

Beef Performance Glossary

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A

Abscess

A swollen, inflamed area in body tissue in which pus gathers.

Accuracy

A measure of reliability associated with an expected progeny difference. The measure ranges from 0 to 1, with values closer to 1 indicating greater reliability because of the inclusion of more information.

Active Ingredient

The specific drug component part of a chemical compound.

Antiseptic

A substance that reduces or stops growth of organisms in or on living tissue.

Average Daily Gain (ADG)

Measurement of daily body weight change in animals on a feed or performance test.

Adjusted Weaning Weight

An unshrinkable off-the-cow weight adjusted to 205 days of age and to a mature dam age equivalence.

Adjusted Yearling Weight

An unshrinkable weight adjusted to either 365, 452 or 550 days of age.

Alleles

Alternate forms of genes. Because genes occur in pairs in body cells, one gene of a pair may have one effect and another gene of that same pair (allele) may have a different effect on the same trait.

Artificial Insemination (AI)

The technique of placing semen from the male into the reproductive tract of the female by means other than natural service.

B

Backcross

The mating of a two-breed crossbreed offspring back to one of its parental breeds. (Example: A Hereford-Angus crossbred back to an Angus bull.)

Beef Improvement Federation (BIF)

A federation of organizations, businesses and individuals interested or involved in performance evaluation of beef cattle. The purposes of BIF are to bring about uniformity of procedures, development of programs, cooperation among interested entities, education of members and the users' performance evaluation methods and to build confidence of the beef industry in the principles and potentials of performance testing.

Birth Weight (BW)

The weight of a calf taken within 24 hours of birth. Heavy birth weights tend to be correlated with calving problems, but the conformation of the calf and the cow are contributing factors.

Body Condition Score

A score reflecting the amount of fat reserves in a cow's body on a scale of 1 to 9, where 1 = very thin and 9 = extremely fat.

Bos indicus

These are Zebu (humped) cattle including the Brahman breed in the United States.

Bos taurus

Includes most cattle found in the United States, including their European ancestors.

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Breed

Animals with a common origin and common characteristics that distinguish them from other groups of animals within that same species.

Breeding Program Goals

The objective or “direction” of breeders’ selection programs. Goals are basic decisions breeders must make to give “direction” to their breeding programs. Goals should vary among breeders due to relative genetic merit of their cattle, their resources and their markets.

Breeding Soundness Examination

Inspection of a bull involving evaluation of physical conformation and soundness through genital palpation, scrotal circumference and testing semen for motility and morphology.

Breeding Value

Value of an animal as a parent. The working definition is twice the difference between a very large number of progeny and the population average when individuals are mated at random with the population and all progeny are managed alike. The difference is doubled because only one gene of each pair is transmitted from a parent to each progeny.

British Breeds

Breeds of cattle originating in Great Britain, such as Angus, Hereford and Shorthorn.

C

Caesarean Section

A process where the calf is removed from the cow during parturition by making a large incision in the right side of the cow just above the flank.

Calving Difficulty (Dystocia)

Abnormal or difficult labor, causing difficulty in delivering a fetus and/or placenta.

Calving Rate

Number of calves born divided by the number of cows exposed to a bull.

Calving Season

The season(s) of the year when calves are born. Limiting calving seasons is the first step to performance testing the whole herd, accurate records and consolidated management practices.

Carcass Evaluation

Techniques of measuring components of quality and quantity in carcasses.

Carcass Merit

Desirability of a carcass relative to quantity of components (muscle, fat and bone), USDA quality grade, plus potential eating qualities.

Carcass Quality Grade

An estimate of palatability based primarily on marbling and maturity and to a lesser extent on color, texture and firmness of lean.

Carrier

A heterozygous individual having one recessive gene and one dominant gene for a given pair of genes (alleles). For example, an animal with one gene for polledness and one gene for horns will be polled but can produce horned offspring when mated to another animal carrying the gene for horns.

