

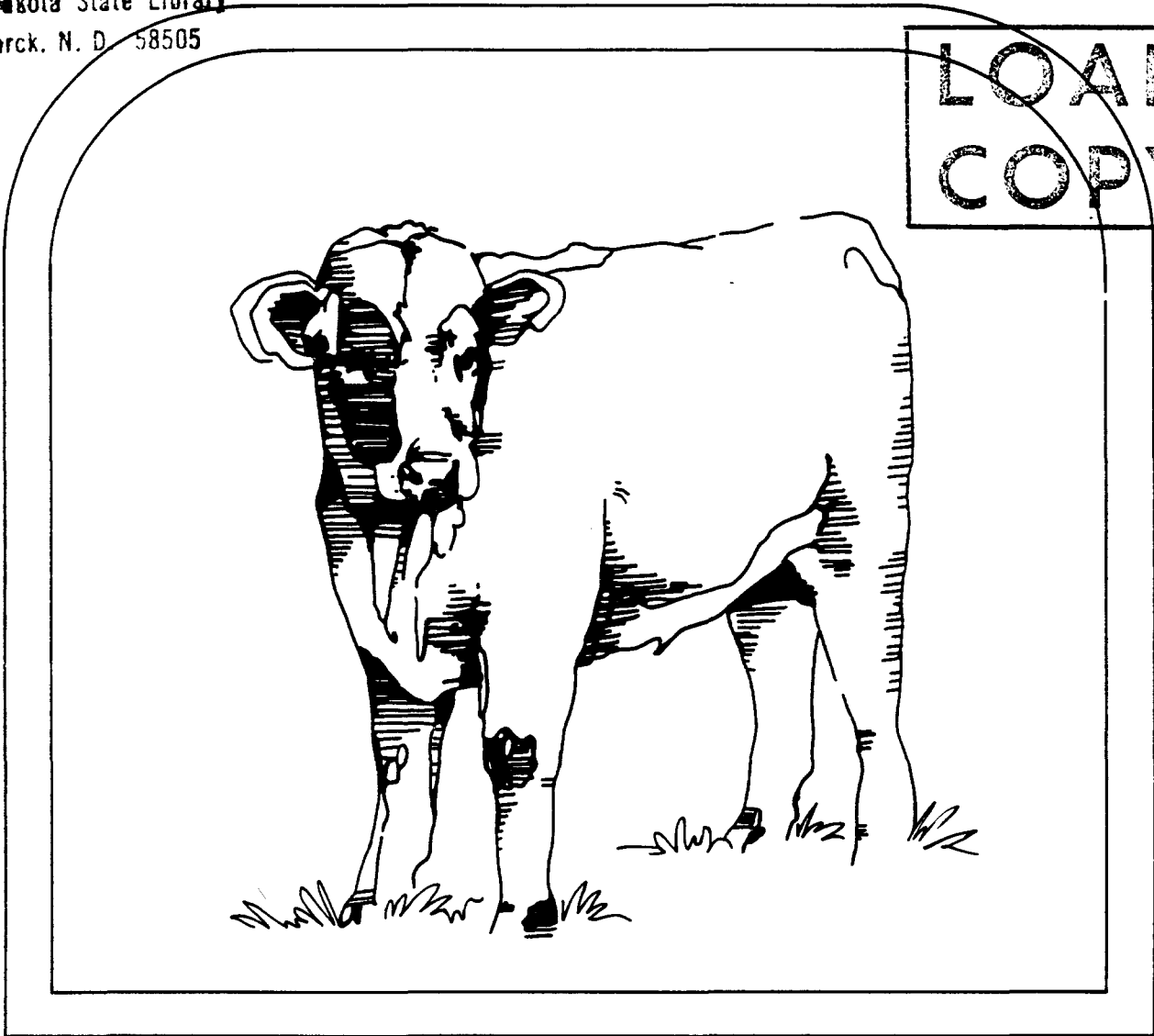
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# PERFORMANCE TESTING OF BEEF CATTLE

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## PERFORMANCE TESTING IN BEEF CATTLE

Performance testing has undergone thorough evaluation by researchers and producers and has proven to be important in economical beef production. The result has been a steady increase in the use of objective measurements as a basis for beef cattle improvement. The economic value of performance testing has earned broad acceptance within the beef industry. A number of the economically important traits can be objectively measured.

