

MAY 22 1979

On-The-Farm Performance Testing

Missouri Beef Cattle Improvement Programs



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MP 474
Revised 3/79/3M

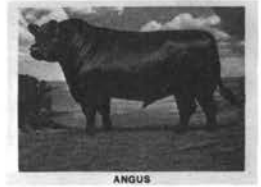
University of Missouri-Columbia
Extension Division

Procedure for Calculating 205-Day Adjusted Weaning Weight	2
Calculating 205-day-Weight, Formula, and Example	2
Adjustment of 205-Day-Weight for Age of Dam, Formula and Example	2
Adjusted Average Daily Gain, Formula, and Example	3
Weight Ratio, Formula, and Example	3
Feeder Grade Ratio, Formula, and Example	4
Frame Scores	4
Cow Production Records, Formula, and Examples	5
How to Use Heritability Estimates	6
Keeping the Records	7
Selection	19
Adjusting Heights for Determining Frame Score	
Weaning Heights	22
Postweaning Heights	23
Summary	25

Contents

Missouri Beef Cattle Performance Testing Herd Enrollment Form	8
Plan A Calf Crop Record	9
Chart for Calculating Days of Age	10
Nomograph for Figuring Calf Weaning Weight to 205-Days of Age	11
Birth Weights and Age of Dam Adjustments for Calculating Weaning Weights	12
Age of Dam at Calving and Other Conditions Which Alter Age of Dam Adjustment	13
Average Daily Gain for 205-Day Adjusted Weights	14
Standards for Feeder Cattle Grades (April, 1966)	16
Heritability Estimates for Economic Traits in Beef Cattle	19
Bull Frame Types and Frame Score Table	20
Heifer Frame Types and Frame Score Table, Weaning 5 to 9 Months	21
Postweaning Heifer Height Adjustment to 365 Days of Age for Herd or Management Group for Average Daily Gain	24
Summary of Calf Crop Records (Plan A)	26
Beef Cow Production Record	27
Beef Cow Production Record	28
Postweaning Phase—Plan B	29

Tables



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 has flexibility 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.

There are six major phases of the program that should receive emphasis.

- 1) Plan A which ends at 205 days when the calf is weaned and scored. (Page 9).
- 2) Plan B, the postweaning phase, 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 preweaning phase. (Page 29).
- 3) Central beef cattle testing stations operated by the University of Missouri or privately owned stations. (Contact local area specialist for rules).
- 4) Use of ultrasonics and potassium-40 evaluation in livestock improvement. (Contact local area specialist for details.)
- 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.)

The foregoing records of performance programs are useful primarily to provide a basis for comparing cattle within a herd, managed the same, and within sex; and 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 (205 Days)

The purpose of this phase of the program is to evaluate calving interval (fertility) and mothering ability of dam (milk production), preweaning growth rate, and quality by USDA feeder standards and potential mature frame. (A.H.E. Form No. 2 P.R. 79, page 9).

The procedure for obtaining performance data:

- 1) Contact the local University of Missouri Extension Center and



set up an appointment with the area livestock specialist for discussing the program.

- 2) Enrollment: Enroll all of the cows in your herd. (A.H.E. Form No. 1 P.R. Rev. 79, page 8.)
- 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 possibilities. 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 page 12.
- 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.



Ear tag and tattoo.



Neck chain, hip brand, and horn brand.



Birth weight.

Procedure for Calculating 205-Day Adjusted Weaning Weight

- 1) Calves are to be weighed between 160 and 250 days of age. The nomograph on page 11 may be used to determine the 205-day weaning weight when calves are weighed in this age range.
- 2) To determine the age of the calf use "Chart for Calculating Days of Age" on page 10.
- 3) 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

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

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

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

- 4) 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 12 & 13.

For the purpose of adjusting the 205-day-weight of calves for age of dam the following schedule applies:

Age Range of Dam at Calving	Age of Dam
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	5- to 10-year old
10 yrs 9 mos and older	11-year-old & over

Further information on "Age of Dam Adjustment Factor Within Breed for 205 Days" is to be found on page 13. 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 per cent = 72 lbs. Then 480 lbs. + 72 lbs. = 552 lbs, the adjusted 205-day weight for age of dam within sex.

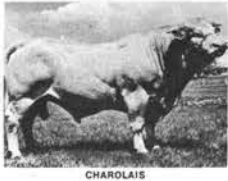
- 5) Adjusted Average Daily Gain: On page 14 is a chart for obtaining the adjusted average daily gain on 205-day adjusted weights, ranging from 300 lbs to 795 lbs. Weights above or below this range may be figured by applying the following example.