Central Test

A location where animals from several herds are assembled to evaluate differences in certain performance traits under uniform management conditions.

Chromosome

A chromosome is a long DNA molecule on which genes (the basic genetic codes) are located. Domestic cattle have 30 pairs of chromosomes.

Clinical Disease

Visible signs of poor health due to the presence of invading organisms.

Closed Herd

A herd into which no outside breeding stock (cattle) is introduced.

Collateral Relatives

Relatives of an individual that are not its ancestors or descendants. Brothers and sisters are examples of collateral relatives.

Compensatory Gain

Gain from cattle that have been nutritionally deprived for part or all of their lives. Once fed feedlot rations, they compensate for the earlier restriction of feed by gaining very rapidly.

Conformation

The shape and arrangement of the different body parts of an animal.

Congenital

Acquired during prenatal life. Condition exists at or dates from birth. Often used in the context of congenital (birth) defects.

Contemporary Group

A group of cattle that are of the same breed and sex and have been raised in the same management group (same location on the same feed and pasture). Contemporary groups should include as many cattle as can be accurately compared.

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 consistent relationship. Correlation coefficients may vary between +1.00 to -1.00.

Crossbreeding

The mating of animals of different breeds (or species). Crossbreeding usually results in heterosis (hybrid vigor).

Culling

The process of eliminating less productive or less desirable cattle from a herd.

Cutability

An estimate of the percentage of salable meat (muscle) from a carcass versus percentage of waste fat. Percentage of retail yield of carcass weight can be estimated by a USDA prediction equation that includes hot carcass weight, ribeye area, fat thickness and estimated percentage of kidney, pelvic and heart fat.

D

Deviation

A difference between an individual record and the average for that trait for that contemporary group. These differences sum to zero when the correct average is used. A ratio deviation is the ratio less the average ratio of 100.

Dominance

Dominant genes affect the phenotype when present in either homozygous or heterozygous condition. A dominant gene need only be obtained from one parent to achieve expression.

Dosage

The amount of a drug or other substance given to an animal at one time.

Double Muscling

A simple recessive trait evidenced by an enlargement of the muscles with large grooves between the muscle systems especially noticeable in the hind leg.

Dressing Percentage

Hot carcass weight divided by the live weight times 100.

Dwarfism

A recessive trait in which the skeleton is quite small and the forehead has a slight bulge.

Dystocia (Calving Difficulty)

Abnormal or difficult labor causing difficulty in delivering the fetus and/or placenta.

E

Economic Value

The net returns within a herd for making a pound or percentage change of the trait in question.

Effective Progeny Number (EPN)

An indication of the amount of information available for estimation of expected progeny differences in cattle evaluation. It is a function of number of progeny but is adjusted for their distribution among herds and contemporary groups and for the number of contemporaries by other sires. EPN is less than the actual number because the distribution of progeny is never ideal.

Embryo Transfer

Removing fertilized ova (embryos) from one cow (donor cow) and placing these embryos into other cows (recipient cows), usually accompanied by hormone-induced superovulation of the donor dam. More calves can be obtained from cows of superior breeding value by this technique. Only proven producers should become donor dams.

Environment

All external (non-genetic) conditions that influence the reproduction, production and carcass merit of cattle.

Established Safe Level

Concentration of drug or drug metabolite in tissue considered to be without hazard to consumers and below which the FDA normally will not take regulatory action.

Estimated Breeding Value (EBV)

An estimate of an individual's true breeding value for a trait based on performance of the individual and close relatives for the trait. EBV is a systematic way of combining available performance information on the individual, sibs and progeny of the individual. Expected progeny differences have replaced EBVs in most breed associations.

Estrus

Regularly recurrent state of sexual excitability during which the female (cow or heifer) will accept the male (bull).

Estrus Synchronization

Causing a group of cows or heifers to exhibit estrus together at one time by artificial manipulation of the estrous cycle.