The function of performance testing is to help breeders locate differences among animals in their herds and increase the likelihood of selecting genetically superior individuals for breeding replacements. A secondary function involves the use of performance records in merchandising breeding stock to producers using standard terms and information relative to beef cattle improvement.

The benefits of applying performance records to herd selection and marketing should increase the prospect for economic gain reflected in dollars realized from the herd. The cow-calf producer realizes these benefits by the number and weight of animals he has to market and the quality of the stock demanded by the market. Producers must collect, record and analyze all the objective data available to improve the efficiency of production. The economic traits that are most important are: reproduction, growth rate, efficiency of gain, carcass merit and structural soundness. Procedures and methods to objectively measure these traits should be implemented to improve the productive efficiency and the desirability of the product.

Performance testing offers beef producers a means of measuring differences among animals in heritable, economic traits. It is not a game or contest, but a management tool to be used in improving herd productivity.

The principal features of an effective record of performance program are:

- All animals of a given sex and age are given equal opportunity to perform through uniform feeding and management.
- Systematic records of economically important traits on all animals are maintained.
- Records are adjusted for known sources of variation, such as age of dam and age and sex of calf.
- Records are used to select herd replacements (bulls and females) and to eliminate poor producers.
- The nutritional regime and management practices are practical and comparable to those

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*Reference: USDA Guidelines For Uniform Beef Improvement Programs.*

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where the progeny of the herd are expected to perform.

## SELECTION TRAITS

Many production traits are sufficiently high in heritability to provide a sound basis for selection. Heritability estimates may be defined as the proportion of the total phenotypic variation that is due to heredity. Weaning weight heritability estimates are approximately 30 percent, meaning 30 percent of the variation in a group of individuals is due to genetics and the remaining 70 percent to the environment in which they were raised.

## HERITABILITIES OF VARIOUS TRAITS IN BEEF CATTLE

TRAIT	HERITABILITY (percent)
Calving Interval	10
Birth Weight	40
Weaning Weight	30
Cow Maternal Ability	40
Feedlot Gain	45
Pasture Gain	30
Efficiency of Gain	40
Final Feedlot Weight	60
Conformation Score:	
Weaning	25
Slaughter	40
Carcass Traits:	
Carcass Grade	30
Rib Eye Area	70
Tenderness	60

Differences in performance among individuals or groups of animals are due to genetic and environmental causes. The observed or measured performance of each animal for each trait is the result of its heredity and the total environment in which it is produced. Genetically superior individuals can be more readily identified when the animals are maintained under the same management systems and their performance records are adjusted for known environmental differences. There are also many random or chance environmental variables which contribute to errors in estimating the breeding value of animals.

Research has shown that self-feeding the same growing ration to young bulls under comparable conditions will produce large differences in individual gains and among progeny groups of different sires. When bulls selected for ability to gain, as well as for conformation, were mated to cows selected at random, the calves sired by fast-gaining bulls were heavier at weaning time, gained more when handled as stocker cattle, and gained more while on finish feed.

Systematic measurements and the use of records in selection will increase the rate of genetic improvement. An estimated Breeding Value may be used to increase the effectiveness of selection by using all available performance data on individual animals and their ancestors to estimate the value of these individual animals as parents.

### HOW CAN PERFORMANCE TEST RECORDS BE USED?

Beef performance records are used to increase profits in the following ways:

- \* Raise the average performance of the herd in areas that affect net income, such as percent calf crop and growth rate to market age.
- \* Provide a complete herd inventory to use for improving management of the herd.
- \* Index the cows in the herd to identify the high-producing cows to keep and the low-producing ones to cull.
- \* Aid in selection of replacement heifers and herd bulls.
- \* Evaluate each sire within the herd.
- \* Provide objective performance data for potential buyers.
- \* Help advertise the merits of the herd.

### TWO ESSENTIALS IN SETTING UP A PERFORMANCE TESTING PROGRAM

1. Each cow and calf must be permanently identified.
2. A scale must be available to weigh the calves at weaning time and again at the end of the post-weaning period, if the animals are carried through this period.

