

On-The-Farm Performance Testing

Missouri Beef Cattle Improvement Programs



John W. Massey
Livestock Improvement Specialist
Animal Science Department

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CONTENTS

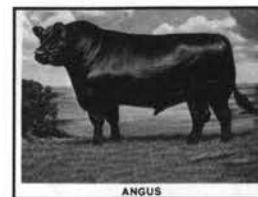
On-The-Farm Beef Performance Testing	1
Plan A: Measurement of Weaning Weight	1
Procedure for Calculating 205-day Adjusted Weaning Weight	3
Feeder Grade	4
Frame Scores	4
Cow Production Records	5
Plan B: Measurement of Average Daily Gain	5
How to Use Heritability Estimates	6
Keeping the Records	6
Birth Weights and Age of Dam Adjustment Factors for 205-day Weights	7
Conformation Scores for Plan A	7
Present Standards for Feeder Cattle Grades, August 1, 1979	8
Present Specifications for Official United States Standards for Grades of Thrifty Feeder Cattle (Frame Size)	9
Proposed Specifications for Official United States Standards for Grades of Thrifty Feeder Cattle (Muscling)	9
Specifications for Official U.S. Standards for Grades of Unthrifty Feeder Cattle	9
Heritability Estimates for Economic Traits in Beef Cattle	10
Adjusting Weaning Heights for Determining Frame Score	10
Adjusting Postweaning Heights for Determining Frame Score	11
Adjusting Heights for Determining Frame Score	11
On-The-Farm Beef Cattle Performance Testing Analyses of Field Data	12

APPENDIX

ASE Form No. 1 P.R. (Herd Enrollment Form)	14
ASE Form No. 2 P.R. (Plan A Hand Calculation Record Form)	15
ASE Form No. 5 P.R. (Computer Data Form)	16
ASE Form No. 4 P.R. (Beef Cow Production Record)	17-18
ASE Beef Cattle Computer Data Coding Instructions	19-20
Postweaning Heifer Height Adjustment Table	21
Nomograph Figuring Calf Weaning Weight	22
Average Daily Gain for 205-Day Adjusted Weights	23
Birth Weights and Age of Dam Adjustments	24-25
Heifer Frame Score Table	26
Bull Frame Score Table	27
Chart for Calculating Days of Age	28
Sample Computer Printout for 205-Day Weight and Sire Weaning Summary	29
Sample Computer Printout for 365-Day Weight and Sire Postweaning Summary	30

Editor:
Marianne Kurth.

Photographs by Don Esslinger
and Ann Carmody.



On-The-Farm Beef Performance Testing

The Missouri Beef Cattle Performance Testing Program is designed to help improve Missouri beef cattle in both quality and growth through breeding and selection.

The phases of this program are available to beef cattle breeders who may use them to check each animal's performance from birth until it is added to a herd or slaughtered. The program is flexible and will be helpful to both purebred and commercial cattlemen in their selection and breeding programs. It is most useful in evaluating individual animals within a herd. It is not designed for the purpose of comparing one herd with another herd or one breed with another breed, because the environmental conditions will vary from herd to herd. However, in cooperation with many of the respective breed associations, sire evaluation can and must be made across herds. Missouri is presently in the process of initiating a sire evaluation program in conjunction with the postweaning central testing station.

There are seven major phases of the program that should receive emphasis. The first two are discussed in this publication. Information on three through seven are provided through local area specialists. The seven phases include:

1. **Plan A** which ends at 205 days when the calf is weaned and scored. (Page 1)
2. **Plan B** which includes the superior bull calves full-fed for a minimum of 140 to 160 days postweaning, or both bulls and heifers grown for 365 days after the pre-weaning phase. (Page 5)
3. **Central beef cattle testing stations** operated by the University of Missouri or privately owned stations.
4. **Use of ultrasonics and potassium-40** evaluation in livestock improvement.
5. **State and area performance-tested bull sales.** (Sponsored by Missouri Beef Cattle Improvement Association).

6. **Progeny testing via carcass information.** (In cooperation with United States Department of Agriculture).
7. **Sire evaluation program.** (Contact respective breed association.)

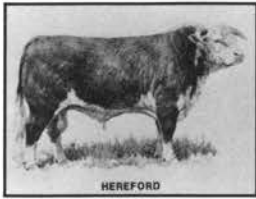
Records of performance programs are useful primarily to provide a basis for comparing cattle within a herd, managed the same, and within sex. Records are useful only secondarily for estimating differences between herds or between groups treated differently within a herd. This is because large environmental differences caused by location, management, and nutrition are likely to exist between herds or different management groups within a herd. It is not possible to adjust accurately for these differences. This is important because differences that are due to environment are not transmitted from parents to their offspring.

Plan A: Measurement of Weaning Weight

The purpose of this phase of the program is to evaluate calving interval (fertility) and mothering ability of dam (milk production), pre-weaning growth rate, and quality by USDA feeder standards and potential mature frame. *A.S.E. Form No. 2 (P.R. 79)* page 15 is used for hand computation. *A.S.E. Form No. 5 P.R.*, page 16 is used for computer entry for both Plan A and Plan B program.

The procedure for obtaining performance data is:

1. **Appointment:** Contact the local University of Missouri Extension Center and set up an appointment with the area livestock specialist to discuss the program.
2. **Enrollment:** Enroll all of the cows in your herd. (*A.S.E. Form No. 1 P.R. (Rev. 79)*, page 14).



3. **Identification of cows:** Identify each cow in the herd—tattoo, horn brand, neck chain, plastic neck tag, brand numbers, plastic ear tags, etc. If a tattoo is used in the ear, an ear tag or neck chain will make identification much easier.
4. **Birth date of calves:** The birth date of each calf must be accurately recorded. It may be handier to record the birth dates in a herd notebook during the calving season and then transfer them to the permanent record.
5. **Identification of calves:** Each calf must be identified at calving time with a tattoo, ear tag, or other positive identification and recorded by dam.
6. **Birth weight:** There are two possible procedures. Each calf may be weighed at birth, or the standard birth weight for the breed may be used. The latter is used most commonly. Standard birth weights for breeds are listed on pages 24 and 25.
7. **Adjusted weaning weights:** Weaning weights will be adjusted to 205 days within sex and management group. The 205-day weaning weights will be adjusted for age of dam.



Birth weight.

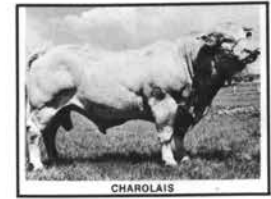


Neck chain, hip brand and horn brand.



Ear tag and tattoo.

*Note: A.S.E. Beef Cattle
Computer Data Coding
instructions for completing A.S.E.
Form No. 5 P.R. 2/1983 is found
on pages 19-20.*



Procedure for Calculating 205-Day Adjusted Weaning Weight

Calves are to be weighed between 160 and 250 days of age. The nomograph on page 22 may be used to determine the 205-day weaning weight when calves are weighed in this age range.

The procedure for calculating 205-day adjusted weaning weight is on the computer at the University of Missouri-Columbia. This program will provide a ranking of calves at 205-days by ratio plus a sire weaning summary. It will also retain data for *Estimated Breeding Value* and *Most Probable Producing Ability* for fee on request. This is most useful after 3 or more years of total herd records.

To determine the age of the calf, use *Chart for Calculating Days of Age* on page 28. The following formula may be used to adjust the weaning weights of calves that are not weighed within the range of the age limits.

Formula: W.W.—Weaning Weight
B.W.—Birth Weight.

$$\left(\frac{\text{Actual W.W.} - \text{B.W.}}{\text{Actual Age at Weaning}} \right) \times 205 \text{ days} + \text{B.W.} = \text{205-day-wt.}$$

Example: A calf 180 days of age weighs 430 lbs with a birth weight of 70 lbs.

$$\frac{430 \text{ lbs} - 70 \text{ lbs}}{180} \times 205 \text{ days} + 70 \text{ lbs} = 480 \text{ lbs 205-day-wt.}$$

A dam's age and sex of the calf influence its weaning weight. Weaning weights will be adjusted for age of dam within sex by using the data found on pages 24 and 25.

For the purpose of adjusting the 205-day-weight of calves for age of dam, the following schedule applies for most breeds. Also see Appendix.

Age Range of Dam at Calving	Age of Dam	Age in Days
1 yr 9 mos to 2 yrs 9 mos	2-year-old	639-1004
2 yrs 9 mos to 3 yrs 9 mos	3-year-old	1005-1369
3 yrs 9 mos to 4 yrs 9 mos	4-year-old	1370-1734
4 yrs 9 mos to 10 yrs 9 mos	5 to 10-yr	1735-3925
10 yrs 9 mos and older	11-yr-old & over	3926-over



Calculating adjusted weaning weight.

Further information on *Age of Dam Adjustment Factor Within Breed for 205 Days* is to be found on page 7. The 205-day weight is adjusted by adding the specified number of pounds for the dam age by breed or multiplying by the factor as specified.

Example: The 205-day weight of a calf from a 2-year-old dam is 480 lbs. Obtain the adjusted 205-day-weight for age of dam by multiplying 480 lbs x 15 percent = 72 lbs. Then 480 lbs + 72 lbs = 552 lbs, the adjusted 205-day weight for age of dam within sex.