Example:

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

- 6) Other adjustments: 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, whereas with steers and heifers it is 0.2 and 0.1, respectively.
- 7) 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.
- 8) 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.
- 9) Weight ratio: 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 the Plan A Calf Crop Record, and dividing the individual calf's weight by the herd average for its sex. (page 9, 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 the bull calves is 450 pounds (total and average of Column 10, Plan A Page 9) and bull calf No. 1's adjusted 205-day weaning weight is 600 pounds.

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

All calves in the purebred herds should be graded at weaning according to the USDA feeder grade standards by the extension specialist or a three-man committee. "Feeder Steers, U. S. Grades" are illustrated on page 15. "Standards for Feeder Cattle Grades, April, 1966" are included in this publication on pages 16, 17, 18, and 19.

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

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

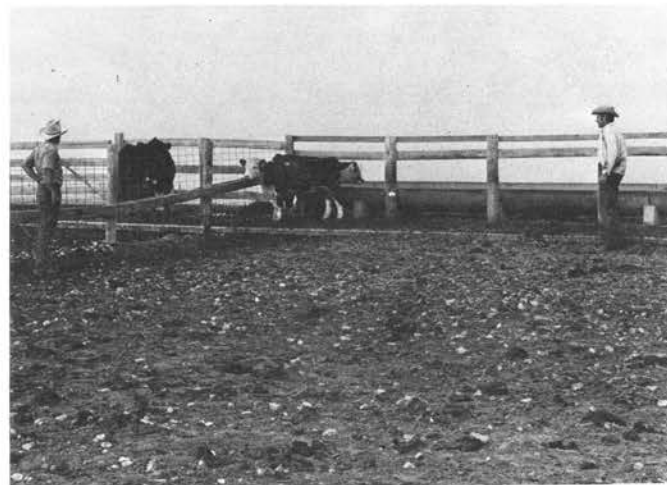
Example: The average feeder grade score of all bull calves is 12 and bull calf No. 1's score is 14.

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

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 five, with one the smallest and five the largest, and three is intermediate or average for the breed. The Charolais and Simmental each range three through seven, 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.

Feeder Grade



Grading calves.

Frame Scores



Measuring frame.



4) Galloway, Red Angus, and Murray Grey will be close to the Hereford and Angus frames.

See pages 20 and 21 for frame score types and Frame Score Tables for bulls and heifers. Frame score adjustments for sex and management are given on pages 22, 23, and 24.

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 record.

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.

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 27 and 28, and may be obtained at the local extension office for printing cost.

Example: To compare Cow A with Cow B

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

Formula: Breeding Value or Most Probably Producing Ability

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

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



$$\begin{aligned} & \text{MMPA for Cow A} \\ & 100 + \frac{(4)(.4)}{1 + (4-1) .4} \times 111-100 \\ & 100 + \frac{1.6}{2.2} \times 11 = 108.00 \end{aligned}$$

$$\begin{aligned} & \text{MMPA for Cow B} \\ & 100 + \frac{(3)(.4)}{1 + (3-1) .4} \times 110-100 \\ & 100 + \frac{1.2}{1.8} \times 10 = 106.66 \end{aligned}$$

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 expected 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 3.20 pounds and heifers 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, and something should be known about the heritability to estimate for rate of gain in the feedlot.

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

$$\begin{aligned} \text{SUPERIORITY OF DAMS} &= 2.80 - 2.40 \text{ or } 0.40 \text{ lb per day.} \\ \text{SUPERIORITY OF SIRES} &= 3.20 - 2.40 \text{ or } 0.80 \text{ lb per day.} \\ \text{SUPERIORITY OF PARENTS} &= \frac{0.40 + 0.80}{2} = 0.60 \text{ lb per day.} \end{aligned}$$

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 19).

$$\text{EXPECTED GENETIC GAIN} = 0.60 \times 55\% \text{ or } 0.33 \text{ lb/day.}$$