### HERD IDENTIFICATION

To collect performance data, the cow herd must be identified through the use of ear tags, freeze or hot brands or neck chains. When freeze or hot brand numbers are used, they should be placed on the hip. Several years ago, the North Dakota Legislature authorized branding numbers on the hip for animal identification. Ear and horn tattoos are excellent means of identification, but they do not lend themselves to easy identification in pastures. It is desirable to use the tattoo for identification along with one of the methods which are more easily read in pastures or lots. Calves must be identified at birth, usually with numbered ear tags. Record the number of the mother, date of birth, sire number and sex of the calf and the birth weight if possible.

### WHEN IS PERFORMANCE DATA COLLECTED?

Weaning weights should be obtained when the calf crop averages about 205 days of age. To compute 205-day adjusted weaning weights on the NDSU

computer, the calves cannot be younger than 120 days or older than 270 days. A more desirable range is 160 to 250 days.

### WHAT IS WEANING WEIGHT ADJUSTMENT FACTOR?

To compare calves on a standard basis, the records are adjusted for age of calf, sex and age of dam. The amounts (in percentage or pounds) of adjustment are based on research from many experiment stations. The weight of a calf is standardized for differences which are not heritable, such as age at weighing, age of dam and sex of the calf. A table for calculating number of days of age at weaning time is included on page 9 at the end of this circular.

North Dakota Beef Cattle Improvement Association Program adjusts all calves to 205 days of age and to a bull equivalent weight. An adjustment is made for sex of calf since a bull calf on the average is expected to weigh more than steer or heifer calves at weaning time.

The Beef Improvement Federation (BIF) Guidelines encourage accounting for differences in sex of calf by calculating indexes for males and females separately.

The most appropriate adjustments for age of dam may differ from one breed to another. Many breed associations have developed their own adjustment factors for age of dam by sex of calf, so adjustments derived separately for each breed can be substituted for these recommended factors.

### QUALITY GRADE SCORE

At weighing, a quality grade score may be placed on each calf. This is an **optional** measurement. Several producers do not grade the calves at weaning time. The belief is that selecting for a desirable weight also selects for all or most of the other desirable traits. When the calves are not graded it simplifies performance testing and shortens the tabulations.

### RATIOS AND INDEXES

The use of ratios or indexes are useful in a performance testing program as they indicate the percentage above or below the herd average that an individual has performed to a given time — usually weaning and/or one year of age.

A weight ratio or index is the animal's individual adjusted weight divided by the average of the group's average adjusted weight within sex, multiplied by 100. An index above 100 is above the average of the group; conversely, an index below 100 is less than average. When evaluating animals by index, the number of contemporaries is important. The greater the number, the more meaningful the index.

The indexes are calculated for comparison within herds. Indexes can be very helpful when purchasing breeding stock from another producer's herd but must be interpreted with caution as they are based on a different herd average. An index of 110 in one herd is not equal to 110 in another herd.

**WHAT ARE 'CONTEMPORARIES'?** This refers to the number of animals reared, or tested, as one group. Sometimes, number of herd mates or number tested is used instead of number of contemporaries. When a single animal is tested, there are no contemporaries and the animal's weight ratio or test index is 100. On the other hand, if 205-day weights of 47 bull calves were summarized as one group from one herd, the number of contemporaries would be 46. Pay particular attention to number of contemporaries when comparing weight ratios or test indexes of animals from different herds or tests.

**WHAT IS THE WEIGHT RATIO?** It indicates the degree of superiority or inferiority, in weight, of an animal relative to the average weight of all animals of that particular sex and group. A weight ratio is calculated as:

$$\text{Wt. ratio} = \frac{\text{Animal's adj. wt.}}{\text{Sex group avg. adj. wt.}} \times 100$$

It is used to quickly determine the relative ranking of individuals within a group. Any animal with a weight ratio above 100 is heavier than the sex or group average; likewise, an animal whose weight ratio is less than 100 is lighter than the group average.

## BIRTH WEIGHTS

Collecting birth weights is a desirable management tool.

Calf birth weight is the single best indicator of calving difficulty, so selection of breeding animals for smaller birth weight appears to be an effective criterion for improving calving ease. Both sex of calf and age of the cow influence birth weight of the calf.

For recordkeeping, weight of females can be adjusted to a male basis by multiplying their birth weight times 1.07.