On page 23 is a chart for obtaining the adjusted average daily gain on 205-day adjusted weights, ranging from 300 lbs to 795 lbs. Weights above or below this range may be figured by applying the following example.

Example:

$$\frac{\text{Adjusted 205-day-wt of 552 lbs} - \text{B.W. (70 lbs)}}{205\text{-days}} = 2.35 \text{ Adj ADG}$$

205-days



Calves that are creep-fed or calves that are on nurse cows must be listed and compared separately. In most areas of the state, the average adjustment for creep-fed calves would be 0.3 pound expected additional gain for each day on creep for bull calves. With steers and heifers it is 0.2 and 0.1, respectively.

Some associations compare produce of dam and actual weaning weight by adjusting to steer equivalent. If this is the case, the bull calves are adjusted down 5 percent and the heifers up 5 percent.

Inbreeding will have minor effect on weaning weight, but if one wishes to adjust for within herd comparison add 0.7 pound to adjusted weaning weight for each one percent of inbreeding.

The weight ratio is calculated by obtaining the average adjusted 205-day weaning weight within sire, sex, and management group for the herd, using column 10 of *Plan A Calf Crop Record*, and dividing the individual calf's weight by the herd average for its sex (page 15, col. 12). If 10 or more calves within sex are sired by a given sire, the average weaning weight of his progeny may be used for "group average." All male calves are included in the male herd average. If they are castrated and healed at the time the weaning weight is taken, give them a 5 percent upward adjustment for weight to bring them to a bull equivalent.

Example: The adjusted 205-day average weaning weight for bull calves is 450 pounds (total and average of column 10, *Plan A* page 15) and bull calf No. 1's adjusted 205-day weaning weight is 600 pounds.

$600 \text{ lbs} \div 450 \text{ lbs} = 133.3 \text{ wt ratio for Calf No. 1}$

Feeder Grade

All calves in purebred herds should be graded at weaning by the extension specialist or a three-man committee according to the 1966 *USDA Feeder Grade Standards*. These grades are discussed on pages 7 - 8. The present (1979) *Standards for Feeder Cattle Grades* are included in this publication on pages 9.

In commercial herds major attention for heifer selection should be given to adjusted weaning weight and evaluation of sire or herd group for conformation.

The feeder grade ratio is figured the same as the weight ratio within each sex; that is, by obtaining the average feeder grade score within sex and giving the individual calf's feeder grade score by the herd average for its sex.

Example: The average feeder grade score of all bull calves is 12 and bull calf No. 1's score is 14.

$\frac{14}{12} = 116.7$ Feeder grade ratio for Calf No. 1



Grading calves.

Frame Scores

Frame scores are based on the average height at 7 months for the British breeds using 38 inches as average (frame 3), plus or minus 2 inches for each frame.

1. The Hereford, Polled Hereford, Shorthorn, and Angus range from one to seven, with one the smallest and seven the largest. Three is average for the breed. The Charolais and Simmental range three through seven or above with five the average for the breed.
2. The newer breeds in this country, at least the higher percentage, will probably fit the Charolais range. At the present time with half bloods, and three-quarter bloods, we will see all frames represented.



3. The Brahman, Santa Gertrudis, and Brangus will fall in the Charolais classification also.
4. Galloway, Red Angus, and Murray Grey will be close to the Hereford and Angus frames.

See pages 26 and 27 for frame score types and *Frame Score Tables* for bulls and heifers. Frame score adjustments for heifers postweaning are shown on page 21.

Actual heights and adjusted heights are recorded in column 13 of the Plan A record form. The frame score is based on adjusted height at 205 days (7 mos) and is recorded in the upper half of column 15 of the Plan A (P.R. 2) record on page 15.

Cow Production Records

In order to compare cows within the herd for the weaning weight of their progeny when they have produced unequal numbers of bulls, steers, and heifers in different seasons, it is necessary to add and average the progeny's weaning weight ratios for each cow. If your records have been forwarded to the central computer in Columbia, you may get a printout of each cow in the herd, listing her Estimated Breeding Value (EBV) or Most Probable Producing Ability (MPPA) for a small fee.

A.H.E. Form No. 4 P.R., Cow Production Record, has been designed on heavy card stock for use as a permanent record on each cow. This form is illustrated on pages 17-18 and may be obtained at the local extension office for printing cost.

Example: To compare Cow A with Cow B:

Age	Sex of Calf	Weaning Wt. Ratio within Sex	Age	Sex of Calf	Weaning Wt. Ratio within Sex
2 years	B	110	4 years	H	105
3 years	S	114	6 years	H	115
4 years	H	111	6 years	B	110
5 years	B	109			
Total		444	Total		330
Av. Wt. Ratio		111	Av. Wt. Ratio		110

Formula: Breeding Value or Most Probable Producing Ability

$$\text{MPPA} = \bar{H} \text{erd av.} + \frac{nr}{1 + (n-1)r} \times (\bar{C} \text{ow av. ratio} - \bar{H} \text{erd av. ratio})$$

- n = number of records
 r = repeatability of trait—W.W., 0.4;
 Conformation, 0.3
 \bar{H} = Herd average which is 100
 \bar{C} = Mean ratio of weight or conformation of individual

MPPA for Cow A	MPPA For Cow B
$100 + \frac{(4)(.4)}{1 + (4-1).4} \times 111 - 100$	$100 + \frac{(3)(.4)}{1 + (3-1).4} \times 110 - 100$
$100 + \frac{1.6}{2.2} \times 11 = 108.00$	$100 + \frac{1.2}{1.8} \times 10 = 106.66$

Plan B.: Measurement of Average Daily Gain

The purpose of this phase of the program is to provide a measurement of average daily gain from 160-days postweaning to 365 days of age. This program also includes adjusted 365-day weight, ratio and frame.

The 365-day weight must be taken between 350 and 440 days of age. The 365-day weight and ratio will be calculated with the use of an adjustment factor of age of dam. The following formulas are used:

- a. Adjusted 205-day weight—weaning weight taken between 160 and 250 days of age:

$$\frac{\text{Actual weaning weight} - \text{birth weight}}{\text{Days of age}} = \text{Prewaning A.D.G.}$$

$$\text{A.D.G.} \times 205 \text{ days} + \text{birth weight} + \text{age of dam adjustment}$$
- b. Adjusted 365-day weight—final weight taken between 350 and 440 days of age:

$$\frac{\text{Final weight} - \text{Actual weaning weight}}{\text{Days from weaning wt. to final wt.}} = \text{Postweaning A.D.G.}$$

$$\text{Postweaning A.D.G.} \times 160 \text{ days} + \text{Adjusted 205 day weight.}$$
- c. Adjusted daily gain for life:

$$\frac{\text{Adjusted 365-day weight} - \text{birth weight}}{365 \text{ days}}$$
- d. To determine yearling weight ratio for all contemporaries, use both weaning and postweaning weights in the following formula:

$$\frac{\text{Calf's Adjusted 205-day Wt.} + \text{Calf's 160-day Postweaning gain}}{\text{Herd Av. Adj. 205-day weights} + \text{Group Av. 160-day P.W. gain}} = 365 \text{ day wt. Ratio}$$
- e. Frame is determined by adjusting the actual height at weaning and yearling, using .033 inch x days of age from 160 to 365 days; and .025 inch x days of age from 365 to 440 days.



Heifers may be figured on the same basis as bulls or can be computed on a 450 adjusted age basis.

When yearling records are mailed in on A.S.E. Form No. 5 P.R., the calf should be identified by the same number as is shown on the weaning printout. Another suggestion is to send in the yearling information on a copy of the original weaning information. This will save time when putting the record into the computer.

How to Use Heritability Estimates

Heritability estimates can be used to estimate the progress and set-backs in different traits that can be expected from different matings. For example, a particular mating may bring improvement in rate of gain if the parents are superior. If they are inferior, however, they may cause a decline in rate of gain in their offspring.

To illustrate how to figure progress from a particular mating, assume that from a herd in which the average daily gain in the feedlot is 2.40 pounds per day, bulls which gained 2.80 pounds per day were kept for breeding purposes.

How much gain in genetic improvement would be expected in the progeny of these selected parents?

To answer this question, first calculate just how superior these parents were to the average in the herd. Then something should be known about heritability in order to estimate for rate of gain in the feedlot.

The superiority of the breeding animals may be calculated as follows:

$$\begin{aligned} \text{Superiority of Dams} &= 2.80 - 2.40 \text{ or } 0.40 \text{ lb/day} \\ \text{Superiority of Sires} &= 3.20 - 2.40 \text{ or } 0.80 \text{ lb/day} \\ \text{Superiority of Parents} &= \frac{0.40 + 0.80}{2} = 0.60 \text{ lb/day} \end{aligned}$$

The next question is how much of this 0.60 pound advantage of the parents is transmitted to the offspring. The heritability of rate of gain of beef cattle in the feedlot is about 55 percent. (See page 10).

Expected Genetic Gain = 0.60 x 55% or 0.33 lb/day.

The advantage of the parents (0.60 lb) times the heritability estimate (55 percent) gives the genetic gain (0.33 lb) expected in the offspring per day.

The herd average was 2.40 pounds feedlot gain per day. With all other things being equal, we would expect the offspring of the selected parents mentioned to gain an average of:

$$2.40 + 0.33 = 2.73 \text{ pounds per day.}$$

This is the average of the herd from which the parents were selected plus the genetic advantage transmitted by the selected parents.