Expected Progeny Difference (EPD)

The difference in performance to be expected from future progeny of an individual compared with that expected from future progeny of another individual. EPD is an estimate based on progeny testing and is equal to one-half the estimate of breeding value obtainable from progeny test records.

Extra Label

Administering a drug or other substance in a manner not specified on the label.

F

F1

Offspring resulting from the mating of a purebred (straight-bred) bull to purebred (straight-bred) females of another breed.

Fat Thickness

Depth of fat in tenths of inches over the ribeye muscles in the twelfth rib. It consists of a single measurement at a point three-fourths of the lateral length of the ribeye muscle from the split chine bone.

Feed Conversion (Feed Efficiency)

Units of feed consumed per unit of weight gained; production (meat, milk) per unit of feed consumed.

Fed Cattle

Steers and heifers managed to produce high-quality carcasses (Prime, Choice and Select quality grades).

Fertilization

The union of male and female gametes to form a new individual. This union combines two haploid cells to restore the diploid number of chromosomes in the new individual.

Frame Score

A score based on subjective evaluation of height or actual measurement of hip height. This score is related to slaughter weight at which cattle should grade Choice or have comparable amounts of fat.

Freemartin

Female born twin to a bull calf (approximately 9.8 out of 10 of the female twins will not be fertile).

G

Generation Interval

Average age of the parents when offspring destined to replace them are born. A generation represents the average rate of turnover of a herd.

Genes

The basic unit of heredity that occurs in pairs and has its effect in pairs in the individual but is transmitted singly (one or the other gene at random of each pair) from each parent to offspring.

Genetic Correlations

Correlations between two traits that arise because some of the same genes affect both traits. When two traits (i.e., weaning and yearling weight) are positively and highly correlated to one another, successful selection for one trait will result in an increase in the other trait. When two traits are negatively and highly correlated (i.e., birth weight and calving ease) to one another, successful selection for one trait will result in a decrease in the other trait.

Genotype

Actual genetic makeup (constitution) of an individual determined by its genes or germ plasm. For example, there are two genotypes for the polled phenotype PP (homozygous dominant) and Pp (heterozygote).

Genotype X Environment Interaction

Variation in the relative performance of different genotypes from one environment to another. For example, the “best” cattle (genotypes) for one environment may not be the “best” for another environment.

Gestation

The period of pregnancy, or the period of time from conception until birth.

H

Half-Sibs

Individuals having the same sire or dam—half-brothers and/or half-sisters.

Heredity

The transmission of genetic or physical traits of parents to their offspring.

Heritability

The proportion of the difference among cattle, measured or observed, that is transmitted to the offspring. Heritability varies from zero to one. The higher the heritability of a trait, the more accurately does the individual performance predict breeding value and the more rapid should be the response due to selection for that trait.

Heritability Estimate

An estimate of the proportion of the total phenotypic 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 measured traits of the crossbreds exceed the average of the two or more purebreds mated to produce the crossbreds.

Heterozygous

Genes of a specific pair (alleles) are different in an individual.

Homozygous

Genes of a specific pair (alleles) are alike in an individual.

Hot Carcass Weight

Weight of carcass just prior to chilling.

I

Inbreeding

Production of offspring from parents more closely related than the average of a population. Inbreeding increases the proportion of homozygous gene pairs and decreases the proportion of heterozygous gene pairs. Also, inbreeding increases prepotency and facilitates expression of undesirable recessive genes.

Incomplete Dominance

A situation in which neither gene within a gene pair dominates the other, with the result that both are expressed in the phenotype which is intermediate between the two traits.

Independent Culling Levels

Selection of culling based on cattle meeting specific levels of performance for each trait included in the breeder's selection program. For example, a breeder could cull all heifers with weaning weights below 400 pounds (or those in the bottom 20 percent on weaning weight) and yearling weights below 650 pounds (or those in the bottom 40 percent).

Intramammary

Placement of drugs and other substances directly into the udder usually through the teat opening.

Intramuscular Injection (IM)

An injection into the muscle.

Intraruminal Injection

Injection into the body space surrounding the gastrointestinal tract.