The following additive factors are recommended to adjust birth weight for differences in age of dam.

Age of cow	Pounds
2-year-olds	+ 8
3-year-olds	+ 5
4-year-olds	+ 2
5-10-year-olds	0
11 years or older	+ 3

Birth weight adjusted for age of dam and sex should be expressed as a ratio to the average of the birth weights of contemporary calves born in the same season. Birth weight ratios can be used to make comparisons between calves from the same herd born in different seasons. To facilitate selection for lighter birth weights to improve calving ease, it is recommended that a birth weight ratio be computed as follows.

$$\text{Birth weight ratio} = \frac{\text{Average adjusted birth weight of contemporary group}}{\frac{\text{Actual birth weight} + \text{Additive age of dam adjustment factor}}{100}} \times 100$$

## PREWEANING PHASE

**ADJUSTING WEANING WEIGHT TO 205 DAYS:** Two options are available for determining the 205-day adjusted weight: use the chart on page 8 (the chart uses a 70 pound birth weight) or use the following formula.

Computed  
205-day  
weight (lbs.) =

$$\frac{\text{actual weaning weight} - \text{birth weight}}{\text{age in days at weaning}} \times 205 + \text{birth weight} + \text{age of dam adjustment}$$

**MEASUREMENTS OF WEANING WEIGHT (205 DAYS).** The following provides an adjusted 205-day weight. A birth weight of 70 pounds may be used or one may use the following as recommended by some of the National Breed Association:

Breed	Male	Female	Both Sexes
BIF Guidelines			70
Charolais			85
Hereford	75	70	
Simmental	91	83	

Several breeds use the BIF Guidelines recommendation.

## ADDITIVE ADJUSTMENT FOR AGE OF DAM BY SEX OF CALF

Young cows and older cows are not expected to weigh off calves as heavy as cows five through 10 years old, and the following adjustment for age of dam is recommended in BIF Guidelines:

Age of Dam	Calf Sex	
	Male	Female
2 year old	60	54
3 year old	40	36
4 year old	20	18
5 to 10 years	0	0
11 and over	20	18

**ADDITIVE ADJUSTMENT FOR AGE OF DAM BY SEX OF CALF FOR CERTAIN BREEDS:**

Breed	Age of Dam	Calf Sex		Both Sexes
		Female	Male	
Charolais	2 years	59 lbs	69 lbs	
	3 years	30	35	
	4 years	11	10	
	5 to 10 years	None	None	
	11 years plus	30	30	
Hereford	Up to 2 years and 3 months			52
	2 yr & 3 mo to 3 yrs			35
	3 yr to 3 yrs and 11 mo			23
	3 yrs & 11 mo to 4 yrs & 11 mo			9
	4 yrs & 11 mo to 12 years			0
	Over 12 years			12
	Simmental	2 years old and younger	53	63
3 yr old		32	37	
4 yr old		16	22	
5 year and older		0	0	

The period between weaning weight and final weight should be at least 160 days. Final weight should not be taken at less than 330 days of age for any individual animal, and the average age for each sex-management group should be at least 365 days. It is recommended that the number of days between weaning and final weight be the same for all animals of the same sex in a herd. With this procedure a producer needs to obtain only weaning weight and yearling weight on each animal. All growth periods in this animal's life are included in this procedure.

The procedure of using adjusted 365-day weights as a measure of yearling weight will apply primarily to herds that develop bulls on a rather high level of concentrate feeding starting at weaning time. For breeders who prefer to develop bulls more slowly, a long yearling weight may be used as an alternative to the adjusted 365-day weights. Also, it may be more desirable to develop replacement heifers on a lower feeding regime. In such instances, long yearling weights may be more appropriate.

Adjusted long yearling weight (452 or 550 days) for each sex should be computed in the same manner as adjusted 365-day weight:

Adjusted 550-day weight =

$$\frac{\text{Actual final weight} - \text{Actual weaning weight}}{\text{Number of days between weights}} \times 345 + 205\text{-day weaning weight adjusted for age of dam}$$

To compute 452-day weight, substitute 247 for 345 in the equation. For bulls grown on intermediate feed levels, adjusted 452-day weight gives a better evaluation of growth potential than 365-day weight. Feeding them to 550 days on a standard ration might result in their becoming excessively fat. Final weight should not be taken at less than 500 days of age when estimating 550-day weight or at less than 400 days when estimating 452-day weight.