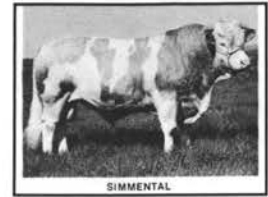
Heritability estimates.

Keeping the Records

Sample copies of forms to use in keeping the records on your herd are in the appendix. These are available from the extension livestock specialist in your area. They are:

- A.S.E. Form No. 1 P.R. (Rev. 79)—Missouri Beef Cattle Performance Testing Herd Enrollment.
- A.S.E. Form No. 2 P.R. (Rev. 79)—Plan A Calf Record (Pre-weaning Phase).
- A.S.E. Form No. 4 P.R.—Beef Cow Production Record.
- A.S.E. Form No. 5 P.R. (Apr. 1983)—Beef Cattle Data Computer Record.

Summary forms are designed for use by the area livestock specialist for reporting to the State Animal Science Extension Office the



herds enrolled in the area. *Note: Only herd records that have bulls for tested bulls sales need to comply with dates on the form. Commercial and other purebred herds can be submitted together when total calf crop is analyzed. However, the annual deadline is May 30.*

Other illustrations, charts, and tables are available to aid in record keeping. *Science and Technology Guides* published by the University of Missouri-Columbia which relate to the Missouri Beef Cattle Performance Testing Program are:

2909 Predicting Inheritance of Breeding Herds
2005 Value of Beef Performance Records

These are available by writing to:
 Extension Publications
 222 South Fifth
 University of Missouri
 Columbia, Missouri 65211
 or by contacting your local area livestock specialist.

Birth Weights and Age of Dam Adjustment Factors for 205-Day Weights

For breeds not listed on pages 24-25, the Beef Improvement Federation regulations apply. They are: Birth weight of 70 pounds for both bulls and heifers; additive factors of 60, 40, 20, 0 and 20 pounds for ages 2, 3, 4, 5-10 and over 11, respectively, with 10 percent less for females, 54, 36, 18, 0, and 18 pounds, respectively for age of dam.

The age of dam at calving is determined according to the following schedule:

Age Range of Dam at Calving	Use Adjustment Factor for:
1 yr 9 mos to 2 yrs 9 mos	2-year-old
2 yrs 9 mos to 3 yrs 9 mos	3-year-old
3 yrs 9 mos to 4 yrs 9 mos	4-year-old
4 yrs 9 mos to 10 yrs 9 mos	Mature cow—no adjustment
10 yrs 9 mos and older	11-year-old & over

Other Conditions Which Alter the Age of Dam Adjustment:

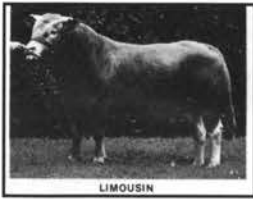
1. A cow nursing twin calves is figured as a 2-year-old dam for that lactation period regardless of her age.
2. If a cow has twin calves and only one nurses, the nursing calf will receive the regular adjustment for the age of its dam.
3. Calves which nurse dairy animals will receive no age of dam adjustment.
4. Calves weaned early, before 120 days of age, and placed on self-feeder will receive no age of dam adjustment.

Conformation Scores for Plan A

The Missouri program follows the 1966 standards because they distinguish clearly within the present Feeder Grade System. Records are stored in the MU Computer Data Bank using the 1966 Grading Standards.

1. High-prime, 17; Prime, 16; Low-prime, 15.

Fancy feeder cattle are now classified as Prime under the new grading system. The cattle which possess minimum qualifications for the Fancy grade are extremely thrifty and very large for their age, breed considered. They are very thick-muscled throughout. They are wide throughout the chest floor with well-sprung ribs, wide and thick through the back, crop, and loin. The rounds are thick, plump, and deep in the twist. They have a straight top and bottom line and are deep in the fore and rear flanks. As to skeletal structure, the animal will stand on strong, straight, moderately short legs, on the corners. The head is usually short and wide and the neck is usually short and thick. They have large rugged frames with moderately large but refined bones. They have a high degree of symmetry and smoothness throughout, and usually show no evidence of nonbeef breeding. Only steers and heifers are eligible for the Fancy feeder grade or Prime logical slaughter potential.



2. High-choice, 14; Choice, 13; Low-choice, 12.

The Choice feeder cattle are very thrifty and are large for their age, breed considered. They are moderately thick-muscled throughout, showing moderate width through the chest, crop, back, and loin with a moderate spring of rib. The rounds are moderately thick and plump and the twist is moderately deep. They will show a straight top and bottom line with moderate depth in the fore and rear flank. Choice cattle should stand on slightly short, moderately straight, strong bone with moderate width between their legs. They have a moderate degree of symmetry and smoothness throughout, usually showing a very high proportion of beef breeding and will have a slaughter potential of Choice.

3. High-good, 11; Good, 10; Low-good, 9.

Good grade feeder cattle which possess typical minimum qualifications for the Good grade are thrifty but may be slightly small for their age, breed considered. They are slightly thick-muscled throughout, slightly narrow through the chest and spring of rib. They are slightly narrow through the crop, back, and loin, with slightly sunken muscling in the rump between the pins and hips, but showing slightly prominent muscling in the shoulder and round. They usually have moderately straight top lines but may lack depth in the rear flank. The legs tend to be slightly long or set slightly wide apart, and frequently are crooked, showing some coarseness in skeletal structure. However, they may have slightly large frames showing fineness in the skeletal bone structure of the legs. They are slightly irregular and rough in appearance and usually are predominant beef breeding. They have a logical slaughter grade potential of Good.

4. High-medium, 8; Medium, 7; Low-medium, 6.

Medium feeder cattle which possess typical minimum qualifications for the Medium grade are only moderately thrifty and are moderately small for their age, breed considered. They are slightly thin-muscled and are angular, rough, and irregular in appearance throughout. They tend to be narrow through the chest and over the crops, back, loin, and rump. The hip and shoulder joints are prominent, showing narrowness through the rump and shallowness in the twist.

They usually predominantly show some nonbeef breeding and have a logical slaughter potential of Standard or Commercial, depending upon their maturity.

5. High-common, 5; Common, 4; Low-common, 3.

The Common feeder cattle which possess typical minimum qualifications for the Common grade are slightly unthrifty and are small for their age, breed considered. They are thinly muscled throughout and are very angular, rough, and irregular in appearance. They have a very small frame and their bones are very fine or are large and coarse. They usually have very little beef breeding or slaughter potential.

6. Inferior, 2 to 0.

Inferior are those described for common but are unthrifty, or are inferior to those described for common grade.

Present Standards for Feeder Cattle Grades, August 1, 1979

This is a listing of the 53.208 Specifications for official United States standards for grades of feeder cattle—steers, heifers, and cows. Since stags and bulls are used as feeders only infrequently, standards for grades of these classes are not included herein.



Present Specifications for Official United States Standards for Grades of Thrifty Feeder Cattle (Frame Size)

Large Frame (L)

Feeder cattle which possess typical minimum qualifications for this grade have large frames, are thrifty, and are tall and long bodied for their age. They would be expected to excel in growth rate but *steers and heifers* would not be expected to produce *U.S. Choice beef carcasses* until their live weights exceeded about 1200 and 1050 pounds, respectively.

Medium Frame (M)

Feeder cattle which possess typical minimum qualifications for this grade have slightly large frames, are thrifty, and are slightly tall and slightly long bodied for their age. They would be expected to have an average growth rate. Steers and heifers would be expected to produce U.S. Choice beef carcasses at live weights of 1000 to 1200 pounds and 850 and 1050 pounds, respectively.

Small Frame (S)

Feeder cattle included in this grade have small frames, are thrifty, and are shorter bodied and not as tall as specified as the minimum for the Medium Frame grade. They would be expected to have a relatively slow growth rate. Steers and heifers would be expected to produce U.S. Choice grade carcasses at live weights of less than 1000 pounds and 850 pounds, respectively.

Proposed Specifications for Official United States Standard for Grades of Thrifty Feeder Cattle (Muscling)

No. 1

Feeder cattle with a slightly thin covering of fat which possess typical minimum qualifications for this grade are thrifty and are very thick throughout. They are very wide through the

chest and through the middle part of the rounds. The forearm and gaskin is very thick and full and the back and loin appears full and well rounded. The legs are set very wide apart both front and rear. They usually show no evidence of non-beef breeding. Cattle with a higher degree of thickness—extremely thick—are also recognized in this grade. “Double-muscled” cattle are not eligible for this grade.

No. 2

Feeder cattle with a slightly thin covering of fat which possess typical minimum qualifications for this grade are thrifty and are slightly thick throughout. They are slightly wide through the chest and through the middle of the round. The forearm and gaskin is slightly thick and full and the back and loin has a rounded appearance. The legs are set slightly wide apart, both front and rear, and show a very high proportion of beef breeding. Cattle with two higher degrees of thickness—moderately thick and thick—are also recognized in this grade.

No. 3

Feeder cattle included in this grade include thrifty animals which are inferior in their thickness to the minimum requirements specified for the No. 2 grade.

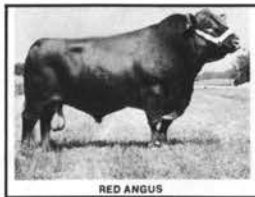
Specifications for Official United States Standards For Grades of Unthrifty Feeder Cattle

Inferior

This grade includes those feeder cattle which are unthrifty because of *such factors as mismanagement, disease, parasitism, or lack of feed, and those that are “double-muscled.”* Cattle in this grade may have any combination of muscling and frame size.