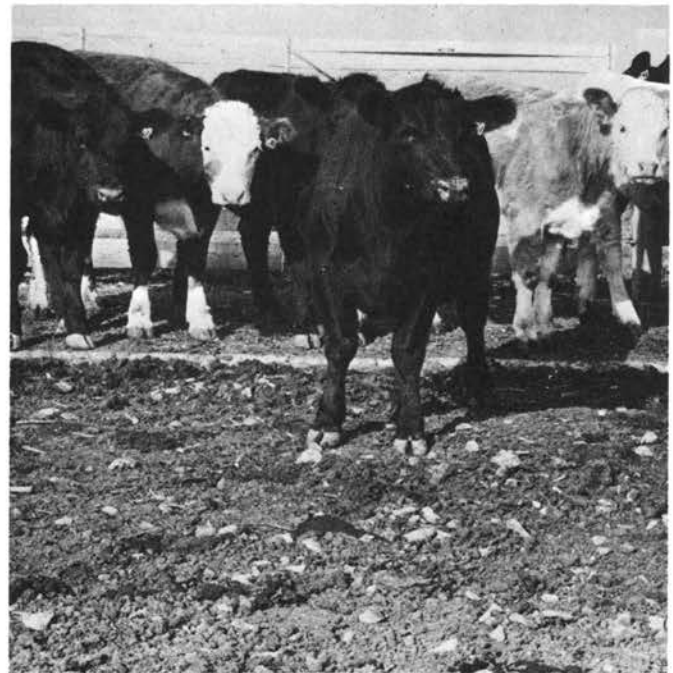
The advantage of the parents (0.60 lb) times the heritability estimate (55 percent) gives the genetic gain (0.33 lb) expected in the offspring per day.

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 parents.

How to Use Heritability Estimates



Replacement yearling heifers.



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.H.E. Form No. 1 P.R. (Rev. 79)—Missouri Beef Cattle Performance Testing Herd Enrollment.
- A.H.E. Form No. 2 P.R. (Rev. 79)—Plan A Calf Crop Record (Pre-weaning Phase).
- A.H.E. Form No. 4 P.R.—Beef Cow Production Record.
- A.H.E. Form No. 2A P.R.(Rev. 79)—Beef Performance Testing Plan A Herd Summaries.

(Summary forms are designed for use by the area livestock specialist for reporting to the state animal husbandry extension office the herds enrolled in the area. Note: Only herd records that have bulls for tested bull 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 to aid in record keeping. Science and Technology Guides, 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*, 206 Whitten Hall, University of Missouri-Columbia, Columbia, Missouri, 65211, or by contacting your local area livestock specialist.

PLAN A--CALF CROP RECORD

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. Day (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	Trim-ness
												Adj. Height (13)	Testicle Size (cm.) (14)	Muscle Score 1-5 (15)	Sound-ness 1-5 (16)
												---	---	---	---
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												---	---	---	---

¹ Use separate form for each sex. ² Management Information: (1) Creep; (2) Noncreep; (3) Other.

³ Use column 10 to figure Column 11 from the table on page 14.

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

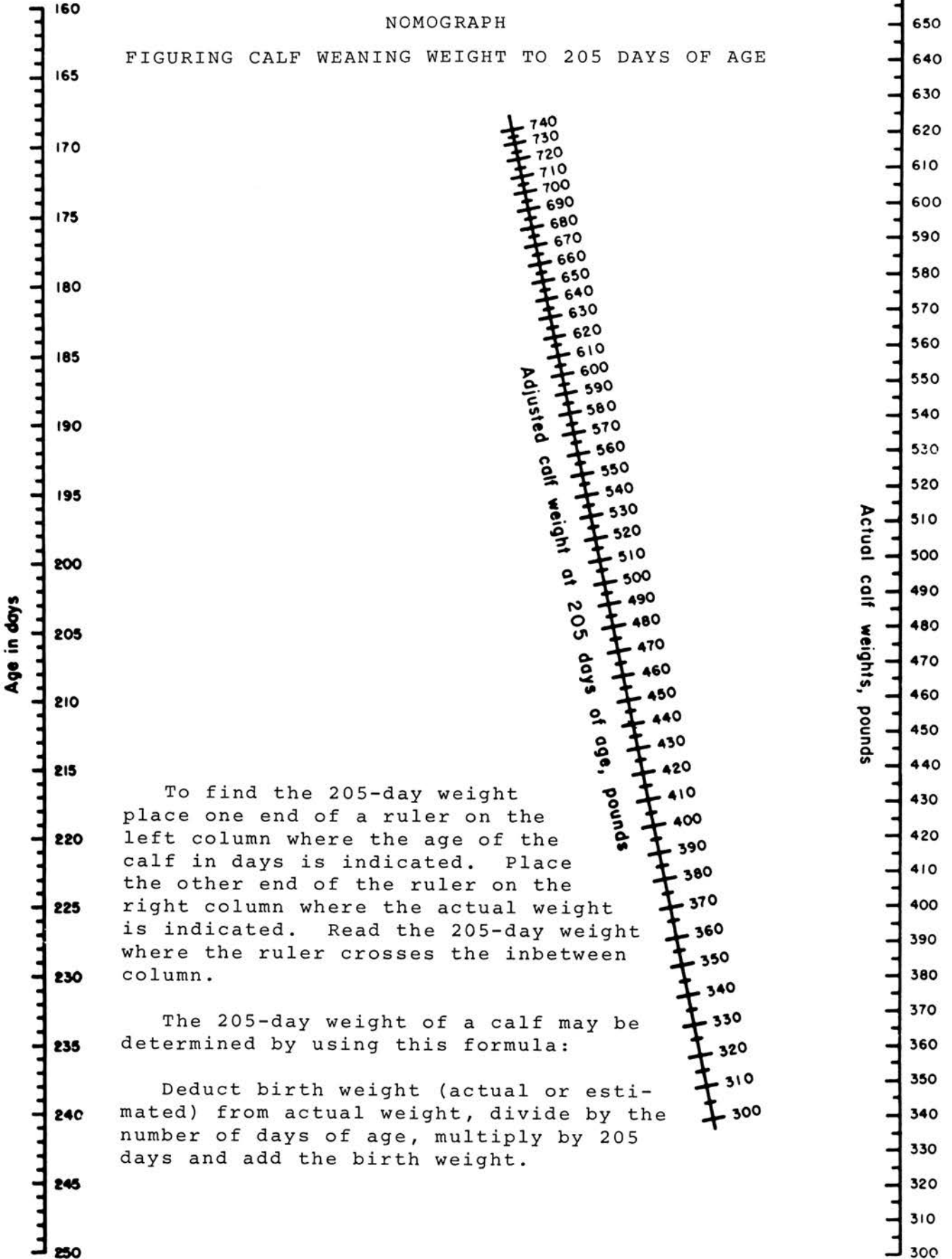
Jan. 1 Feb. 2 March 3 April 4 May 5 June 6 July 7 Aug. 8 Sept. 9 Oct. 10 Nov. 11 Dec. 12