**WEIGHT RATIOS.** Weight ratios for either adjusted 365-day weight (yearlings), adjusted 452-day weight, or adjusted 550-day weight (long yearlings) should be computed separately for each sex-management code group. Weight ratios should also be reported separately for each sex-management code group for ease of ranking individual animals for each sex in making selections.

**HERD MANAGEMENT**

Several measures can be summarized to evaluate reproduction efficiency of the whole herd or of bull mating groups. Identification of bull or overall herd deficiencies will allow producers to see where cor-

**POSTWEANING PHASE — ON THE FARM OR RANCH.** This phase is a measurement of yearling weight (365) days or long yearling weight (452 or 550 days). When cattle have been compared on a constant weight or age basis, yearling weight at 365 days or long yearling weight at 452 or 550 days are particularly important because of their high heritability and high genetic association with efficiency of gain and pounds of retail trimmed boneless beef produced.

Yearling weight should be computed and reported separately for each sex. In on-the-farm or ranch tests, the postweaning period should start on the date weaning weights are obtained (for example, actual weaning weight is used as initial weight on test). Research results show that the age-of-dam effects on 365-day weight are of approximately the same magnitude as age-of-dam effects at weaning. For this reason, it is desirable to add postweaning gains in a 160-day, postweaning period to 205-day weaning weight, adjusted for age of dam, to arrive at adjusted 365-day weight. The following formula is recommended:

Adjusted 365-day weight =

$$\frac{\text{Actual final weight} - \text{Actual weaning weight}}{\text{Number of days between weights}} \times 160 + 205\text{-day weaning weight adjusted for age of dam}$$

rective actions should be taken to improve reproduction in their herds. Quantities to calculate are as follows:

1. Number of cows exposed. This is the number of cows exposed for either A.I. or natural service breeding either in the present year's breeding season or in the past year's breeding season (see 2 and 3). This figure should be calculated on a total herd basis but may also be calculated on a bull mating group basis.
2. Percent palpated pregnant. This is a measure of the success of the breeding season. It is calculated as follows:

$$\text{Percent palpated pregnant} = \frac{\text{Number of cows palpated pregnant}}{\text{Number of cows exposed}} \times 100$$

3. Live calving percent. This is a measure of the success of the cumulative results of the breeding and calving seasons. It is calculated as follows:

$$\text{Live calving percent} = \frac{\text{Number of live calves}}{\text{Number of cows exposed} - \text{Number of cows sold or died}} \times 100$$

4. Weaning percent. This measure, also called "percent calf crop weaned," relates the cumulative results of breeding, calving, and preweaning to reproductive efficiency in the cowherd. Percent calf crop weaned has been recognized as the most descriptive single measure of reproductive efficiency. It is calculated as follows:

Weaning percent =

$$\frac{\text{Number of calves weaned} + \text{Number of calves sold preweaning}}{\text{Number of cows exposed} - \text{Number of cows sold or died before calving}} \times 100$$

The summarization of breeding and calving dates would also be helpful to the breeder in evaluating reproduction in the cowherd or in sire breeding groups. A review of breeding date records will help

to identify such early breeding problems as a bull's infertility or the non-cycling cow. Review of calving date records is an "after the fact" reflection of the previous year's conception dates and may also be used to plan methods to shorten the breeding and calving seasons in future years.

## PROCESSING THE DATA

The producer has a number of alternatives in having the data processed.

1. The producer may elect to process his own data. Forms for this are available at the County Extension Office or from the Extension Animal Science Office, Hultz Hall, NDSU, Fargo, 58105. Cow and sire summaries may be time-consuming for the producer to calculate without a computer.
2. Computer service, arranged for by the NDBCIA, is available at NDSU for processing the data. The service includes processing weaning records, yearling data and sire certification data. The print out includes data on each calf, cow and sire. Cow and sire summaries and estimated breeding values are included in the print out. There is a nominal charge for this service. The information included on the print outs are a result of input and recommendations from representatives of the North Dakota Beef Cattle Improvement Association, Extension Service and the Agricultural Experiment Station. This program is useful to commercial producers as well as registered breeders.
3. Most National Breed Associations provide processing service through their performance testing programs. Some associations require that performance data be submitted before the individuals are registered. The use of a program through the breed association is necessary to become a part of a national sire reference program.
4. The AGNET program available through the County Extension Agent's Office is available for processing 205-day adjusted weaning and yearling weights. The AGNET program does not compute cow or sire summary averages for more than one year.