Relationship of Extension Grade and Present Feeder Cattle Muscle Score

The computer automatically gives a 1 muscle score to animals which grade 12 or better.



Feeder Grade of 12 or better	Muscle score 1
Feeder Grade 8 through 11	Muscle score 2
Grades lower than 8	Muscle score 3

Heritability Estimates for Economic Traits in Beef Cattle

Trait	Percent Heritable
Fertility	10
Birth weight	40
Weaning weight	30
Cow maternal ability	40
Feedlot gain	55
Pasture gain	30
Efficiency of gain in feedlot	40
Yearling weight (365-day)	60
Height at shoulder	55
Height at hip	45
Weaning	30
Slaughter	40
Carcass Traits:	
Carcass grade	50
Dressing percent	45
Rib eye area	70
Fat thickness	45
Tenderness	60
Retail product, percent	30
Retail product, pounds	60

Selection

Selection is the only tool a breeder has with which to change the genetic potential of his herd.

Objectively evaluate differences within the herd and mate the best to the best based on record. Your progress will depend on the superiority of selected parents, heritability of trait, generation interval, and number of traits selected. (See MU Guide 2909, *Predicting Inheritance of Breeding Herds*.)

$$\text{Progress} = \frac{\text{Selection Differential}^* \times \text{Heritability of Trait}}{\text{Heritability of Trait}}$$

*Selection differential is the superiority of selected parents over the population or herd from which they come.



Heritability estimates.

Adjusting Weaning Heights for Determining Frame Score

Plan A—Weaning Heights

The sex adjustment factors for heights at weaning are:

Bulls, .03 Heifers, .025

Age of dam adjustment factors for heights at weaning are:

British Breeds

Age of Dam	Males	Heifers
2 and 13 up	1.02	1.02
3 and 12	1.015	1.015
4 and 11	1.01	1.01

Large Breeds

Age of Dam	Males	Heifers
2 years and up	1.00	1.00

To adjust heights to 205 days, multiply the number of days under 205 by .03 for bulls or .025 for heifers and add to the actual height. Multiply the number of days over 205 by .03 for bulls or .025 for heifers and subtract the result from the actual height. (Adjusted height for sex.)

The sex-adjusted 205-day height is multiplied by the age-of-dam factor. (Adjusted for sex and age of dam.)

Example: Angus heifer

Data: Born January 1, 1976; birth weight 70 pounds; weaned July 21, 1976; weight 470 pounds; height 38 inches; 201 days old; dam three years old; adjusted 205-day weight is 496 pounds.



205 days - 201 days = 4 days
 38 inches + (4 x .025) = 38.1 inches x
 1.015 = 38.67 inches
 205-day height adjusted for age of dam and
 sex of calf.

Adjusting Postweaning Heights for Determining Frame Score

Plan B—Postweaning Heights

Bulls

Daily adjustment may be made as follows:
 Number of days under 365 x .033 + actual
 height = adjusted height. For adjustments from
 365 to 440 days: Number of days over 365 x
 .025 - actual height = adjusted height. (See
 explanation at close of *Frame Score Table* on
 page 27).

Heifers

When comparing heifers within management
 group, yearling heights are taken between 325
 and 440 days of age. Multiply days + 365 days,
 times .025 and add to or subtract from actual
 height to get adjusted 365-day height.

Heifer height adjustments for the
 post-weaning period are based on the group
 rate of weight gain in the postweaning period,
 and adjusted to 1.2 pounds average daily gain.
 (See *Beef Heifer Frame Score Table*, page
 26.)

Example: Same heifer used in weaning height
 example.

When making selections outside of
 contemporary management groups, use the
 following procedure to make yearling heifer
 adjustments.

Yearling weight 670 pounds on January 11,
 1977; 41.5 inches high at shoulder; with 174
 days in the postweaning period (July 21, to
 January 11).

670 lbs final weight - 470 lbs actual weaning
 weight = 200 pounds gain.

$200/174 = 1.15$ lbs postweaning a.d.g.

1.15×160 days = 184 lbs + 496 lbs (205
 day adjusted weight) = 680 lbs 365-day
 adjusted weight.

This heifer's daily gain of 1.15 lbs per day in
 the postweaning period was average for its
 group. (Line No. 6 in column 1 of the *Postweaning
 Height Adjustment Table* on page 21.)

41.5 inches final height - 38 inches actual
 weaning height = 3.5 inches growth in the
 post-weaning period.

$3.5/174 = .0201$ daily growth x 160 days = 3.218
 growth.

Adjust to 1.2 lbs/day by multiplying 3.218 by
 the factor given in line 6, column 3, of the
Post-weaning Height Adjustment Table
 (page 21); $3.218 \times 100 = 3.22 + 38.67$ (the
 adjusted 205-day ht) = 41.89 inches
 adjusted yearling height.

USDA Frame Related to Missouri Frame Score at Shoulders

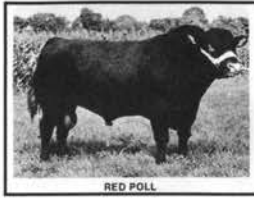
USDA Frame	Missouri Frame
Small	1 to 3.5
Medium	3.5 to 6
Large	6 & over

Adjusting Heights for Determining Frame Score

Summary for Using Heifers Height Adjustments Between Management Groups

1. Figure the preweaning height adjusted for
 management.
2. Figure the 160-day growth.
3. Add the adjusted 160-day height to the
 adjusted 205-day height to obtain the
 365-day adjusted height for 1.2 pounds
 average daily gain.
4. If you want to score the frame of the
 heifer, read from the *Heifer Frame Score
 Table* (page 26).

The British breed heifer used in the example
 on page 26 that adjusted to 41.89 inches at one
 year of age is a 3-frame heifer.



On-The-Farm Beef Cattle Performance Testing Analyses of Field Data

Weaning Weights and Heights at the Shoulder and at the Hip

Measurements for height at the shoulder and the hip as well as weaning weights were taken by the area livestock specialists from herds in their respective areas. Many breeds of cattle were represented. These measurements were made when the animals were from 160 days to 250 days of age, adjusted to 205-days of age. The analysis was made on 2,742 individual records collected from herds in the Missouri On-the-Farm Performance Testing Program. The records were adjusted using ratios for between-herd and breed average prior to analysis.

The between-breed group adjustments for age of dam were not significantly different at the shoulder or hip. However, the data showed a significant difference of .01 between sexes.

Height adjustments at the shoulder and for calf age are additive. They were .03 inches per day for male calves and .025 per day for female calves between the ages of 160 and 250 days, adjusted to 205 days. There was a significant difference in age of dam and breed group affects. The age of dam and breed group determined by sire showed a multiplicative adjustment for weight and height. Since the Beef Improvement Federation made a national recommendation that we use the adjustments recommended by the respective breed associations for weaning weight and birth weight, the Missouri program continues to use those adjustments. However, the adjustments for height for age in days to 205 days were adopted from these data. They were .03 for bulls and steers and .025 for heifer calves regardless of breed. These same adjustments were adopted by the Beef Improvement Federation in its national annual meeting held in May, 1979.

The age of dam adjustments for shoulder height are multiplicative after height is adjusted to 205 days as follows:

Cow Age	205-Day Shoulder Height Adjustment Factor	205-Day Shoulder Height Adjustment Factor
<i>British Breed:</i>	<i>Male Calves</i>	<i>Heifer Calves</i>
2 and 13 up	1.02	1.02
3 and 12	1.015	1.015
4 and 11	1.01	1.01
<i>Larger Breeds:</i>		
2 years and up	1.00	1.00

Because the Rural Development Program provides a programmer and funds for analysis, we were able to arrive at a postweaning heifer height adjustment for herd or management group in the Plan B postweaning phase of the Beef Cattle Improvement Program from 205 days of age to 365 days of age.

The adjustment for heights in yearling heifers in the postweaning phase is to be computed in the same manner as weight is computed. This is done by adjusting for group postweaning average daily gain and by adjusting within management group. These adjustments were discussed earlier in this publication.



APPENDIX

ASE Form No. 1 P.R. (Herd Enrollment Form)	14
ASE Form No. 2 P.R. (Plan A Hand Calculation Record Form)	15
ASE Form No. 5 P.R. (Computer Data Form)	16
ASE Form No. 4 P.R. (Beef Cow Production Record)	17-18
ASE Beef Cattle Computer Data Coding Instructions	19-20
Postweaning Heifer Height Adjustment Table	21
Nomograph Figuring Calf Weaning Weight	22
Average Daily Gain for 205-Day Adjusted Weights	23
Birth Weights and Age of Dam Adjustments	24-25
Heifer Frame Score Table	26
Bull Frame Score Table	27
Chart for Calculating Days of Age	28
Sample Computer Printout for 205-Day Weight and Sire Weaning Summary	29
Sample Computer Printout for 365-Day Weight and Sire Postweaning Summary	30

Missouri Beef Cattle Performance Testing
Herd Enrollment Form

County _____

Name of Breeder _____

Specialist _____

Complete Address _____

Year _____ Breed _____

Calf No. or ID	Sex	Dam No. or ID	Sire No. or ID	Birth Date of Dam or Year Born	Birth Date of Calf	Birth Weight of Calf	Breed Sire	Remarks
							Breed Dam	

Plan A—Hand Calculation Record Form

County & Area: _____

Name: _____ Address: _____ Specialist: _____

Date of Weaning Weight: _____ Year: _____

Sex¹: _____ Indicate Management Code²: _____ Breed: _____

Calf I.D. (1)	Dam (2)	Sire (3)	Age of Dam (4)	Birth Date (5)	Birth Wt. (6)	Weaning Age in Days (7)	Weaning Wt. 160-250 Days of Age (8)	205-Day Wt. (9)	205-day Wt. Adj. for Age of Dam ³ (10)	Adj. A.D.G. (11)	Adj. W.W. Ratio (12)	Actual Height	Feeder Grade	Frame	Trimness
												Adj. Height (13)	Testicle Size (cm.) (14)	Muscle Score 1-5 (15)	1-5 Soundness 1-5 (16)
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¹Use separate form for each sex. ²Management Information: (1) Creep; (2) Noncreep; (3) Other.
³Use column 10 to figure Column 11 from the table on page 14.