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.

NOMOGRAPH

FIGURING CALF WEANING WEIGHT TO 205 DAYS OF AGE



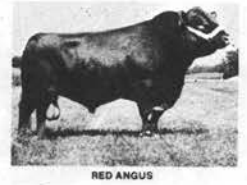
To find the 205-day weight place one end of a ruler on the left column where the age of the calf in days is indicated. Place the other end of the ruler on the right column where the actual weight is indicated. Read the 205-day weight where the ruler crosses the inbetween column.

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.

BIRTH WEIGHTS AND AGE OF DAM ADJUSTMENTS FOR CALCULATING
WEANING WEIGHTS

Breed	Birth Weight		Age of Dam	Factor: Additive (+) or Multiple (x) Sex of Calf	
	B	H		(B) Male	(H) Female
Angus (AN)	70	65	2 3 4 & 10+ 6-9	+45 +21 + 9 0	+37 +18 + 7 0
Charolais (CH)	88	83	2 3 4 5-10 11+	+69 +35 +10 0 +30	+59 +30 +11 0 +30
Chianina (CA)	85	80	2 3 4 & 10+ 5-9	x1.15 x1.10 x1.05 x1.00	x1.15 x1.10 x1.05 x1.00
Note: W.W. to be taken 160 to 240 days of age					
Hereford (HH)	75	70	2 3 4 & 10+ 5-9	x1.15 x1.10 x1.05 x1.00	x1.15 x1.10 x1.05 x1.00
Limousin (LM)	80	75	2 3 4 & over 10 5	x1.15 x1.10 x1.05 x1.00	x1.15 x1.10 x1.05 x1.00
Maine Anjou (MA)	92	86	2 3 4	+66 +30 +13	+57 +33 + 6
Note: Birth weights change with each sire summary. (September of each year)					
Polled Hereford (HP)	75	70	2 3 4 & 11 up 5-10	+60 +40 +20 0	+54 +36 +18 0
Red Angus (RA)	70	70	2 3 4 & 11 up 5-10	+60 +40 +20 0	+54 +36 +18 0
Santa Gertrudis (SG)	70	65	(No response)		
Shorthorn (SS)	70	70	2 3 4 & over 10 5	x1.15 x1.10 x1.05 x1.00	x1.15 x1.10 x1.05 x1.00
Simmental (SM)	98	90	2 3 4	+50 +14 0	+40 +17 0



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

For breeds not listed on page 12, 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.

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.

