



Beef Improvement Terminology

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Efficient beef cattle production has become a specialty business in recent years. Breeding, nutrition, and reproduction work jointly toward efficient production of beef. The following terms and definitions have become everyday language for today's cattleman. The terminology has been gathered from many sources and deals primarily with breeding and improvement and, to a lesser extent, with nutrition and reproduction.

Accuracy (of selection). Correlation between "true" breeding value and estimated breeding value.

Ad lib feeding. No limit placed on amount of intake (self-feeding).

Adjusted weaning weight. A weaning weight adjusted for age of calf and age of dam in the pre-weaning period.

Average daily gain. The average weight change in pounds of an animal during a 24-hour feeding or grazing period.

Beef carcass data service. A program whereby any producer can receive carcass evaluation data on his cattle by using a special "carcass data" eartag in his slaughter animals.

Beef Improvement Federation (BIF). A federation or organization interested or involved in performance evaluation of beef cattle.

Birth weight. The weight of a calf within 24 hours after birth. Heavy birth weights are correlated with calving problems, but the conformations of the calf and the cow are contributing factors.

Breed. Animals having a common origin and characteristics which distinguish them from other groups within the same species.

Breed average (herd-mates). A herd-mate (offspring of another sire in the same herd at the same time) producing at the current average production for that particular breed.

Breeding value. Value of an animal as a breeder. The working definition is *twice the difference* between an infinitely large number of progeny and the population average when the individual is mated to random numbers of the population and all progeny are managed alike. The difference is doubled because only a sample half (one gene of each pair) is transmitted to the progeny. Breeding value exists for each trait and is dependent on the population in which the animal is evaluated.

Bull. An uncastrated male bovine.

Calf. The sexually immature young of certain large mammals including cattle.

Calf crop. Calves produced by a herd of cattle in one season.

Carcass cutability. An estimate of the percent of trimmed boneless retail cuts from the round, loin, rib, and chuck.

Carcass evaluation. Technique of measuring components of quality and quantity of carcasses.

Carcass merit. Desirability of a carcass relative to quantity of edible portion and quality of product.

Carrier. A heterozygote for any trait where the homozygous recessive is different from the homozygous dominant and heterozygous genotype.

Central testing stations. Locations with facilities to assemble animals from several herds to evaluate differences in post-weaning performance under uniform conditions.

Chute randomization. One method of assigning cows to test series in an unpredictable manner. The cows are bred to a rotating list of bulls as they come into estrus. Usually the method of choice used by contract breeders. Also helps spread the calves by each sire over the season.

Closed herds. A herd in which no outside genes are introduced.

Comparable cows. Similar sets of cows mated to bulls being evaluated to eliminate differences in cows from the difference between sire progeny averages.

Conception. The fecundation of the ovum. The action of conceiving or becoming pregnant.

Congenital. Acquired during prenatal life. It exists at or dates from birth.

Correlation. A measure of how two traits vary together. A correlation of +1.00 means that as one trait increases the other also increases—a perfect positive relationship. A correlation of -1.00 means that as one trait increases the other decreases—a perfect negative, or inverse, relationship. A correlation of 0.00 means that as one trait increases, the other may increase or decrease—no relationship. Thus, a correlation coefficient may lie between +1.00 and -1.00.

Cow. A mature female bovine.

Crossbreeding. The mating of animals of different breeds (or species).

Culling. The process of eliminating non-productive or undesirable animals.

Cutability. An expression of the amount of salable meat in a carcass. In practice; it is determined through proper combination of records, including carcass weight, ribeye area, fat thickness, and estimated percent of kidney, pelvic, and heart fat.