Name of Cow _____ Birth Date _____ Registration No. _____ Ident. _____
 Mo/Day/Yr.

PRODUCTION RECORD OF HER CALVES

Birth			Weaning					Postweaning							
Calf Ident.	Sex	Sire	Birth Mo/Day/Yr Wt.	Age in Days	Actual Wt.	Adj. 205-day Wt. Ratio	Adj. Daily Gain	Feeder Grade Frame Score	Off Feed Date Wt.	Total Gain ADG	Adj. 365-Day Wt. Ratio	Life Daily Gain	Conf. Score Frame Score	Av. Acc. Wt. Ratio	Cow MPPA
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BEEF COW PRODUCTION RECORD

Name of Cow _____ Birth Date _____ Registration No. _____ Ident. _____
 Mo./Day/Yr.

ANCESTRY		Reg. No.	Adj. 205-day W.W.	W.W. Ratio	No. Bull Calves	Feeder Grade Frame Score	% Calves Fed	Adj. 365-Day Wt.	Life Daily Gain	365-Day Wt. Ratio	Frame Score
Paternal	Grand Sire					-----					-----
	Grand Dam					-----					-----
Maternal	Grand Sire					-----					-----
	Grand Dam					-----					-----
Parent	Sire of Dam					-----					-----
	Dam of Dam					-----					-----
28	Dam Record					-----					-----
Record of Sires	Name:					-----					-----
	Name:					-----					-----
	Name:					-----					-----
	Name:					-----					-----
	Name:					-----					-----
Sire's Progeny Record	Name:					-----					-----
	Name:					-----					-----
	Name:					-----					-----
	Name:					-----					-----

A.S.E. BEEF CATTLE COMPUTER DATA CODING INSTRUCTIONS Missouri Beef Cattle Improvement Programs

Column

1 **Calf I.D.'s:** This is a 5-digit code. The first digit is a letter which signifies the year of birth as follows: (Example—R0001) The letters "I", "O", and "Q" are not used.

1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
A	B	C	D	E	F	G	H	J	K	L	M	N
1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
P	R	S	T	U	V	W	X	Y	Z	A	B	C

Calf I.D.'s should not be repeated within the same year. (If calf No. 10 has been born in January, this number cannot be repeated for a calf born in December of the same year. To distinguish between the two animals change the last digit of the number to a letter in accordance with the following value:

0	1	2	3	4	5	6	7	8	9
A	B	C	D	E	F	G	H	J	K

In the same manner you could give twin calves the same number by changing the last digit of the number to a letter as shown.

1-4-6 Breed Codes:

The breed code system involves the use of 4 numerals or letters or combinations that will explain $\frac{1}{2}$ to $\frac{15}{16}$ blood animals and straightbreds. The first number or letter is that of the sire, the second is that of the sire of the dam, the third is the sire of the granddam, and the fourth is the sire of the great granddam.

This system assumes purebred sires. The coding number or letter for each breed follows:

Numbers	Upper Case	<u>Lower case</u>	Upper Case	<u>Lower case</u>
1-Angus	A-Simmental	a-Simbrah	O-(Do not use)	
2-Hereford	B-Beef Master	b-_____	P-Blonde D'Aquitaine	p-_____
3-Shorthorn	C-Highlander	c-Hays Converter	Q-(Do not use)	
4-Red Angus	D-South Devon	d-_____	R-Red Polled	p-_____
5-Brahman	E-Red Brangus	e-_____	S-Brown Swiss	s-_____
6-Santa Gertrudis	F-M. Shorthorn	f-_____	T-Texas Longhorn	t-Tarentaise
7-Charolais	G-Galloway	g-_____	U-3X	u-_____
8-Brangus	H-Holstein	h-Beef Friesian	V-Normande	v-White Park
9-Polled Hereford	I-Gelbvieh	i-_____	W-Pinzgauer	w-_____
10-Devon (Use Zero)	J-Barzona	j-_____	X-Guernsey & Jersey	x-_____
	K-Murray Grey	k-_____	Y-Amerifax	y-Ankina
	L-Limousin	l-_____	Z-Chianina	z-_____
	M-Maine Anjou	m-Magnum		
	N-Charbray	n-_____		

Note: Lower case letters are being used to expand the breed codes

Examples of Use: 1111 = Angus; A222 = $\frac{1}{2}$ Simmental and $\frac{1}{2}$ Hereford; AA22 = $\frac{3}{4}$ Simmental and $\frac{1}{4}$ Hereford; AAA2 = $\frac{7}{8}$ Simmental and $\frac{1}{8}$ Hereford; AAAA = $\frac{15}{16}$ Simmental or Straightbred (Purebred)

(Please do not confuse the Angus and Simmental breed codes)

Column

2 **Sex Code:** Bull (1); Heifer (2); Steer (3)

3 **Management Codes:**

- Creep Fed 1
- No Creep 2
- Foster calf no dam adjustment 3
- Twin (give dam her correct age) T with either "1" or "2"
- Transplants X with either "1" or "2"

Example: Twin calves that are supposed to have a 2-yr-old dam adjustment and who are creep fed would be designated in the Management Code as 1T

Transplant calves are listed with the genetic dam in column 3. The dam adjustment is given according to the nursing cow—a dairy cow gives a foster calf adjustment (3); a nursing cow of the same breed gives the regular dam breed adjustment to the calf; and would be designated by 1X or 2X according to whether it was a creep fed calf or a noncreep fed calf.

Column

4 **Dam I.D.:** Use 5-digit code, using letter to signify year of birth.

5 **Dam Birth Date:** Use six digits signifying month, day, and year. Example: 011083, January 10, 1983.

6 **Sire I.D.:** Use 5-digit code, using letter to signify year of birth.

7 **Calf birth date:** Use six digits signifying the month, day, and year. Example: 011083, January 10, 1983.

8 **Birth weight:** If using the breed standard leave this column blank. Report actual birth weight if weights are taken within 24 hours of birth.

9-12

& 14 These columns used to complete the weights and dates of weighing at weaning and at yearling.

13 **Grades: Feeder Grades:** 17, 16, & 15—Prime; 12, 13, 14—Choice; 9, 10, 11—Good.
If an animal is not graded a "12" is given automatically.

Breeding Grades: 96.7-93.4 = A; 93.3-90.0 = A-; 89.6-86.7 = B+ ;
86.6-83.4 = B; 83.3-80.0 = B-; 79.9-76.7 = C+ ;
76.6-73.4 = C; 73.3-70.0 = C-

15 **T/S:**

Trimness: Scores range from 1 to 5 with 1 extremely trim, 3 average, and 5 extremely wasty.

Soundness: Scores range from 1 to 5 with 1 correct, 2 above average, 3 average, 4 structural faults, and 5 unsound, cripple, founder, double muscle and no testicle in bulls.

**Postweaning Heifer Height Adjustments to 365 Days of Age for
Herd or Management Group for Average Daily Gain**

Compute Group Postweaning ADG and Adjust Each Calf on Basis of Group Average	Adjustment Factor Per Day to Adjust Height to 160 Days Postweaning Period	Adjustment Coefficient to Adjust Postweaning 160-Day Ht. to 1.2 lbs. Average Daily Gain
---	--	--

British Breeds: Angus, Hereford, Polled Hereford, Red Polled, Galloway, Shorthorn,
and Red Angus
Quadratic Adjustment

Gain Rate	Height/Day	Percent Adjustment to 1.2 lbs./Day
(Column 1)	(Column 2)	(Column 3)
0.0 to .3	.0170	154
.301 to .5	.0179	140
.501 to .7	.0187	128
.701 to .9	.0195	117
.901 to 1.1	.0203	108
1.101 to 1.3	.0211	100
1.301 to 1.5	.0219	93
1.501 to 1.7	.0227	87
1.701 to 1.9	.0235	81
1.901 to 2.1	.0243	76
2.101 to 2.3	.0252	71
2.301 to 2.5>	.0259	67

Parameter	Estimate	Sig (T)	Standard Error Estimate
Intercept	0.01267377	0.0001	.000528
Gainrate x Gainrate	0.00058160	0.0001	0.000052
Gainrate	0.00680978	0.0001	0.000433

