 = Full Feed
- 2 = Limited Feed
- 3 = Pasture Equivalent

**550-Day Evaluation:** Adjusted long yearling weight (550 days) for each sex will be computed in the same manner as adjusted 365-day weight. Thus, the appropriate formula for computing adjusted 550-day weight would be:

$$\text{Adj. 550-day wt.} = \frac{\text{actual final weight} - \text{actual wn. wt.}}{\text{number days between weights}} \times 345 + \text{adj. 205-day wn. wt.}$$

Yearling weight and type score ratios, final index of individual animals and sire, dam, and group averages are reported and should be used in comparisons.

## **INDIVIDUAL COW RECORD**

(Produce of Dam)

In addition to preweaning and postweaning information provided on a calf-crop basis, the program will also provide a lifetime accumulated cow-production record (produce of dam) for each cow in the herd printed-out on a separate sheet.

This brings each individual cow record up to date each year. Each succeeding year, the cow's current production is added to her past performance, re-totaled and averaged.

The breeder need only tear out the old cow report sheet and replace with the new sheet behind the permanent cow card in the notebook provided.

EDP calculates a summation for each column; then, computes an average for each of these columns, taking into consideration the number of entries listed in this column. If data are not available for a certain year (or only partial data), the machines are programmed to average only the available data. If no records are available, or the cow is open for a given year, the program will list it as such.

In addition to listing the production each year, the program will also relist all averages by sex groups.

## **MOST PROBABLE PRODUCING ABILITY**

(MPPA)

MPPA is calculated from one or more records on the same cow to predict the future level of performance. This value is based on the hereditary and permanent environmental factors affecting individual

performance Cows with different ages and numbers of records can be compared with respect to their probable producing ability by using a common base This base is established from a knowledge of how repeatable the consecutive records are for a given trait.

The MPPA, calculated from the previous records of performance for each cow, can be used to accurately identify the superior performing cows within the herd.

Procedure of computing MPPA is as follows where  $r$  = repeatability of a single record ( .35),  $R$  = repeatability for multiple records, and  $n$  = number of records:

**Model**

Cow A = Index of 114 (single record)

Cow B = Index of 110 (four records)

103

107

112

$$1) \text{ MPPA for Cow A} = \text{Herd Ave.} + r(\text{Cow A Ave.} - \text{Herd Ave})$$

$$= 100 + .35 (114 - 100)$$

$$= 104.9$$

$$2) \text{ MPPA for Cow B} = \text{Herd Ave.} + R(\text{Cow B Ave.} - \text{Herd Ave.})$$

$$= 100 + .68 (108 - 100)$$

$$= 105.4$$

Note:  $R = nr$

$$\frac{1 + (n-1) r}{1 + (4-1) .35} = \frac{4 (.35)}{1 + (4-1) .35} = .68 \text{ where there are 4 records}$$

### CARCASS EVALUATION

Carcass merit is influenced by two general factors. They are the edible portion of the carcass in the high-value regions and the indicators of quality and palatability of this edible portion.

Carcass evaluation in breeding and management programs is subject to variability dictated by diversification and changing market demands

An optional phase of the Production Testing Program is using measurement techniques as indicators of carcass merit:

Trait Considered	Description
Number of progeny	6 minimum—all steers within one year.
Feed Test	Fed and managed under uniform conditions. 12 to 16 months of age at slaughter. No weight consideration.
Carcass Weight	Hot carcass weight (at time of slaughter)
L. D. Area	Tracing—12/13 rib or determined by grader.

Trait Considered	Description
Fat Thickness	One measurement at 12th rib (¾ length of L.D. from chine).
Yield of Cuts	USDA cutability standards
Quality	USDA grade, conformation, quality components. Shear (optional)
Percent of Kidney, Pelvic and Heart Fat	Estimated

## CARRYING OUT CARCASS EVALUATION PROGRAM

The success of a carcass evaluation program depends on considering the following items: (1) identification, (2) location of packer, (3) packer cooperation, (4) actual data collection, (5) transmittal of collected data to proper authorities, and (6) payment for data collection.

A method of obtaining data that has wide applicability is the use of the personnel of the Federal Grading Service in collecting data. Steps to follow in procuring this service are:

1. Arrange to have cattle slaughtered in a federally inspected packing plant or a nonfederally inspected plant approved to receive the Federal Meat Grading Service.
2. Obtain packer permission to have carcasses evaluated by USDA meat grader.
3. Contact USDA meat grading office to make arrangements for Carcass Evaluation Service and to obtain tags for identification of cattle.

Direct requests for the Beef Carcass Evaluation Service or additional information concerning it to:

Meat Grading Branch, Livestock Division,  
 Consumer and Marketing Service,  
 U.S. Department of Agriculture,  
 Room 23, Livestock Exchange Building,  
 Cleveland, Ohio, 44102.

Services of qualified personnel of the Cooperative Extension Service are also available for carcass evaluation on a limited basis. Contact W. W. Wharton for details.

## USE OF RECORDS

Records compiled in this program are kept confidential and returned to the herd owner for use in his breeding program. He should use them to help make decisions in culling, selecting replacements, comparing progeny, planning breeding programs, improving specific abilities, merchandising, etc. Remember, a progeny test is worthless unless it's results lead to action. For example, two or more sires must

be progeny tested with the poorer ones culled if the testing is to lead to genetic progress

The best estimate of the future performance of an animal is his past performance record; therefore, the breeder should use the records to cull low-producing animals and select replacements. Comparison of the breeding value of sires is legitimate only when each bull has sired a reasonable number of calves and all bulls have had an equal opportunity to be mated to cows which are similar in size, age, etc.

## **SUPPLIES PROVIDED**

The Ohio Beef Cattle Production Testing Program provides appropriate forms for the breeder to record the information that is needed for calculations as well as to compile accumulated data. Complete instructions for filling out the forms are on the reverse side of each form sheet.

A specially designed notebook is provided to each breeder at the time of enrollment. It should be used as a permanent file for all Production Testing records. Additional notebooks may be purchased at cost as the need arises.

## **ASSISTANCE**

Herd owners are assisted in setting up production testing programs for their herds by the Extension specialist in animal science, county and area Extension workers. It is the responsibility of the herd owner, however, to secure and record the needed information. This program is not a contest and is conducted only for the benefit of the herd owner. He should send his completed record forms to the Extension specialist in animal science for calculation. This information is kept strictly confidential. When requested, advice will always be available on breeding, management, and selection problems connected with the beef cattle enterprise.

## **INQUIRY**

Direct all inquiries in relation to the Production Testing of Beef Cattle in Ohio to your county Extension agent, area livestock agent, or:

W. W. Wharton  
Extension Specialist, Animal Science  
The Ohio State University  
2029 Fyffe Road  
Columbus, Ohio 43210  
Telephone: 293-6791

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