

Red Angus Association of America

Breeder's Guide

Glossary



Red Angus Association of America

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GLOSSARY

A

ACCURACY (ACC) -- A measure of the reliability of an EPD. Accuracy values are reported as decimal numbers between zero and one. Values closer to one indicate larger amounts of available information and greater certainty that a bull's EPD will not change significantly as more progeny information becomes available.

ADJUSTED WEANING WEIGHT (WW) -- An unshrunk, off-the-cow weight adjusted to 205 days of age and to a mature dam age equivalence.

ADJUSTED YEARLING WEIGHT (YW) -- An unshrunk weight adjusted to either 365, 452, or 550 days of age.

ALLELES -- Alternate forms of genes. Most genes occur in pairs in body cells, so 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.

ANIMAL MODEL -- A genetic prediction procedure in which EPDs are directly computed for all animals in the population.

ARTIFICIAL INSEMINATION (A.I.) -- The technique of placing semen from the male into the reproductive tract of the female by means other than natural service.

AVERAGE DAILY GAIN (ADG) -- Measurement of daily body weight change over a specified period of time of an animal on a feed test.

B

BACKCROSS -- The mating of a two-breed crossbreed offspring back to one of its parental breeds. Example: A Hereford-Angus cross cow bred back to an Angus bull.

BEEF CATTLE IMPROVEMENT ASSOCIATION (BCIA) -- An organization, usually at the state level, that sponsors cattle improvement programs.

BEEF IMPROVEMENT FEDERATION (BIF) -- A federation of organizations, businesses, and individuals interested or involved in performance evaluation of beef cattle. It seeks to build confidence of the beef industry in the principles and potentials of performance testing. The purpose of BIF is to achieve utilization of the most efficient and effective performance evaluation methods, uniformity of procedures, development of programs cooperation among interest entities, and education of its members.

BEST LINEAR UNBIASED PREDICTION (BLUP) -- A genetic prediction methodology providing the most accurate and precise genetic evaluations possible, given the information and family structure that is available.

BIOLOGICAL TYPE -- A group of cattle breeds having similar geographic origin and past selection history and with similar genetic potential of traits of economic importance. British general purpose beef cattle breeds, for example, have genetic potential for moderate growth, muscling, and milk yield; whereas continental European dual- purpose breeds have genetic potential for high milk yield and rapid growth.

BIRTH WEIGHT (BW) -- The weight of a calf taken within 24 hours after birth. Heavy birth weights tend to be correlated with calving problems, along with other factors.

BIRTH WEIGHT EPD -- Predicts the difference, in pounds, for birth weight, and is also used in the calculation of Red Angus' Calving Ease Direct (CED) EPD

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

BOS INDICUS --A subspecies of cattle of South Asian origin. Often known as Zebu, they have prominent humps forward of the shoulder. The Brahman breed is one example in the United States.

BOS TAURUS --A subspecies of cattle of western Asian origin but often referred to as "European". Most breeds commonly found in the United States and Canada, and their European ancestors, belongs to this group.

BREED -- Animals which have a common origin and common characteristics which distinguish them from other groups of animals within that same species.

BREED ASSOCIATION -- An organization that maintains pedigree and performance information and arranges for timely genetic evaluation of animals within that breed. Breed associations also establish regulations for registration of animals, promote the breed, and advance the interests of the breeder members.

BREEDING PROGRAM GOALS -- The objective or "direction of breeders" selection programs. Goals are basic decisions breeders must make to give "direction" to their breeding program. Goals will vary among breeders because relative genetic merit of their cattle, their resources, and their markets differ.

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 UP -- Purebred sires of a single breed are used in a herd, generation after generation. Female replacements are selected within the herd. This would be the process to develop RAAA Category 1-B cattle.

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BREEDING VALUE --Transmissible genetic merit of an individual, or the value of that individual as a parent. In the United States and Canada, genetic predictions are expressed as progeny differences rather than as breeding values. Because any parent contributes only half the genes in any one offspring, the progeny difference of an individual is half its breeding value.

BRITISH BREEDS --Breeds of cattle such as Angus, Hereford, and Shorthorns originating in Great Britain.

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CAESAREAN SECTION --A process in which the calf is surgically removed from the cow during parturition by making a large incision in the right side of the cow just above the flank.

CALVING EASE DIRECT (CED) EPD --The expected progeny difference, in percent probability, of calves being born without assistance to two year old heifers. This EPD accounts for birth weight measures and calving ease scores, making it more accurate than the Birth Weight EPD to predict probability of unassisted calving.