N = 983 Heifers; mean height/day, .0203; SD, .0072; r = .455

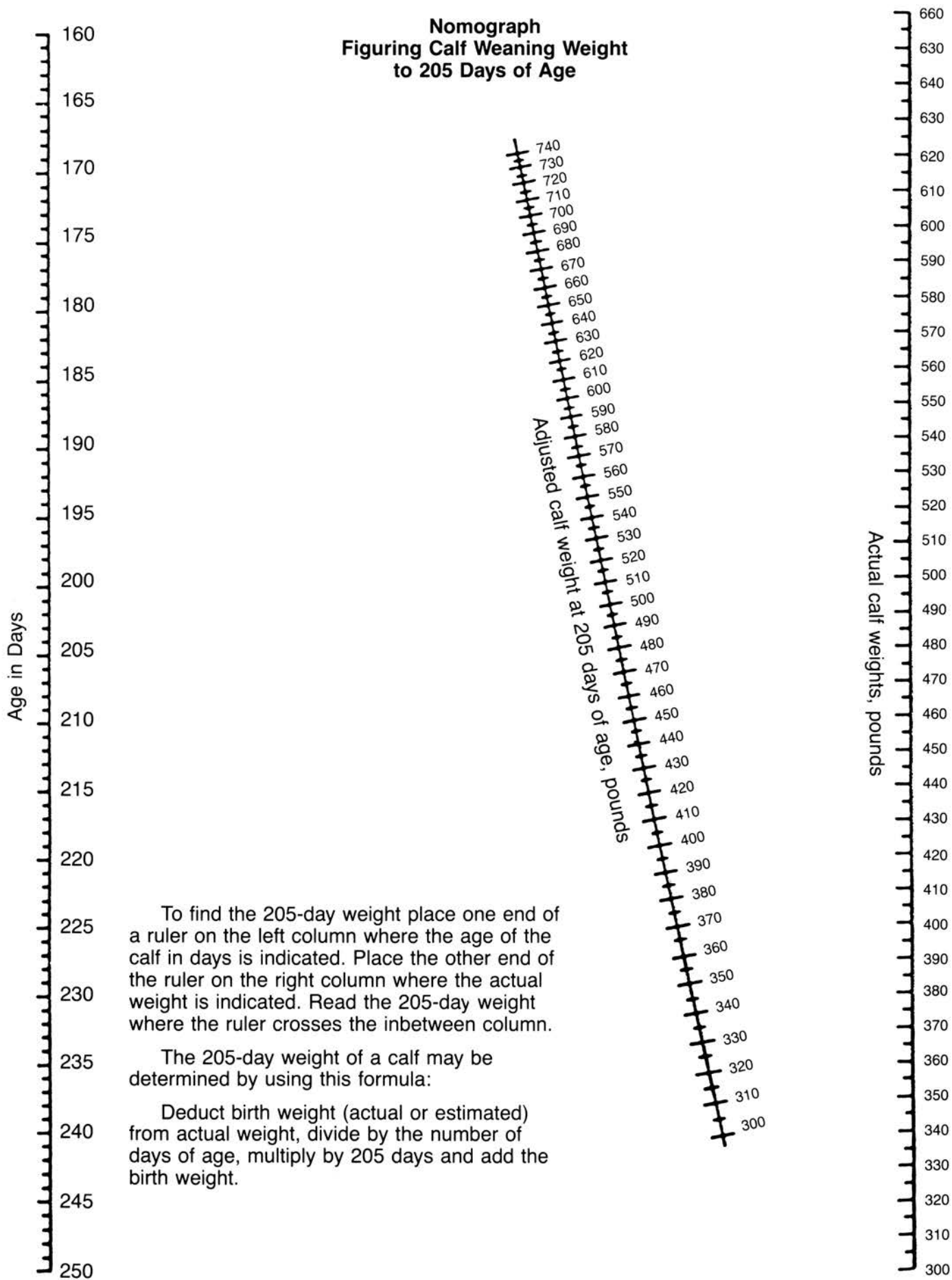
Large Breeds: Simmental, Brangus, Santa Gertrudis, Brahman, Limousin, Beefmaster,
Charolais, and Friesian
Linear Adjustment

0.0 to .3	.0101	216
.301 to .5	.0126	173
.501 to .7	.0149	146
.701 to 1.1	.0172	127
1.101 to 1.3	.0195	112
1.301 to 1.5	.0218	100
1.501 to 1.7	.0242	90
1.701 to 1.9	.0265	82
1.901 to 2.1	.0288	76
2.101 to 2.3	.0311	70
2.301 to 2.5>	.0334	65
	.0357	61

Parameter	Estimate	Sig (T)	Standard Error Estimate
Intercept	0.00791567	0.0001	0.00113348
Gainrate	0.01160097	0.0001	0.00090902

N = 233 Heifers; mean height/day, .0216; SD, .0057; r = .645

Nomograph Figuring Calf Weaning Weight to 205 Days of Age



To find the 205-day weight place one end of a ruler on the left column where the age of the calf in days is indicated. Place the other end of the ruler on the right column where the actual weight is indicated. Read the 205-day weight where the ruler crosses the inbetween column.

The 205-day weight of a calf may be determined by using this formula:

Deduct birth weight (actual or estimated) from actual weight, divide by the number of days of age, multiply by 205 days and add the birth weight.

AVERAGE DAILY GAIN FOR 205-DAY ADJUSTED WEIGHTS*
(70-Pound Birth Weight)

Adjusted 205-Day Weight	Adjusted Daily Gain	Adjusted 205-Day Weight	Adjusted Daily Gain	Adjusted 205-Day Weight	Adjusted Daily Gain	Adjusted 205-Day Weight	Adjusted Daily Gain
300	1.12	425	1.73	550	2.34	675	2.95
305	1.15	430	1.76	555	2.37	680	2.97
310	1.17	435	1.78	560	2.39	685	3.00
315	1.19	440	1.80	565	2.41	690	3.02
320	1.22	445	1.83	570	2.44	695	3.05
325	1.24	450	1.85	575	2.46	700	3.07
330	1.27	455	1.88	580	2.49	705	3.10
335	1.29	460	1.90	585	2.51	710	3.12
340	1.32	465	1.93	590	2.54	715	3.15
345	1.34	470	1.95	595	2.56	720	3.17
350	1.37	475	1.97	600	2.59	725	3.19
355	1.39	480	2.00	605	2.61	730	3.22
360	1.41	485	2.02	610	2.63	735	3.24
365	1.44	490	2.05	615	2.66	740	3.27
370	1.46	495	2.07	620	2.68	745	3.29
375	1.49	500	2.10	625	2.71	750	3.32
380	1.51	505	2.12	630	2.73	755	3.34
385	1.54	510	2.15	635	2.76	760	3.37
390	1.56	515	2.17	640	2.78	765	3.39
395	1.59	520	2.19	645	2.80	770	3.41
400	1.61	525	2.22	650	2.83	775	3.44
405	1.63	530	2.24	655	2.85	780	3.46
410	1.66	535	2.27	660	2.88	785	3.49
415	1.68	540	2.29	665	2.90	790	3.51
420	1.71	545	2.32	670	2.93	795	3.54

*This table was constructed by using the following formula:

$$\frac{\text{Adjusted 205-day weight} - 70 \text{ pounds}}{205 \text{ days}} = \text{Adjusted daily gain}$$

BIRTH WEIGHTS AND AGE OF DAM ADJUSTMENTS FOR CALCULATING WEANING WEIGHTS

Breed	Birth Weight		Age of Dam	Age Range*	Factor ¹ Sex of Calf	
	B	H			Males	Females
ANGUS AN	70	65				
	4	4	2	639 days through 1004 days	+45	+37
	2	2	3	1005 days through 1369 days	+21	+18
	.5	.5	4	1370 days through 1734 days	+ 9	+ 9
	0	0	5	1735 days through 3925 days	0	0
	1	1	11	3926 and over	+ 9	+ 9
ANKINA AK	75	70				
			2	639 days through 1004 days	x1.15	x1.15
			3	1005 days through 1369 days	x1.10	x1.10
			4	1370 days through 1734 days	x1.05	x1.05
			5-10	1735 days through 3925 days	0	0
		11	3926 and over	x1.05	x1.05	
BARZONA (BIF) BA	70	70				
			2	639 days through 1004 days	+60	+54
			3	1005 days through 1400 days	+40	+36
			4	1401 days through 1795 days	+20	+18
			5-10	1796 days through 3925 days	0	0
		11	3926 days and over	+20	+28	
BEEFMASTER BM	75	70				
			2	Birth through 913 days	x1.15	x1.15
			3	914 days through 1278 days	x1.10	x1.10
			4	1279 days through 1643 days	x1.05	x1.05
			5-10	1644 days through 3833 days	0	0
			11-13	3934 days through 4928 days	x1.05	x1.05
		Over	4929 days and over	x1.10	x1.10	
BRANGUS (BIF) BN	70	70				
			2	639 days through 1004 days	+60	+54
			3	1005 days through 1400 days	+40	+36
			4	1401 days through 1795 days	+20	+18
			5-10	1796 days through 3925 days	0	0
		11	3926 days and over	+20	+18	
CANADIAN HAYS CONVERTER HC	75	70				
	Age of dam adjustments based on 200 days of age		2	Less than 913 days	+59.4	+48.4
			3	914 days through 1278 days	+26.4	+19.8
			4	1279 days through 1643 days	6.6	+ 6.6
	Subtract 5 x adg from 205-day adj to arrive at Assn. Wng. Wt.		Mature		0	0
		Over age		0	0	
CHAROLAIS CH	88	83				
			2	609 days through 1003 days	+69	+59
			3	1004 days through 1368 days	+35	+30
			4	1369 days through 1733 days	+10	+11
			5-10	1734 days through 3926 days	0	0
		11	3927 days and over	+30	+30	

*To convert days of age to months divide by 30.43 days.