## HOW TO MAKE GOOD USE OF YOUR RECORDS

1. Build up a history of production on each cow in your herd. You probably know which is the best cow in your herd and which is the poorest. But do you know which cows are in the top half and which are in the bottom half? Studies of some herds have indicated the top third of the cow herd will return three times the net income of the lower third of the cow herd. Use these cow records to:
  - a. Cull your herd. Culling even first-calf heifers on the basis of one calf is an economically sound practice.

- b. Make a list of potential herd replacements from calves with heaviest weaning weights and satisfactory type scores.
- From the list of potential replacements, select calves that gain fastest after weaning and have the heaviest yearling weight. These calves should be herd replacements or good prospects for sale to other producers.
  - Check the weaning weights, grade, feedlot gain, and carcass quality of calves sired by different bulls if you use more than one bull.
  - A seed stock producer should supply performance records to his prospective buyers. The records do not change the cattle, but complete records should make them more valuable.

**EXAMPLE USED FOR CALCULATING ADJUSTED WEANING WEIGHT (Chart 1, Page 11)**

Calf birth weight —	68 lbs.
Sex	Female
Birth Date	April 4
Weaning Date	October 4
Dam Age	4 years
Actual weaning weight	430 lbs.
Age in days —	183 (from page 9)
Adjusted weaning weight-	472 lbs.
	(from page 8)
Plus Adjustment for age of dam —	18 lbs.
	(from page 4)
Adjustment for age of calf and dam	472 + 18 = 490

**WEIGHT RATIOS**

Female average adjusted weaning weight 450 lbs.

Female average birth weight 74 lbs.

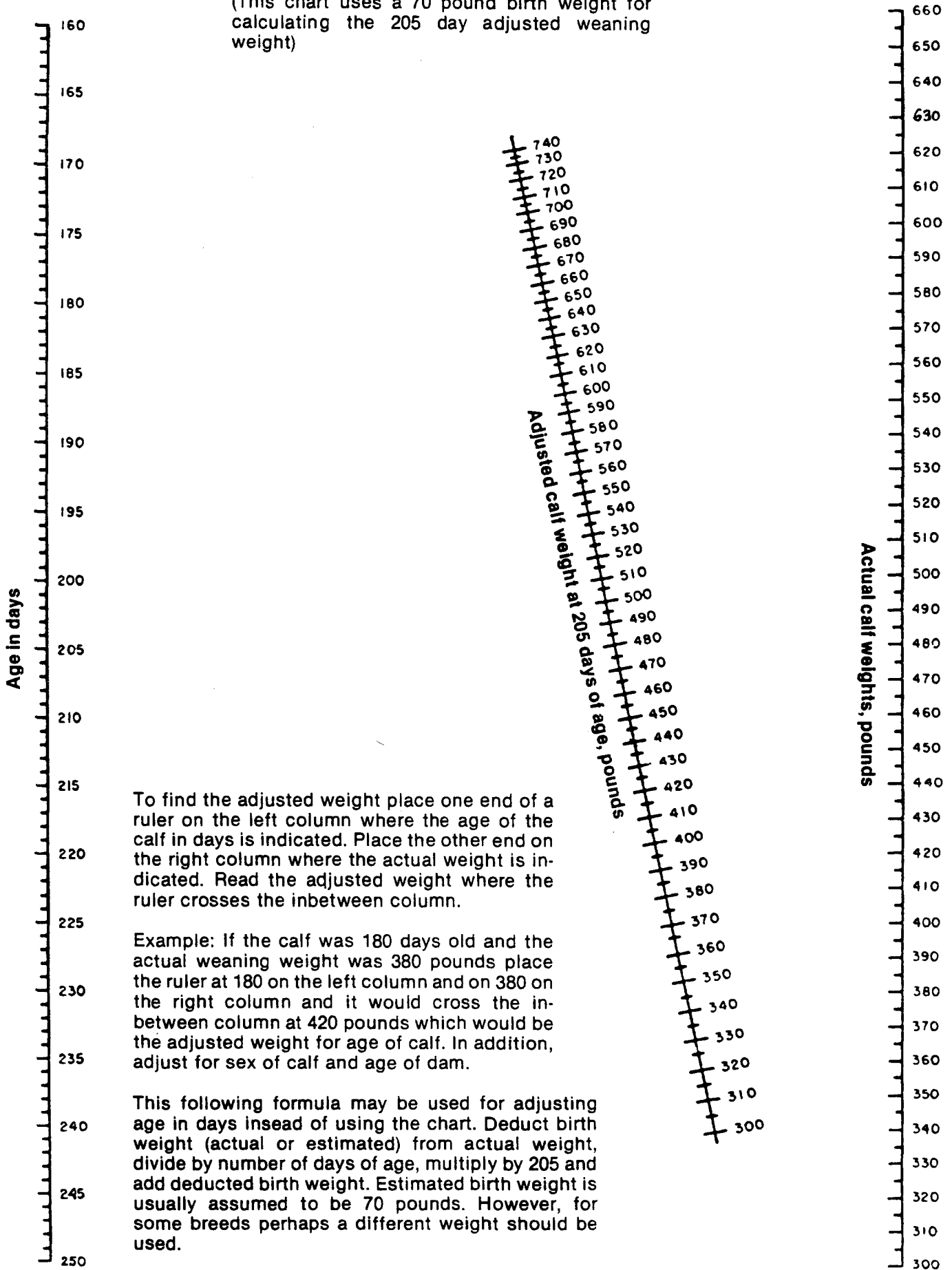
$$\text{Weaning wt. ratio} = \frac{\text{Animals Adj. Wt.}}{\text{Sex group ave. adj. wt.}} \times 100$$