CALVING EASE TOTAL MATERNAL (CEM) EPD --The expected difference, in percent probability, of a given animal's daughters calving unassisted at two years of age.

CALVING DIFFICULTY (DYSTOCIA) --Abnormal or difficult labor, causing difficulty in delivering the fetus and/or placenta.

CALVING SEASON --The season(s) of the year when the 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 generally 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. 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 are assembled from several herds to evaluate differences in certain performance traits under uniform management conditions.

CHROMOSOME --Chromosomes are paired strands of DNA, with accompanying structural proteins, on which genes are located. Domestic cattle have 30 pairs of chromosomes, one chromosome of each pair having been inherited from each parent. One random chromosome of each pair is transmitted to each egg or sperm cell produced by a parent.

CLOSED HERD --A herd in 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.

COMMERCIAL PRODUCERS --Producers whose primary goal is to produce animals for herd replacement, feeding, and slaughter rather than breeding stock for sale to other producers. Progressive commercial producers see bulls or semen from seed stock breeders that have comprehensive programs designed to produce animals with optimum genetic merit for the combination of traits that increase efficiency and profit of their production system.

COMPOSITE BREED --A breed made up of combinations of other breeds.

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

COMPLEMENTARITY --The combining of breeds or individual animals that have characteristics that complement each other, thereby obtaining optimum progeny.

CONCEPTION--The fertilization of the ovum (egg). The act of conceiving or becoming pregnant.

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.

CONTINENTAL (European) BREED --Breeds originally developed on the continent of Europe. Examples include Simmental, Limousin and Charolais.

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 and –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, rib eye area, fat thickness, and estimated percent of kidney, pelvic, and heart fat.

D

DAM --The female parent.

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 or 100.

DIRECT EFFECT --For weaning weights, that portion of preweaning growth that is due to the calf's genetics.

DIRECT EPD --An EPD representing the effect of the individual's own genes on the trait of interest. A calving ease direct EPD, for example, represents calving ease of an individual's progeny.

DISPOSITION (temperament) -- A measure of an animal's docility, wildness, or aggression toward unfamiliar situations, human handlers, or management interventions.

DNA (deoxyribonucleic acid) -- The chemical compound that stores within each cell genetic information unique to an individual. A DNA molecule is composed of two strands of nucleotides bound to one another by chemical bonds between each complementary (A – T and G – C) base pair. The molecule has the appearance of a twisted ladder. The sequence of bases within DNA molecules determine amino acid sequences of proteins, control development, and establish the genetic potential for production of the individual.

DNA FINGERPRINTING -- A method of visualizing similarities and differences between individuals based on genetic makeup. The DNA fingerprint is usually displayed as a series of bands. Differences in banding patterns indicate differences in the DNA sequence between individuals. This procedure can be used to verify animal identification or parentage.

DOMINANT --An allele is dominant when its presence prevents a recessive allele from affecting the phenotype of an individual heterozygous at the locus in question. For example, the allele for polledness (P) is dominant to the allele allowing growth of horns (p) so an animal with the genotype Pp shows the polled form of the trait.

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 PERCENT -- (Chilled carcass weight/live weight) x 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 TRAIT LOCUS (ETL)--Area of a chromosome at which exists a gene that has a direct effect on a trait of economic interest. Similar to quantitative trait locus (OTL), except that ETL can refer either to qualitative or quantitative traits.

ECONOMIC VALUE --The net return within a herd for making a pound or percentage change of the trait in question.

ECONOMICALLY RELEVANT TRAIT (ERT) -- Traits that are of direct economic importance to cattle producers.

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.

ELECTROPHORESIS -- A process used to separate DNA fragments by length. DNA fragments are placed at the top of a gel matrix that is then exposed to an electrical current. This causes fragments to migrate through the pores in the gel at rates proportional to fragment size. Resulting fragment location on the gel can be visualized by appropriate labeling techniques.

EMBRYO --A fertilized ovum (egg) in the earlier stages of prenatal development, usually prior to development of body parts.

EMBRYO TRANSFER -- Removing fertilized ova (embryos) from one cow (donor dam) and placing these embryos into other cows (recipient cows), usually accompanied by hormone-induced super ovulation 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. When environmental influences on phenotypic merit are not properly accounted for in genetic evaluations, they reduce the accuracy of breeding estimation and of subsequent selection.

ESTIMATED BREEDING VALUE (EBV) --An estimate of an individual's true breeding value for a trait based on the performance of the individual and close relatives for the trait itself and sometimes performance of genetically correlated traits. EBV is a systematic way of combining available performance information on the individual and sibs and the progeny of the individual. Expected progeny differences have replaced EBVs in most breed association programs.