- Dam.** The female parent.
- Deviation.** A difference between one value and the average value. These differences sum to zero when the average is used. A ratio deviation is the ratio less the average ratio or 1.00.
- Dominant.** Dominant genes affect the phenotype when present in either homozygous or heterozygous condition.
- Dystocia.** Abnormal or difficult labor, causing difficulty in delivering the fetus and placenta.
- Economic value.** The net return to an enterprise for making a unit change in a particular trait.
- Equal progeny treatment.** Giving the resulting progeny from all bulls in a test equal treatment in order to eliminate environmental differences from the differences between sire progeny averages.
- Estimate.** (verb)- The process of calculating a particular value from data. (noun) - The value itself obtained from data. The idea is that the true value is being obtained from the calculated value within limits of sampling variation.
- Estrus.** The recurrent, restricted period of sexual receptivity (heat) in female mammals, marked by intense sexual urge.
- Expected progeny difference.** The difference in performance to be expected from future progeny of a sire, compared to that expected from future progeny of the average bull in the same test.
- Feed conversion (feed efficiency).** Units of feed consumed per unit of weight increase. Also, the production (meat, milk, eggs) per unit of feed consumed.
- Fetus.** The unborn young of animals (usually vertebrates) which give birth to living offspring.
- Frame score.** Based on shoulder or hip height measurements at different age increments. Using hip height for bulls at one year of age, a frame size 3 will be 45 to 47 inches, a frame 5 will be 49 to 51 inches. Average commercial cattle vary from a frame score 3 through 5.
- Freemartin.** Female born twin to a bull calf (approximately 9 out of 10 will not conceive).
- Generation interval.** Average age of the parents when the offspring destined to replace them are born. A generation represents a complete turnover of a herd.
- Genes.** The particular units of heredity that occur in pairs and have their effect in pairs in the individual, but which are transmitted singly (one or the other gene at random of each pair) from parent to offspring and, thus, segregate and recombine each generation.
- Genetic correlations.** Correlations between two traits caused by the same genes having effects on both traits.
- Genotype.** Actual genetic constitution (makeup) of an individual as determined by its germ plasm. For example, there are two genotypes for brown eyes, BB and Bb.
- Gonad.** The gland of a male or female which produces the reproductive cells; the testicle or ovary.
- Half-sib.** In genetics, a half-brother or half-sister.
- Heifer.** A female of the cattle species less than 3 years of age which, has not borne a calf.
- Herd.** A group of animals (especially cattle, horses, and swine), collectively considered as a unit.
- Heredity.** The hereditary transmission of genetic or physical traits of parents to their offspring.
- Heritability.** A technical term used by animal breeders to describe what fraction of the differences in a trait, such as milk production or growth, is due to differences in genetic value rather than environmental factors; variation due to genetic effects divided by the total variation (genetic plus environmental variation).
- Heritability estimate.** An estimate of the proportion of the total phenotype variation between individuals for a certain trait that is due to heredity. More specifically, hereditary variation due to additive gene action.
- Heterosis (hybrid vigor).** Amount by which the crossbreds exceed the average of the two purebreds that are crossed to produce the crossbreds.
- Heterozygous.** Genes of a specific pair are unlike in an individual.
- Homozygous.** Genes of a specific pair are alike in an individual.
- Inbreeding.** Production of offspring from parents more closely related than the average of a population. Genetically, inbreeding increases the proportion of homozygous genes in a population.
- Incomplete dominance.** A situation in which neither gene within a gene pair is dominant to the other, with the result that both are expressed in the phenotype which is intermediate between the two traits.
- Intensity (of selection).** The difference between the selected animals and the average of the animals from which they came, expressed relative to the amount of variation in the traits. Intensity is a function of the fraction of a population saved, such as 1 percent.
- Involution.** The return of an organ to its normal size or condition after enlargement, as of the uterus after parturition. A decline in size or activity of other tissues; e.g., the mammary gland tissues normally involute with advancing lactation.
- Linear measurements.** Any measurement of length or distance that may be obtained from an animal. Hip or shoulder height may be used to establish frame score.
- Linebreeding.** A form of inbreeding in which an attempt is made to concentrate the inheritance of some ancestor in the pedigree.
- Linecross.** A cross of two inbred lines.
- Marbling.** The distribution of fat in muscular tissue, which gives meat a spotted appearance.
- Metabolic body size.** The weight of the animal raised to the 3/4 power ($W^{.75}$); a figure to indicate level of metabolism to maintain a certain body weight.
- Metabolism.** The transformation by which energy is made available for body uses.
- Most probable producing ability.** A measure of cow productivity weighed for number of progeny and repeatability.
- National sire evaluation.** Programs of sire evaluation conducted by breed associations to compare sires on a progeny test basis.
- Number of contemporaries.** The number of animals of similar breed, sex, age, etc., against which an animal was compared in performance tests. The greater the number of contemporaries, the greater the accuracy of comparisons.

Open. A term commonly used for farm animals to indicate a nonpregnant status.

Outcross. Mating of an individual to another in the same breed, which is not closely related to it.