Intrauterine

Placement of drugs and other substances directly into the uterus.

Intravenous Injection (IV)

Injection of a drug or other substance directly into a vein.

K

Kidney, Pelvic and Heart Fat (KPH)

Internal carcass fat associated with the kidney, pelvic cavity and heart expressed as a percentage of chilled carcass weight. The kidney is included in the estimate of kidney fat.

L

Labeling

Written information detailing the content, intended use, instructions for use, withholding times and other specifics attached to the drug container and/or on a separate sheet accompanying the container.

Lactation

The period following calving during which milk is formed in the udder.

Lethal Gene

A gene or genes that may cause the death of an individual which expresses them.

Libido

Sexual desire or sex drive.

Linebreeding

A form of inbreeding in which an attempt is made to concentrate the inheritance of one ancestor, or line of ancestors, in a herd. The average relationship of the individuals in the herd to this ancestor (outstanding individual or individuals) is increased by linebreeding.

Linecross

Offspring produced by crossing two or more inbred lines.

M

Marbling

The specks of fat (intramuscular fat) distributed in muscular tissue. Marbling is usually evaluated in the ribeye between the twelfth and thirteenth rib.

Maturity

An estimation of the chronological age of an animal or carcass by assessing the physiological stages of maturity of bone and muscle characteristics.

Metabolic Body Size

The weight of an animal raised to the three-fourths power ($W^{.75}$); a figure indicative of metabolic needs and of the feed required to maintain a certain body weight.

Metabolism

The transformation by which energy is made available for body use.

Microorganisms

A living creature, such as a virus or bacterium, capable of being seen only under a microscope.

Morphology

Form and structure of individual sperm cells.

Most Probable Producing Ability (MPPA)

An estimate of a cow's future productivity for a trait (such as progeny weaning weight ratio) based on her past productivity. For example, a cow's MPPA for weaning ratio is calculated from the cow's average progeny weaning ratio, the number of her progeny with weaning records and the repeatability of weaning weight.

Motility

The vigor and number of cells moving in a linear progressive manner.

N

National Cattle Evaluation

Programs of cattle evaluation conducted by breed associations to genetically compare animals. Carefully conducted national cattle evaluation programs give unbiased estimates of expected progeny differences (EPDs). Cattle evaluations are based on field data and rely on information from the individual animal, relatives and progeny to calculate EPDs.

Nonadditive Gene Effects

Favorable effects or actions produced by specific gene pairs or combinations. Nonadditive gene action is the primary cause of heterosis. Nonadditive gene action occurs when the heterozygous genotype is not intermediate in phenotypic value to the two homozygous genotypes.

Non-Fed Cattle

Cull cows and bulls sold for slaughter. Carcasses usually fall into Commercial, Utility, Cutter and Canner quality grades.

Number of Contemporaries

The number of animals of similar breed, sex and age against which an animal is compared in performance tests. The greater the number of contemporaries, the greater the accuracy of comparisons.

O

Optimum Level of Performance

The most profitable or favorable ranges in levels of performance for the economically important traits in a given environment and management system. For example, although many cows produce too little milk,

in every management system there is a point beyond which higher levels of milk production may reduce fertility and decrease profit.

Oral

Placement of a drug or other substance into an animal through its mouth.

OTC

Drugs and other substances that can be bought by anyone over the counter because adequate instructions for layman use can be printed on the label.

Outbreeding

Mating of animals less closely related than the average of the population.

Outcrossing

Mating of individuals that are less closely related than the average of the breed. Commercial breeders and some purebred breeders should be outcrossing by periodically adding new sires that are unrelated to their cow herd. This outcrossing should reduce the possibility of loss of vigor due to inbreeding.

Ovulation

Release of the female germ cell (egg) by the ovary. Cows usually ovulate several hours (up to 15 hours) after the end of estrus or standing heat.

P

Palatability

Acceptable to the taste or sufficiently agreeable in flavor to be eaten.