BIRTH WEIGHTS AND AGE OF DAM ADJUSTMENTS FOR CALCULATING WEANING WEIGHTS

Breed	Birth Weight		Age of Dam	Age Range*	Factor ¹ Sex of Calf	
	B	H			Males	Females
RED ANGUS AR	70	70				
	+ 4	+ 4	2	639 days through 1003 days	+ 60	+ 54
	+ 2	+ 2	3	1004 days through 1338 days	+ 40	+ 36
	+ .5	+ .5	4	1339 days through 1703 days	+ 20	+ 18
	0	0	5-10	1704 days through 4258 days	0	0
	+ 1	+ 1	11	4259 days or more	+ 20	+ 18
RED POLL RP	70	70				
		2		639 days through 1004 days	+ 60	+ 54
			3	1005 days through 1400 days	+ 40	+ 36
			4	1401 days through 1795 days	+ 20	+ 18
			5-10	1795 days through 3925 days	0	0
			11	3926 days and over	+ 20	+ 18
SANTA GERTRUDIS SG	70	70				
			2	639 days through 1004 days	+ 60	+ 54
			3	1005 days through 1400 days	+ 40	+ 36
			4	1401 days through 1795 days	+ 20	+ 18
			5-10	1796 days through 3925 days	0	0
			11	3926 days and over	+ 20	+ 18
SCOTCH HIGHLAND SH (No reply to inquiry BIF listed here)	70	70				
			2	639 days through 1003 days	+ 60	+ 54
			3	1004 days through 1338 days	+ 40	+ 36
			4	1339 days through 1703 days	+ 20	+ 18
			5-10	1704 days through 4258 days	0	0
			11	4259 days or more	+ 20	+ 18
SHORTHORN SS (Beef Scotch) SP (Polled)	70	70				
			2	639 days through 1003 days	+ 60	+ 54
			3	1004 days through 1338 days	+ 40	+ 36
			4	1339 days through 1703 days	+ 20	+ 18
			5-10	1704 days through 4258 days	0	0
			11	4259 days or more	+ 20	+ 18
SIMMENTAL SM SIMBRAH SI	91	83				
	7	6	2	Up to 1004 days	+ 63	+ 53
	3	3	3	1005 days through 1369 days	+ 37	+ 32
	2	1	4	1370 days through 1734 days	+ 22	+ 16
	0	0		1735 days and older	0	0
SOUTH DEVON DS	70	70				
			2	639 days through 1003 days	+ 60	+ 54
			3	1004 days through 1338 days	+ 40	+ 36
			4	1339 days through 1703 days	+ 20	+ 18
			5-10	1704 days through 4258 days	0	0
			11	4259 days or more	+ 20	+ 18
TARENDAISE TA	70	70				
	8	8	2	639 days through 1003 days	+ 60	+ 54
	5	5	3	1004 days through 1338 days	+ 40	+ 36
	2	2	4	1339 days through 1703 days	+ 20	+ 18
	0	0	5-10	1704 days through 4258 days	0	0
	3	3	11	4259 days or more	+ 20	+ 18

*To convert days of age to months divide by 30.43 days

HEIFER FRAME SCORE TABLE BASED ON SHOULDER MEASUREMENTS

		MONTHS																			
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
F	7	43.5	44.5	45.5	46.3	47	46.6	48.3	49	49.5	50	50.5	50.9	51.3	51.54	52	52.25	52.5	52.75	53	53.75
R	6	41.5	42.5	43.5	44.3	45	45.6	46.3	47	47.5	48	48.5	48.9	49.3	49.75	50	50.25	50.5	50.75	51	51.25
A	5	39.5	40.5	41.5	42.3	43	43.6	44.3	45	45.5	46	46.5	46.9	47.3	47.75	48	48.25	48.5	48.75	49	49.25
M	4	37.5	38.5	39.5	40.3	41	41.6	42.3	43	43.5	44	44.5	44.9	45.3	45.75	46	46.25	46.5	46.75	47	47.25
E	3	35.5	36.5	37.5	38.3	39	39.6	40.3	41	41.5	42	42.5	42.9	43.3	43.75	44	44.25	44.5	44.75	45	45.25

↑

Wt. at Weaning
450 to 550 lbs.

↑

Wt. at Yearling
650 to 750 lbs.

↑

Wt. at 540 Days
830 to 930 lbs.

↑

Approx. Wt.
1,000 lbs.

Gain 1.25 to 1.75 lbs/Day

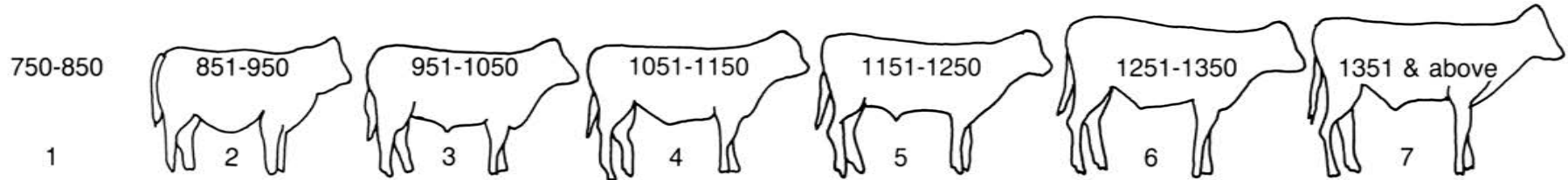
Gain 1 lb/Day

Gain ¾ lb/Day

If gain is 2 lbs./day or more from weaning to yearling, height needs to increase ½"/frame at one year, but will tend to be about the same at 2 years of age—maybe ¼" taller. Mature height for frame will not be much over 1" above the 24 mo. height.

3-frame cows are 47 inches
 4-frame cows are 49 inches
 5-frame cows are 51 inches
 6-frame cows are 53 inches
 7-frame cows are 55 inches

BULL FRAME



Number 1 steers are the smallest feeders available in the U.S. cattle population, and Number 7 steers are the largest. They are expected to weigh within the limits indicated in the drawings at 14½ to 15 months of age. Eighty percent or more are expected to grade Choice under the feeding system used by the commercial feedlots (140 to 200 days on feed.)

F R A M E		AGE IN MONTHS											AGE IN MONTHS								
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
		Height in Inches											Height in Inches								
1		32	33	34	35	36	37	38	39	39.75	40.5	41	41.5	41.75	42	42.25	42.5	42.75	43	43.25	43.5
2		34	35	36	37	38	39	40	41	41.75	42.5	43	43.5	43.75	44	44.25	44.5	44.75	45	45.25	45.5
*3		36	37	38	39	40	41	42	43	43.75	44.5	45	45.5	45.75	46	46.25	46.5	46.75	47	47.25	47.5
4		38	39	40	41	42	43	44	45	45.75	46.5	47	47.5	47.75	48	48.25	48.5	48.75	49	49.25	49.5
**5		40	41	42	43	44	45	46	47	47.75	48.5	49	49.5	49.75	50	50.25	50.5	50.75	51	51.25	51.5
6		42	43	44	45	46	47	48	49	49.75	50.5	51	51.5	51.75	52	52.25	52.5	52.75	53	53.25	53.5
7		44	45	46	48	48	49	50	51	51.75	52.5	53	53.5	53.75	54	54.25	54.5	54.75	55	55.25	55.5

*Frame 8 is average for British breeds.

**Frame 5 is average for Continental breeds.

The base point is 43 inches shoulder height at 12 months of age for a Frame Score of 3. Allow two inches for each Frame Score at the same age. Allow one inch per month from 5 to 12 months of age, allow 0.75, 0.50, and 0.25 inches per month from 12 to 18 months. Daily adjustment may be made as follows: No. of days under 365 x .033 + actual height = Adjusted Height. For adjustments from 365 to 440 days: No. of days over 365 x .025 - actual height = Adjusted height. Adjustment to 205 days when weights are taken between 160 and 250 days on bull calves is .03, and on heifer calves, .025.