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

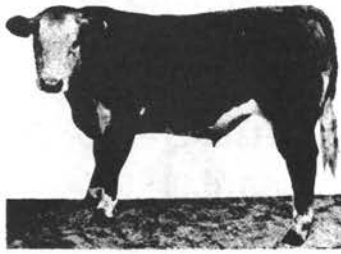
Adjusted 205-Day Weight	Adjusted Daily Gain	Adjusted 205-Day Weight	Adjusted Daily Gain	Adjusted 205-Day Weight	Adjusted Daily Gain	Adjusted 205-Day Weight	Adjusted Daily Gain
300	1.12	425	1.73	550	2.34	675	2.95
305	1.15	430	1.76	555	2.37	680	2.97
310	1.17	435	1.78	560	2.39	685	3.00
315	1.19	440	1.80	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:

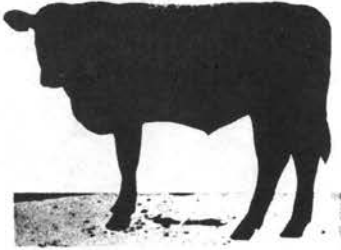
$$\frac{\text{Adjusted 205-day weight} - 70 \text{ pounds}}{205 \text{ days}} = \text{Adjusted daily gain}$$

FEEDER STEERS

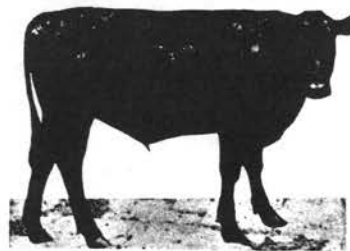
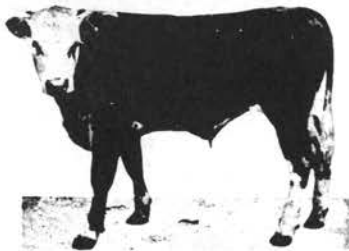
U.S. GRADES



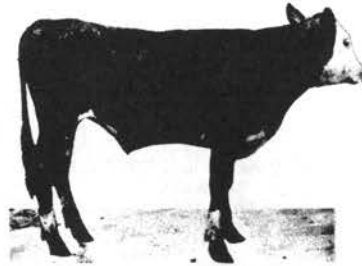
PRIME



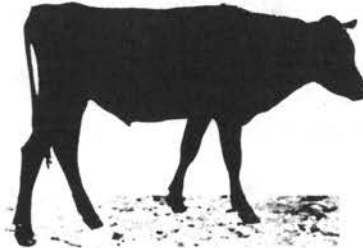
CHOICE



GOOD



STANDARD



UTILITY

COMMERCIAL AND INFERIOR GRADES ARE OMITTED

COPIES OF THE OFFICIAL UNITED STATES STANDARDS FOR GRADE ARE AVAILABLE ON REQUEST

MARCH 1966

UNITED STATES DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE

LIVESTOCK DIVISION

WASHINGTON, D. C.





Official United States standard grades of feeder cattle were established by the Agricultural Marketing Service, USDA, in the Administrative Procedure Act, 7 CFR 53.207 and 53.208, effective September 25, 1964.

The official standards for live cattle developed by the United States Department of Agriculture provide for segregation, (1) according to use—slaughter and feeder, (2) class, which is determined by sex and condition, (3) grade, which is determined by the apparent relative excellence and desirability of the animal for its particular use. Feeder cattle are those which are intended for slaughter after a period of feeding.

I. The term "cattle" as used in these standards includes bovines of all ages.

1. The grade of a feeder animal is determined from a composite evaluation of two general values: logical slaughter potential and thriftiness.
2. The logical slaughter potential of an animal is its slaughter grade at that stage of its development when carcass quality grade and conformation grade are equal.
3. Thriftiness refers to the ability of a feeder animal to gain weight and fatten rapidly and efficiently. Extremely thrifty cattle are healthy, have wide, roomy middles with well-sprung ribs, are large for their age, and have an alert manner.

II. General principles in grading feeder cattle.

1. Although the grade of feeder cattle is determined from a composite evaluation of its logical slaughter potential and its thriftiness, the logical slaughter potential is given primary consideration. Conformation is the most important single factor affecting the grade of feeder cattle.
2. In establishing the feeder grade, conformation is determined by appraising the development of the muscular system in relation to the development of the skeletal system. Degree of fatness is not a factor. These standards are based on animals that have a slightly thin covering of fat. When grading animals which have either a greater or lesser degree of fatness than slight to moderate, a proper allowance must be made for the effect of these differences on appearance of the animal.

Standards for Feeder Cattle Grades April, 1966



3. Cattle will deposit fat at a relatively fast rate over the loin, back, flank, cod, twist, and brisket, as compared to other parts of the body. As the condition increases with cattle, they will appear to be better over the back, loin, and spring of rib development. Therefore, it will be necessary for the grader to make critical evaluation of the development and thickness of muscle through the rear quarter as an indicator of overall muscling and plump natural fleshing in the forearm, since slight to moderate amounts of fat are deposited in these areas and it comes nearer the end of the feeding phase.
4. Thriftiness is a factor affecting the grade of feeder cattle when the animal is relatively less thrifty than normally associated with that particular development as prescribed in the various grades. In such a case, the final grade of the feeder animal may be lowered from that indicated by other grade factors from $\frac{1}{3}$ to 1 full grade, depending upon the degree of thriftiness.
5. Maturity is not normally a factor in determining the grade of feeder animals, since animals will reach their logical slaughter potential before the following limits: Prime, 36 months maximum; Choice, 42 months maximum; Good and Standard, 48 months maximum; Commercial, 48 months minimum. There are no maturity limits for Utility, Cutter, and Canner grades.