Parturition

The act of giving birth; calving.

Pedigree

A tabulation of names of ancestors, usually only those of the three to five closest generations.

Percent Calf Crop

The percentage of calves produced within a herd in a given year relative to the number of cows and heifers exposed to breeding.

Performance Data

Records of an individual animal for reproduction, production and possibly carcass merit. Traits include birth, weaning and yearling weights, calving ease, calving interval, milk production, etc.

Performance Pedigree

A pedigree that includes performance records of the individual, ancestors, relatives and progeny in addition to the usual pedigree information. Some breed associations include expected progeny differences.

Performance Testing

The systematic collection of comparative production information for use in decision making to improve efficiency and profitability of beef production. Differences in performance among cattle must be utilized in decision making for performance testing to be

beneficial. The most useful performance records for management, selection and promotion decisions will vary among purebred breeders and for purebred breeders compared with commercial cattle producers.

Phenotype

The visible or measurable expression of a character; for example, weaning weight, post-weaning gain, reproduction, etc. Genotype and environment influence phenotype.

Phenotypic Correlations

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

Polled

Naturally hornless cattle. Having no horns or scurs.

Pounds of Retail Cuts Per Day of Age

A measure of cutability and growth combined calculated as follows: cutability times carcass weight divided by age in days. It is reported as lean weight per day of age (LWDA) by some associations.

ppb

Parts per billion.

ppm

Parts per million.

Possible Change

The variation (either plus or minus) that is possible for each expected progeny difference (EPD). This measurement of error in prediction or estimation of EPD decreases as the number of offspring per sire increases.

Postpartum

After the birth of an individual.

Prepotent

The ability of a parent to transmit characteristics to its offsprings so they resemble that parent or each other more than usual. Homozygous dominant individuals are prepotent. Also, inbred cattle tend to be more prepotent than outbred cattle.

Preweaning Gain

Weight gained between birth and weaning.

Progeny

The young, or offspring, of the parents.

Progeny Records

The average comparative performance of the progeny of sires and dams.

Progeny Testing

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

Puberty

The age at which reproductive organs become functionally operating and secondary sex characteristics begin to develop.

Purebred

An animal of known ancestry within a recognized breed that is eligible for registry in the official herd book of that breed.

Q

Qualitative Traits

Traits in which there is a sharp distinction between phenotypes, such as black or white or polled or horned. Usually, only one or a few pairs of genes are involved in the expression of qualitative traits.

Quantitative Traits

Traits in which there is no sharp distinction between phenotypes, with a gradual variation from one phenotype to another, such as weaning weight. Usually, many gene pairs are involved, as well as environmental influences.

R

Random Mating

A system of mating where every female (cow and/or heifer) has an equal chance of being assigned to any bull used for breeding in a particular breeding season. Random mating is required for accurate progeny tests.

Rate of Genetic Improvement

Rate of improvement per unit of time (year). The rate of improvement is dependent on (1) heritability of traits considered, (2) selection differentials, (3) genetic correlations among traits considered, (4) generation interval in the herd and (5) the number of traits for which selections are made.

Recessive Gene

Recessive genes affect the phenotype only when present in a homozygous condition. Recessive genes must be received from both parents before the phenotype caused by the recessive genes can be observed.

Reference Sire

A bull designated to be used as a benchmark 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(s).

Regression (Regressed)

A measure of the relationship between two variables. The value of one trait can be predicted by knowing the value of the other variable. For example, easily obtained carcass traits (hot carcass weight, fat thickness, ribeye area and percent of internal fat) are used to predict percent cutability. Likewise, breeding value estimates based on limited data are regressed back toward the population average to account for the imperfection of this relationship.

Residues

Remnants of the compounds in drugs and other substances found in fluid, tissues and feeds.

Ribeye Area

Area of the longissimus muscle measured in square inches at the twelfth rib interface on the beef forequarter.