Chart For Calculating Days of Age

	1 Jan.	2 Feb.	3 March	4 April	5 May	6 June	7 July	8 Aug.	9 Sept.	10 Oct.	11 Nov.	12 Dec.	
1	1 365	32 334	60 306	91 275	121 245	152 214	182 184	213 153	244 122	274 92	305 61	335 31	1
2	2 364	33 333	61 305	92 274	122 244	153 213	183 183	214 152	245 121	275 91	306 60	336 30	2
3	3 363	34 332	62 304	93 273	123 243	154 212	184 182	215 151	246 120	276 90	307 59	337 29	3
4	4 362	35 331	63 303	94 272	124 242	155 211	185 181	216 150	247 119	277 89	308 58	338 28	4
5	5 361	36 330	64 302	95 271	125 241	156 210	186 180	217 149	248 118	278 88	309 57	339 27	5
6	6 360	37 329	65 301	96 270	126 240	157 209	187 179	218 148	249 117	279 87	310 56	340 26	6
7	7 359	38 328	66 300	97 269	127 239	158 208	188 178	219 147	250 116	280 86	311 55	341 25	7
8	8 358	39 327	67 299	98 268	128 238	159 207	189 177	220 146	251 115	281 85	312 54	342 24	8
9	9 357	40 326	68 298	99 267	129 237	160 206	190 176	221 145	252 114	282 84	313 53	343 23	9
10	10 356	41 325	69 297	100 266	130 236	161 205	191 175	222 144	253 113	283 83	314 52	344 22	10
11	11 355	42 324	70 296	101 265	131 235	162 204	192 174	223 143	254 112	284 82	315 51	345 21	11
12	12 354	43 323	71 295	102 264	132 234	163 203	193 173	224 142	255 111	285 81	316 50	346 20	12
13	13 353	44 322	72 294	103 263	133 233	164 202	194 172	225 141	256 110	286 80	317 49	347 19	13
14	14 352	45 321	73 293	104 262	134 232	165 201	195 171	226 140	257 109	287 79	318 48	348 18	14
15	15 351	46 320	74 292	105 261	135 231	166 200	196 170	227 139	258 108	288 78	319 47	349 17	15
16	16 350	47 319	75 291	106 260	136 230	167 199	197 169	228 138	259 107	289 77	320 46	350 16	16
17	17 349	48 318	76 290	107 259	137 229	168 198	198 168	229 137	260 106	290 76	321 45	351 15	17
18	18 348	49 317	77 289	108 258	138 228	169 197	199 167	230 136	261 105	291 75	322 44	352 14	18
19	19 347	50 316	78 288	109 257	139 227	170 196	200 166	231 135	262 104	292 74	323 43	353 13	19
20	20 346	51 315	79 287	110 256	140 226	171 195	201 165	232 134	263 103	293 73	324 42	354 12	20
21	21 345	52 314	80 286	111 255	141 225	172 194	202 164	233 133	264 102	294 72	325 41	355 11	21
22	22 344	53 313	81 285	112 254	142 224	173 193	203 163	234 132	265 101	295 71	326 40	356 10	22
23	23 343	54 312	82 284	113 253	143 223	174 192	204 162	235 131	266 100	296 70	327 39	357 9	23
24	24 342	55 311	83 283	114 252	144 222	175 191	205 161	236 130	267 99	297 69	328 38	358 8	24
25	25 341	56 310	84 282	115 251	145 221	176 190	206 160	237 129	268 98	298 68	329 37	359 7	25
26	26 340	57 309	85 281	116 250	146 220	177 189	207 159	238 128	269 97	299 67	330 36	360 6	26
27	27 339	58 308	86 280	117 249	147 219	178 188	208 158	239 127	270 96	300 66	331 35	361 5	27
28	28 338	59 307	87 279	118 248	148 218	179 187	209 157	240 126	271 95	301 65	332 34	362 4	28
29	29 337	—	88 278	119 247	149 217	180 186	210 156	241 125	272 94	302 64	333 33	363 3	29
30	30 336	—	89 277	120 246	150 216	181 185	211 155	242 124	273 93	303 63	334 32	364 2	30
31	31 335	—	90 276	—	151 215	—	212 154	243 123	—	304 62	—	365 1	31

Jan. 1

Feb. 2

March 3

April 4

May 5

June 6

July 7

Aug. 8

Sept. 9

Oct. 10

Nov. 11

Dec. 12

Dark number—Days to January 1

Light number—Days from January 1

When using two *Light* numbers, subtract one from the other. When adding *Dark* and *Light* numbers subtract one day to adjust for starting and stopping day. During Leap Year add one day to dates after February 28.

Computer Printout Plan A

UNIVERSITY OF MISSOURI EXTENSION SERVICE
 SEX => 1=BULL, 2=HEIFER, 3=STEER
 WEIGHT ADJ. TO 205 DAYS AND AGE OF DAM
 >>>>>>> RATIOS BASED ON SEX AND MGMT

MISSOURI BEEF HERD EVALUATION PROGRAM

 WEANING SUMMARY

13 SEP 1984

HERD -->()

CALF NO.	CALF SEX	CALF BIRTH	SIRE NO.	DAM NO.	DAM BIRTH	AGE	WEANING DATE	WEANING AGE	WEANING WEIGHT	205 ADJ WT	ADJ ADG	WGT RATIO	M S R N	FDR GRD	- SHLD ACT	HT- ADJ	ADJ HIP	ADJ FS	MGMT CODE	BD %
S0036	1	03/11/84	BRAH	E220	02/15/73	11	09/10/84	183	555	611	2.54	100.0	1 1 3	12	44.3	45.0	47.7	6.5	2	
**** BREED **** aaaa								AVERAGES FOR 1 BULLS		611	2.54	GROUP	12.0		45.0			6.5		
S0031	3	03/03/84	BRAH	K40	10/14/78	5	09/10/84	191	635	672	2.66	100.0	1 1 3	15	43.8	44.2	46.9	6.1	2	
**** BREED **** aaaa								AVERAGES FOR 1 STEERS		672	2.66	GROUP	15.0		44.2			6.1		

UNIVERSITY OF MISSOURI EXTENSION SERVICE
 SEX => 1=BULL, 2=HEIFER, 3=STEER
 WEIGHT ADJ. TO 205 DAYS AND AGE OF DAM
 >>>>>>> RATIOS BASED ON SEX AND MGMT

MISSOURI BEEF HERD EVALUATION PROGRAM

 SIRE WEANING SUMMARY

13 SEP 1984

HERD -->()

SIRE NO.	CALF NO.	CALF SEX	CALF BIRTH	-- DAM NO.	-- DAM AGE	--- CALF WEANING DATE	--- CALF WEANING AGE	--- CALF WEANING WEIGHT	205 DAY ADJ WT.	ADJ ADG	WGT RATIO	M S R N	FDR GRD	- SHLD ACT	HT- ADJ	ADJ HIP	ADJ FS	MGMT CODE	BREED
BRAH	S0036	1	03/11/84	E220	11	09/10/84	183	555	611	2.5	100.0	1 1 3	12	44.3	45.0	47.7	6.5	2	
BRAH	*****	AVERAGE FOR ->		1 BULLS		*****	183	555	611	2.54	100.0	1 1 3	12	44.3	45.0		6.5	2	aaaa
BRAH	S0031	3	03/03/84	K40	5	09/10/84	191	635	672	2.7	100.0	1 1 3	15	43.8	44.2	46.9	6.1	2	
BRAH	*****	AVERAGE FOR ->		1 STEERS		*****	191	635	672	2.66	100.0	1 1 3	15	43.8	44.2		6.1	2	aaaa

Computer Printout Plan B

UNIVERSITY OF MISSOURI EXTENSION SERVICE
SEX => 1=BULL, 2=HEIFER, 3=STEER

MISSOURI BEEF HERD EVALUATION PROGRAM

POST-WEANING SUMMARY

13 SEP 1984

>>>>>>> RATIOS BASED ON SEX AND MGMT *****

HERD -->()

CALF NO.	CALF SEX	CALF BIRTH	SIRE NO.	DAM NO.	--END OF DATE	TEST AGE	DATA- WT	DAYS	ADG	160 D GAIN	-- 205 DAY ADJ. WT	-- 365 DAY ADJ. WT	RATIO	T R	S N	BRD GRD	BACK FAT	ADJ S-HT	ADJ H-HT	FR SCR	MG CD	BD%
R0003	1	09/12/83	PACH	DEANN	08/29/84	352	1315	148	3.68	589	795	95.8	1384	97.9	0	0	80 .00	50.4	53.4	6.7	1	
R0005	1	09/13/83	DTIME	LADY	08/29/84	351	1355	148	3.61	578	864	104.2	1442	102.1	0	0	87 .00	52.5	54.0	7.7	1	
**** BREED ****		AAAA	AVERAGES FOR		2 BULLS				3.65	584	GROUP		1413					51.4		7.2		

UNIVERSITY OF MISSOURI EXTENSION SERVICE
SEX => 1=BULL, 2=HEIFER, 3=STEER

MISSOURI BEEF HERD EVALUATION PROGRAM

SIRE POST-WEANING SUMMARY

13 SEP 1984

>>>>>>> RATIOS BASED ON SEX AND MGMT *****

HERD -->()

SIRE NO.	CALF NO.	CALF SEX	CALF BIRTH	DAM NO.	--END OF DATE	TEST AGE	DATA- WT	DAYS	ADG	160 D GAIN	-- 205 DAY ADJ. WT	-- 365 DAY ADJ. WT	RATIO	T R	S N	BRD GRD	BACK FAT	ADJ S-HT	ADJ H-HT	FR SCR	MG CD	BD%
PACH	R0003	1	09/12/83	DEANN	08/29/84	352	1315	148	3.68	589	795	95.8	1384	97.9	0	0	80 .00	50.4	53.4	6.7	1	
PACH	BREED		AAAA	AVERAGES FOR		1 BULLS			3.68	589			1384					50.4		6.7		
DTIME	R0005	1	09/13/83	LADY	08/29/84	351	1355	148	3.61	578	864	104.2	1442	102.1	0	0	87 .00	52.5	54.0	7.7	1	
DTIME	BREED		AAAA	AVERAGES FOR		1 BULLS			3.61	578			1442					52.5		7.7		



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