$$\text{Weaning wt. ratio} = \frac{490}{450} \times 100 = 109$$

$$\text{Birth wt. ratio} = \frac{\text{Ave. adj. birth wt. of contemporary group}}{\text{Actual birth wt.} + \text{Additive age of dam adj. factor (from page 4)}} \times 100$$

$$\text{Birth wt. ratio} = \frac{74}{68 + 2} \times 100 = 106$$

(This chart uses a 70 pound birth weight for calculating the 205 day adjusted weaning weight)



To find the adjusted 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 on the right column where the actual weight is indicated. Read the adjusted weight where the ruler crosses the inbetween column.

Example: If the calf was 180 days old and the actual weaning weight was 380 pounds place the ruler at 180 on the left column and on 380 on the right column and it would cross the in-between column at 420 pounds which would be the adjusted weight for age of calf. In addition, adjust for sex of calf and age of dam.

This following formula may be used for adjusting age in days instead of using the chart. Deduct birth weight (actual or estimated) from actual weight, divide by number of days of age, multiply by 205 and add deducted birth weight. Estimated birth weight is usually assumed to be 70 pounds. However, for some breeds perhaps a different weight should be used.



**CHART FOR FIGURING AGE IN DAYS**

Day of Month	1 Jan.	2 Feb.	3 Mar.	4 Apr.	5 May	6 June	7 July	8 Aug.	9 Sept.	10 Oct.	11 Nov.	12 Dec.	Day of Month
1	1	32	60	91	121	152	182	213	244	274	305	335	1
2	2	33	61	92	122	153	183	214	245	275	306	336	2
3	3	34	62	93	123	154	184	215	246	276	307	337	3
4	4	35	63	94	124	155	185	216	247	277	308	338	4
5	5	36	64	95	125	156	186	217	248	278	309	339	5
6	6	37	65	96	126	157	187	218	249	279	310	340	6
7	7	38	66	97	127	158	188	219	250	280	311	341	7
8	8	39	67	98	128	159	189	220	251	281	312	342	8
9	9	40	68	99	129	160	190	221	252	282	313	343	9
10	10	41	69	100	130	161	191	222	253	283	314	344	10
11	11	42	70	101	131	162	192	223	254	284	315	345	11
12	12	43	71	102	132	163	193	224	255	285	316	346	12
13	13	44	72	103	133	164	194	225	256	286	317	347	13
14	14	45	73	104	134	165	195	226	257	287	318	348	14
15	15	46	74	105	135	166	196	227	258	388	319	349	15
16	16	47	75	106	136	167	197	228	259	289	320	350	16
17	17	48	76	107	137	168	198	229	260	290	321	351	17
18	18	49	77	108	138	169	199	230	261	291	322	352	18
19	19	50	78	109	139	170	200	231	262	292	323	353	19
20	20	51	79	110	140	171	201	232	263	293	324	354	20
21	21	52	80	111	141	172	202	233	264	294	325	355	21
22	22	53	81	112	142	173	203	234	265	295	326	356	22
23	23	54	82	113	143	174	204	235	266	296	327	357	23
24	24	55	83	114	144	175	205	236	267	297	328	358	24
25	25	56	84	115	145	176	206	237	268	298	329	359	25
26	26	57	85	116	146	177	207	238	269	299	330	360	26
27	27	58	86	117	147	178	208	239	270	300	331	361	27
28	28	59	87	118	148	179	209	240	271	301	332	362	28
29	29		88	119	149	180	210	241	272	302	333	363	29
30	30		89	120	150	181	211	242	273	303	334	364	30
31	31		90		151		212	243		304		365	31