EXPECTED PROGENY DIFFERENCE (EPD) -- The difference in expected performance of future progeny of an individual, compared with expected performance of future progeny of an individual of average genetic merit in the base time frame for the genetic evaluation. EPDs are estimated from phenotypic merit of an individual and all of its relatives and are estimates of one-half the breeding values. EPDs are generally reported in units of measurement for the trait (e.g., lb., in., etc.).

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 an inch over the rib-eye muscle at the 12th rib. It consists of a single measurement at a point three-fourth of the lateral length of the rib-eye muscle from the split chine bone.

FAT THICKNESS (FAT) EPD -- The expected difference, in inches, for carcass fat depth over the 12th rib. Fat thickness is a component of carcass yield grade.

FEED CONVERSION (FEED EFFICIENCY) --Units of feed consumed per unit of weight gained. Also the production (e.g., meat, milk) per unit of feed consumed.

FERTILIZATION --The union of the male and female gametes to form a new, genetically unique individual. In cattle, sperm and egg cells with 30 chromosomes each combine to form a zygote with the 60 chromosomes normal to the species.

FETUS-- The developing individual in intrauterine life after the body parts are formed, and before birth.

FINGERPRINT (DNA) -- Pattern of DNA fragments unique to an individual. Often produced by using restriction enzymes to cut the DNA into fragments at specific sequences of nucleotide. Using eletroporesis, these fragments can be sorted and then visualized, forming a unique "fingerprint" for each different animal. (See Electrophoresis)

FRAME SCORE --A score based on subjective evaluation of height or actual measurement of hip height. This score is related to slaughter weights at which cattle should attain a given quality grade or attain a given amount of fact thickness.

FREEMARTIN -- Female born twin to a bull calf (approximately 9 out 10 will be infertile).

G

GENE --The basic unit of heredity. Most occur in pairs in the individual, but are transmitted singly (one or the other gene at random of each pair) from parent to offspring.

GENE MAP -- A blueprint of the chromosomes of a species, indicating the relative order of location of genes and DNA markers.

GENERATION INTERVAL -- Average age of the parents when the offspring destined to replace them are born. A generation represents the average time interval for turnover of a herd.

GENETIC ANTAGONISM --A genetic correlation in which desirable genetic change in one of the trait sis accompanied by an undesirable change in the other. For example, because of the positive genetic correlation between milk yield potential and cow maintenance requirement, selection for increased milk would lead also to increase feed cost of maintenance.

GENETIC CORRELATIONS -- correlations between two traits that arise because some of the same genes affect both traits. When two traits (e.g., weaning and yearling weight) are positively and highly correlated to one another, successful selection for change in one trait will result in change in the same direction in the other trait. When two traits are negatively and highly correlated (e.g., birth weight and calving ease) to one another, successful selection for change in one trait will result in a change in the opposite direction in the other trait.

GENETIC DEFECT--Abnormalities or Deformities existing from conception and typically apparent at birth, resulting from inheritance of genes known to cause such defects.

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 (heterozgote)].

GENOTYPE X ENVIRONMENT INTERACTION -- When the difference in performance among genetic groups depends upon the environment in which they are compared. For example, the most profitable breed in the Great Plains is probably not the same as the most profitable breed on the Gulf Coast. Also, different breeds and crosses will be optimum for producing beef for different market specifications and requirements.

GESTATION --The period of pregnancy, or the period of time from conception until young are born.

GRADING UP-- Purebred sires of a single breed are used in a herd, generation after generation. Female replacements are selected within the herd.

H

HALF-SIBS -- Individuals having the same sire or dam. Half-brothers and (or) sisters.

HEAT SYNCHRONIZATION -- Causing a group of cows or heifers to exhibit heat together at one time by artificially manipulating estrous cycles.

HEIFER PREGNANCY (HPG) -- The expected progeny difference, in percent probability, of heifers conceiving to calve at two years of age.

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

HERITABILITY ESTIMATE -- An estimate of the proportion of the total phenotypic variation between individuals for a certain trait that is due to transmissible genetic merit. It is the proportion of total variation for a trait caused by differences among individuals in breeding value.

HERITABILITY -- The portion of the differences 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 to selection for that trait.

HETEROSIS (HYBRID VIGOR) --Amount by which the average performance for a trait in crossbred calves exceeds the average performance of the two or more purebreds that were mated in that particular cross.