III. Standards for Grades

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.

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

Fancy feeder cattle are now classified as Prime under the new grading system and these 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 through 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.



SANTA GERTRUDIS

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 predominantly beef breeding. They have a logical slaughter grade potential of Good.

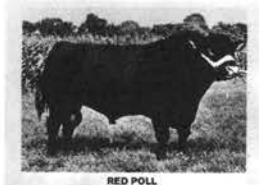
4. High-medium, 8; Medium, 7; Low-medium, 6.

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 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



the bone usually is very fine, although it also may be large and coarse. They usually have very little or no evidence of beef breeding and have a logical slaughter potential of Utility.

6. Inferior, 2 to 0.

Inferior feeder cattle are those described for Common, but unthrifty, or are inferior to those described for Common grade.

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
Conformation score:	
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



Selected yearling bulls off test.

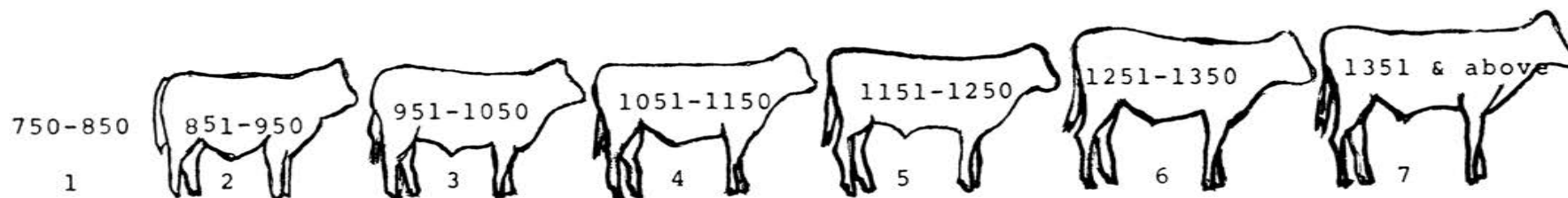
Selection

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 Science and Technology Guide, University of Missouri-Columbia, No. 2909, "Predicting Inheritance of Breeding Herds."

$$\text{PROGRESS} = \text{SELECTION DIFFERENTIAL} * \\ \text{X HERITABILITY OF TRAIT}$$

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



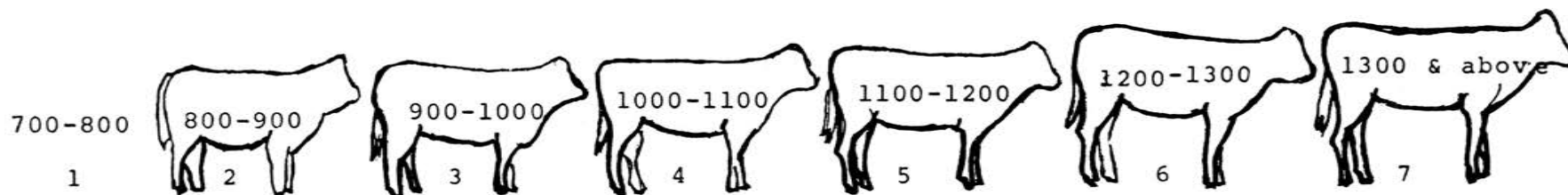
Number 1 steers are the smallest feeders available in the U.S. cattle population, and Number 7 steers are the largest. They are expected to weigh within the limits indicated in the drawings at 14 1/2 to 15 months of age. Eighty percent or more are expected to grade Choice under the feeding system used by the commercial feedlots (140 to 200 days on feed).

FRAME SCORE TABLE

Measure height at shoulder. Point of measurement is at elbow or fifth rib.								
Shoulder Height in Inches								
Age in Months	Frame Score 1	Frame Score 2	Frame Score 3	Frame Score 4	Frame Score 5	Frame Score 6	Frame Score 7	Frame Score 8
5	32	34	36	38	40	42	44	
6	33	35	37	39	41	43	45	
7	34	36	38	40	42	44	46	
8	35	37	39	41	43	45	47	
9	36	38	40	42	44	46	48	
10	37	39	41	43	45	47	49	
11	38	40	42	44	46	48	50	
12	39	41	43	45	47	49	51	
13	39.75	41.75	43.75	45.75	47.75	49.75	51.75	
14	40.50	42.50	44.50	46.50	48.50	50.50	52.50	
15	41	43	45	47	49	51	53	
16	41.5	43.5	45.5	47.5	49.5	51.5	53.5	
17	41.75	43.75	45.75	47.75	49.75	51.75	53.75	
18	42	44	46	48	50	52	54	

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 to 250 days on bull calves is .03, and on heifer calves, .025.