**EXAMPLE**

1. An animal born April 16 and weighed October 20. Look down column 10 to October 20 and read 293. Look down column 4 to April 16 and read 106. Subtract 106 from 293 = 187 days old.

2. An animal born November 10 and weighed May 12. November 10th is the 314th day of the year. Subtract 314 from 365 = 51 days to January 1. May 12 is the 132nd day of the year so add 51 to 132 which equals 183 days, the age of the animal.

## COW AND CALF IDENTIFICATION

1. The entire identification number on all animals must contain eight or less numbers and/or letters.
2. Most importantly, the identification on an animal will not change during the lifetime of the animal. (SEE CAUTION BELOW)
3. Do not go back and change numbers on animals already reported.
4. Use the International year/letter in the identification of the animal to indicate the year of birth.
5. Keep the identification on the herd sires used over the years unique so that the records on the progeny of two or more sires are not combined.
6. Use the official breed codes for designating breed of dam and breed of sire as listed below:

The international year/letter designations are:

L — 1979  
M — 1980  
N — 1981  
P — 1982  
R — 1983  
S — 1984  
T — 1985  
U — 1986  
V — 1987  
W — 1988  
X — 1989  
Y — 1990  
Z — 1991

**CAUTION:** Some producers assign the same I.D. numbers to the calves as their respective dams for the purpose of easily matching calves with dams. Do not use this as your permanent identification system because in four years it could happen that two or more calves could get the same number.

Example: (1979) L102--(1981) N102--(1983) R102  
←—————→ R102

We recommend that the calves be assigned numbers (with year-letter designations) in sequence as they are born. The dam numbers can then be written on the tags for the purpose of matching calves with dams. When reporting the weaning weight of the calf, report the permanent identification of the calf, not the dam number that was written on the tag.

### BREED ABBREVIATION CODES

#### Beef and Dual Purpose

AF—Africander	HH—Hereford (Horned)
AN—Angus	HP—Hereford (Polled)
AR—Red Angus	HR—Red Holstein
BA—Barzona	LM—Limousin
BG—Belted Galloway	LR—Lincoln Red
BM—Beefmaster	MN—Magnum
BD—Blonde d'Aquitaine	MA—Maine Anjou
BN—Brangus	MG—Murray Grey
BR—Brahman	MR—Marchigana
CA—Chianina	RB—Red Brangus
CB—Charbray	RD—Red Dane
CH—Charolais	RN—Romagnola
DE—Devon	RP—Red Polled
DR—Dexter	SB—Brown Swiss (Beef)
DS—South Devon	SG—Santa Gertrudis
FV—Fleckvieh	SH—Scotch Highland
GA—Galloway	SM—Simmental
GV—Gelbvieh	SP—Polled Shorthorn
HC—Hays Converter	SA—Saler

#### Dairy

AY—Ayrshire  
BX—Brown Swiss  
GU—Guernsey  
HO—Holstein  
JE—Jersey  
MS—Milking Shorthorn

SS—Scotch Shorthorn  
TA—Tarentaise  
TL—Texas Longhorn  
WB—Walsh Black