Ovulation. Release of the female germ cell (egg) by the ovary.

Pedigree. A list of an animal's ancestors, usually only those of the three to five closest generations.

Performance data. The record of the animal itself—its birth weight, weaning weight, gain, and grade, etc.

Performance pedigree. Contrasted to a conventional pedigree, which lists names of ancestors, a performance pedigree is a listing of an animal's performance record and of its ancestor's performance and progeny records.

Performance testing. The measurement of certain traits of performance in livestock with the intent of using the records in selection.

Phenotype. The visible or measurable expression of a character; for example, coat color or weaning weight.

Phenotype correlations. Correlations between two traits caused by both genetic and environmental factors influencing both traits.

Polled. A naturally hornless animal. Having no horns.

Possible change value. A measure of the accuracy with which the number and distribution of progeny available allowed the E.P.D. to predict the future progeny performance; this value indicates the amount of change either plus or minus that is possible when additional progeny records are included. The smaller the P.C. value, the less it should change.

Pounds of retail cuts per day of age. A measure of cutability and growth combined, it is calculated as follows:
(cutability X carcass weight) / age in days

Progeny. The offspring of animals.

Progeny data. The record of a bull's calves—weaning weights, feedlot gains, and possibly their carcass evaluation. The progeny test is the best measure of the breeding value of a bull, though it is slow to accomplish.

Progeny testing. Evaluating the genotype of an individual by a study of its progeny.

Puberty. The age at which the reproductive organs become functionally operative and secondary sex characteristics develop.

Purebred. An animal of a recognized breed that is eligible for registry in the official herdbook of that breed.

Qualitative traits. Those traits in which there is a sharp distinction between phenotypes, such as black and white or polled and horned. Usually, only one or two pairs of genes are involved.

Quality. A term indicating fineness of texture as opposed to coarseness. Commonly used to indicate relative merit.

Quantitative traits. Those traits in which there is no sharp distinction between phenotypes, with a gradual variation from one phenotype to another, such as weaning weight. Usually, several genes are involved, as well as environmental factors.

Random mating. A system of mating where every male has an equal chance of mating with every female (or, more practically, has had cows allocated without selection or bias).

Rate of genetic improvement. Dependent on: (1) heritability of traits considered; (2) selection differential; (3) genetic correlation among traits considered; and (4) generation interval of the species.

Recessive gene. Recessive genes affect the phenotype only when present in homozygous condition.

Reference sire. A bull designated to be used as a "bench mark" in progeny-testing other bulls (young sires). Progeny by reference sires in several herds enable comparisons to be made between bulls not producing progeny in the same herd.

Regression (regressed). A measure of the relationship between two variables. The response in one can be predicted by knowing the value of the other variable.

Repeatability. A measure of the consistency between records of an individual. The top producers one year will tend to be near the top the next year.

Scrotal circumference. The circumference of the testicles usually in centimeters. Standards have been set with a minimum of 30 centimeters at a year of age being more desirable. Highly correlated to semen volume.

Selection. Causing or allowing certain individuals in a population to produce the next generation.

Selection differential. The difference between the selected animals and the average of the group from which they came.

Steer. A male bovine castrated before the development of secondary sex characteristics.

Ultrasonics. (Sonoscope, Sonoray, and Scanogram). Ultrasonic devices designed to measure the fat covering on the back of an animal and the size of the rib eye or loin eye by means of high frequency sound waves.

USDA carcass grade. A USDA quality grade is obtained by a federal grader and is a measure of overall carcass desirability. The components are (1) marbling score, (2) texture of the lean, (3) color of the lean, (4) firmness of the lean, and (5) maturity.

USDA yield grade. Measures of carcass cutability categorized into numerical categories with 1 being the best and 5 the poorest. Lean carcasses receive the better yield grades, and fat carcasses receive the poorer grades.

Variance. Variance is a statistic which describes the variation we see in a trait. Without variation, no genetic progress is possible, since genetically superior animals would not be distinguishable from genetically inferior ones.

Weight per day of age. The weight of an animal divided by the animal's age in days when weighed.

Weight ratio. In beef cattle evaluations, weight ratios refer to the weight of an individual animal relative to the average of all animals in the same group. It is calculated as:

$$\frac{\text{Individual record}}{\text{Average of animals in group}} \times 100$$

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