HEIFER FRAME TYPES

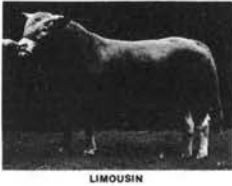


Number 1 heifers are the smallest feeders available in the U.S. cattle population, and Number 7 heifers are the largest. The upper limit is open depending on height. They are expected to weigh within the limits indicated in the drawings at 14½ to 15 months of age. Eighty percent or more are expected to grade Choice under the feeding system used by the commercial feedlots (120 to 180 days on feed).

FRAME SCORE TABLE

Measure height at shoulder. Point of measurement is at elbow or fifth rib.								
Shoulder Height in Inches								
Age in Months	Frame Score 1	Frame Score 2	Frame Score 3	Frame Score 4	Frame Score 5	Frame Score 6	Frame Score 7	Frame Score 8
5	31.5	33.5	35.5	37.5	39.5	41.5	43.5	
6	32.5	34.5	36.5	38.5	40.5	42.5	44.5	
7	33.5	35.5	37.5	39.5	41.5	43.5	45.5	
8	34.5	36.5	38.5	40.5	42.5	44.5	46.5	
9	35.5	37.5	39.5	41.5	43.5	45.5	47.5	

Note: Adjusted 365-day heights are computed differently for heifers than for bulls. See page 23 for details and example.



Adjusting Weaning Heights for Determining Frame Score

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

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

Larger Breeds

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, 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)

Actual 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

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 20.)

Heifers

Heifer height adjustments for the postweaning period are based on the *group* rate of weight gain in the postweaning period, and adjusted to 1.2 pounds average daily gain.

Example: (Same heifer used in weaning height example.)

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

$$\frac{200}{174} = 1.15 \text{ lbs. postweaning a.d.g.}$$

$$1.15 \times 160 \text{ days} = 184 \text{ lbs} + 496 \text{ lbs (205 day adjusted weight)} \\ = 680 \text{ lbs 365-day adjusted weight.}$$

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 24.)

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

$$\frac{3.5}{174} = .0201 \text{ daily growth} \times 160 \text{ days} = 3.218 \text{ growth.}$$

Adjust to 1.2 lbs/day by multiplying 3.218 by the factor given in Line 6, Column 3, of the Postweaning Height Adjustment Table (page 24); $3.218 \times 100 = 3.22 + 38.67$ (the adjusted 205-day ht.) = 41.89 inches adjusted yearling height.

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 (Col. 1)	Height/Day (Col. 2)	% Adjustment to 1.2 lbs/Day (Col. 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
1.501 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
<u>Parameter</u>	<u>Estimate</u>	<u>Sig (T)</u>	<u>Estimate</u>
Intercept	0.01267377	0.0001	.00528
Gainrate x Gainrate	0.00058160	0.0001	.000052
Gainrate	0.00680978	0.0001	.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 .9	.0172	127
.901 to 1.1	.0195	112
1.101 to 1.3	.0218	100
1.301 to 1.5	.0242	90
1.501 to 1.7	.0265	82
1.701 to 1.9	.0288	76
1.901 to 2.1	.0311	70
2.101 to 2.3	.0334	65
2.301 to 2.5	.0357	61

Parameter	Estimate	Sig (T)	Standard Error
<u>Parameter</u>	<u>Estimate</u>	<u>Sig (T)</u>	<u>Estimate</u>
Intercept	0.00791567	0.0001	0.00113348
Gainrate	0.01160097	0.0001	0.00090902

N = 233 heifers; mean Ht./Day, .0216; SD, .0057; r = .645



Adjusting Heights for Determining Frame Score

Summary

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, mentally add 2 inches to her adjusted height and read from the Bull Frame Score Table (page 20).

The British breed heifer used in the example on pages 22 and 23 that adjusted to 41.89 inches at one year of age is a 3-frame heifer determined by adding the 2 inches for sex difference at one year, then going to the *Bull* Frame Score Table (page 20) to read the frame for 43.89 inches at one year of age.