Rotational Crossbreeding

A system of crossing two or more breeds where the crossbred females are bred to bulls of the breed contributing the least genes to that female's genotype. Rotation systems maintain relatively high levels of heterosis and produce replacement heifers from within the system. Opportunity to select replacement heifers is greater for rotation systems than for other crossbreeding systems.

Route of Administration

The method by which a drug or other substance is given to an animal; i.e., oral, subcutaneous, intramuscular, topical, etc.

Rx (Prescription Drugs)

Drugs that must be prescribed by a licensed veterinarian.

S

Sanitary

Clean; absence of organisms that can cause disease or ill health.

Scrotal Circumference

A measure of testis size obtained by measuring the distance around the testicles in the scrotum with a circular tape. Related to semen-producing capability and age at puberty of female sibs and progeny.

Scurs

Horny tissue or rudimentary horns attached to the horn rather than the bony parts of the head.

Seedstock Breeders

Producers of breeding stock for purebred and commercial breeders. Progressive seedstock breeders have comprehensive programs designed to produce an optimum or desirable combination of economical traits (genetic package) that will ultimately increase the profitability of commercial beef production.

Selection

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

Selection Differential (Reach)

The difference between the average for a trait in selected cattle and the average of the group from which they came. The expected response from selection for a trait is equal to selection differential times the heritability of that trait.

Selection Index

A formula that combines performance records from several traits or different measurements of the same trait into a single value of each animal. Selection indexes weigh the traits for their relative net economic importance and their heritabilities plus the genetic associations among the traits.

Sibs

Brother and sisters of an individual.

Sire Summary

Published results of sires from national cattle evaluation programs.

Sperm

A mature male germ cell.

Subcutaneous (SubQ)

An injection under the skin.

Superovulation

Process by which a cow produces more eggs than normal. Done in embryo transfer techniques.

Systems Approach

An approach to evaluating alternative individuals, breeding programs and selection schemes that involves assessment of these alternatives in terms of their net impact on all inputs and outputs in the production system. This approach specifically recognizes that intermediate optimum levels of performance in several traits may be more economically advantageous than maximum performance for any single trait.

T

Terminal Sires

Sires used in a crossbreeding system where all their progeny, both male and female, are marketed. For example, F1 crossbred dams could be bred to sires of a third breed and all calves marketed. Although this system allows maximum heterosis and complementary breeds, replacement females must come from other herds.

Therapy

Treatment of disease or health disorders.

Tolerance

Maximum legally allowable level or concentration of a drug or chemical in a food product at the time the milk is marketed or the animal is slaughtered.

Topical

Application of a drug or other substance to the skin surface or an external membrane, usually concentrated in a small area.

Trait Ratio

An expression of an animal's performance for a particular trait relative to the herd or contemporary group average. It is usually calculated for most traits as:

$$\frac{\text{Individual Record}}{\text{Average of Animals in Group}} \times 100$$

U

Ultrasonic Measurement

Used to estimate carcass and reproductive characteristics. Operates off the principle that sound waves echo differently with different densities of tissues.

V

Vaccine

A preparation containing microorganisms controlled in such a way as to create a response by the recipient animal's body that results in increased protective immunity.

VCPR

Valid veterinarian/client/patient relationship, generally meaning that the veterinarian knows and regularly sees the animals and the individual responsible for authorizing medical treatment for those animals agrees to follow the veterinarian's instructions.

Variance

Variance is a statistic that 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.

W

Weaning Rate

Number of calves weaned divided by number of cows exposed to a bull.

Weight Per Day of Age (WDA)

Weight of an individual divided by days of age.

Withholding Times

The amount of time, usually expressed in hours, days or number of milkings that must occur, before the milk or meat from an animal treated with a drug may be sold.

Y

Yield Grade

Measurements of carcass cutability categorized into numerical categories with 1 being the leanest and 5 being the fattest. Yield grade and cutability are based on the same four carcass traits.

Reference: Executive Summary of the National Non-Fed Beef Quality Audit. 1994. National Cattlemen's Beef Association. Englewood, Co.

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