SUMMARY OF CALF CROP RECORDS (PLAN A)

Check Purebred Herds Involved in Performance-Tested Sale Area _____
 *1 _____ Calves born 12/1 through 5/31 Specialist _____
 *2 _____ Calves born 6/1 through 11/30 Breed _____
 *3 _____ Calves from commercial herds and other purebred herds (Separate form for each breed)

Name of Breeder, Address County	Sex	No. of Animals	Total Ages of Dams ----- Average	Total of ADJUSTED 205-Day W.W.'s ----- Average	Top Range ----- Bottom Range	Total Feeder Grades ----- Average	Top Range ----- Bottom Range	Total Frame Scores ----- Average	Top Range ----- Bottom Range	Remarks
	B		-----	-----	-----	-----	-----	-----	-----	
	S		-----	-----	-----	-----	-----	-----	-----	
	H		-----	-----	-----	-----	-----	-----	-----	
	B		-----	-----	-----	-----	-----	-----	-----	
	S		-----	-----	-----	-----	-----	-----	-----	
	H		-----	-----	-----	-----	-----	-----	-----	
	B		-----	-----	-----	-----	-----	-----	-----	
	S		-----	-----	-----	-----	-----	-----	-----	
	H		-----	-----	-----	-----	-----	-----	-----	
	B		-----	-----	-----	-----	-----	-----	-----	
	S		-----	-----	-----	-----	-----	-----	-----	
	H		-----	-----	-----	-----	-----	-----	-----	

*Due Dates: 1. Dec. 31; 2. June 30; 3. As completed

BEEF COW PRODUCTION RECORD

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	Conf. Score Frame Score
P A T E R N A L	Grand Sire					-----					-----
	Grand Dam					-----					-----
M A T E R N A L	Grand Sire					-----					-----
	Grand Dam					-----					-----
P A R E N T	Sire of Dam					-----					-----
	Dam of Dam					-----					-----
∞	Dam Record					-----					-----
R E C O R D o f S I R E S	Name:					-----					-----
	Name:					-----					-----
	Name:					-----					-----
	Name:					-----					-----
S I R E S P R O G E N Y R E C O R D	Name:					-----					-----
	Name:					-----					-----
	Name:					-----					-----
	Name:					-----					-----
	Name:					-----					-----

POSTWEANING PHASE--PLAN B

The Plan B record form is available from the area livestock specialist.

A.H.E. Form No. 3 P.R. (Rev. 79) PLAN B--POSTWEANING RECORD Year: _____

Specialist's Signature: _____ County & Area: _____

Breeder: _____ Address: _____ Sex: _____ Breed: _____

Calf No.	Birth Date	Age of Dam	Sire	Adj. 205-day Weight	Actual Weaning Weight	Final Weight	Total Gain	Post-weaning A.D.G.	365-day Adj. Weight	Height Inches	Adj. Frame Score	Trimness 1-5	Conf. Score	Comments
				N= _____ Weight Ratio*	** Date Weaned	** Date of Final Weight	Post-weaning Days	Post-weaning Adj. to 160 days	Wt. Ratio Adj. for Contemporaries	*** Adj. 365-day Height	Muscle Score 1-5	Soundness 1-5		

*Ratio figured on sire group if there are 10 or more calves within sex management code; otherwise, figured on herd av. for season (Dec. through May) (June through Nov.)

**Minimum of 140 days between weaning weight and final weight.

***Days under 365 x .033 + actual height = Adjustment; Days over 365 x .025 - actual height = Adjustment

$$\text{Adj. 365-Day Weight Ratio for Contemporaries} = \left(\frac{\text{Individual Calf Weaning Weight Adj. 205 Days}}{\text{Mgt. Gp. Avg. Adj. 205-Day Weaning Wt.}} \right) + \left(\frac{\text{Individual 160-Day Post Weaning Gain}}{\text{Mgt. Gp. 160-Day Post Weaning Gain}} \right)$$

The first six columns of Form No. 3, P.R. are for information transferred from Form No. 2, P.R., Plan A--Calf Crop Record. These are:

- 1. Calf I.D.
- 2. Birthdate
- 3. Age of Dam
- 4. Sire/Dam
- 5. Adjusted 205-day wt./Wt. ratio and number of contemporaries averaged
- 6. Actual weaning wt./Date weaned



■ Issued in furtherance of Cooperative Extension Work Acts of May 8 and June 30, 1914 in cooperation with the United States Department of Agriculture. Carl N. Scheneman, Vice President for Extension, Cooperative Extension Service, University of Missouri and Lincoln University, Columbia, Missouri 65211. ■ An equal opportunity institution.

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Scanning system software ScandAll Pro v. 2.1.5 Premium
Optical resolution 600 dpi
Color settings 8 bit grayscale
File types tiff

Derivatives - Access copy

Compression Tiff: LZW compression
Editing software Adobe Photoshop CC
Resolution 600 dpi
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