HETEROZYGOUS -- Genes of a specific pair (alleles) are different in an individual (e.g., Aa).

HOMOZYGOUS -- Genes of a specific pair (alleles) are alike in an individual (e.g., AA or aa).

HOT CARCASS WEIGHT --Weight of carcass just prior to chilling.

I

INBREEDING --The mating together of parents more closely related than average in the population. Inbreeding decreases the proportion of heterozygous gene pairs in the offspring and increased the proportion of homozygous gene pairs. It increased the frequency of expression of genetic defects caused by recessive genes. Inbreeding may increase prepotency for simply inherited and highly heritable traits.

INBREEDING COEFFICIENT -- A numerical measure, ranging from zero to 1.0, of the intensity of inbreeding of an individual. It represents the proportion of gene loci in the individual at which both genes are identical copies of the same ancestral gene.

INBREEDING DEPRESSION --The reduction in performance level for many economically important traits that accompanies, on average, the increase in inbreeding coefficient.

INCOMPLETE DOMINANCE-- A situation in which neither gene nor gene pair is completely dominant to the other, with the result that both are expressed in the phenotype. Phenotypic expression for the heterozygous genotype will be intermediate to that of the two homozygotes.

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 lb. (or those in the bottom 20 percent on weaning weight) and yearling weights below 650 lb. (or those in the bottom 40 percent).

INTEGRATED RESOURCE MANAGEMENT (IRM) – Producing beef cattle in a manner that efficiently, profitably, and sustainably uses available human and physical resources.

INTERMIM EPD --An expected progeny difference computed from an individual's own performance information and (or) the EPDs of its parents. Interim EPDs may be used to support selection and merchandizing decisions before EPDs from regularly scheduled national cattle evaluation runs become available.

K

KIDNEY, PELVIN AND HEART FAT (KPH) --The 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

LACTATION -- The period of calf nursing between birth and weaning.

LETHAL GENE -- A gene, or genes, that causes the death of an individual at some state of life.

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 line breeding.

LINECROSS -- Offspring produced by crossing two or more inbred lines.

LOCUS -- The specific area on a chromosome where a particular gene is located.

LONGISSIMUS DORSI -- Muscle that is measured to determine rib-eye area in beef carcass.

M

MARBLING -- The specks of fat (intramuscular fat) distributed in muscular tissue. Marbling is usually evaluated in the rib-eye between the 12th and 13th rib.

MARBLING SCORE (MARB) -- The expected difference, in marbling score units, for carcass marbling score. Higher scores are associated with higher carcass quality.

MARKER ASSISTED SELECTION (MAS) -- A method of genetic evaluation, which takes into consideration the DNA marker genotype along with conventional selection procedures.

MATERNAL EFFECT -- For weaning weight, the dam's maternal ability which influences preweaning growth.

MATERNAL EPD -- An EPD representing the effect of the genes of an individual's daughters on the trait of interest. A calving ease maternal EPD, for example, represents the ease with which an individual's daughters calves are born.

MATERNAL HETEROSIS -- Amount by which the average performance for a trait in the progeny of crossbred cows exceeds the average performance of progeny of purebred cows of the two or more breed ancestors of the crossbred cows.

MATURE COW MAINTENANCE ENERGY REQUIREMENTS (ME) -- The expected progeny difference, in Meal/month, for nutritional requirements of metabolizable energy for maintenance. Used in a profit function, this estimates differences in cow herd feed costs and/or reproductive failure due to inadequate nutrition.

MATURITY -- An estimation of the chronological age of the animal or carcass. This is accomplished by assessing the physiological states of maturity of bone and muscle characteristics.

MATERNAL MILK EPD -- The expected difference (due to milk production alone) in weaning weight of calves out of a bull's daughters compared to calves from daughters of a bull with a zero EPD for maternal milk. Maternal milk EPD valued is measured in pounds of calf weaned and indicates milking ability.

METABOLIC BODY SIZE -- The weight of the animal raised to the $\frac{3}{4}$ power ($W^{0.75}$); a figure indicative of metabolic needs and of the feed required maintaining a certain body weight.

METABOLISM -- The transformation by which energy is made available for body uses.

MILK (MILK) -- Predicts the difference in maternal production of an individual animal's daughters as expressed by the weaning weight of their calves.

MOLECULAR (DNA) MARKERS -- Areas of the genome at which differences in the DNA sequence can be visually detected. A marker locus by itself may not have a direct effect on a phenotypic trait, but it may be located close to a gene that does directly affect a trait

(ETL). Markers can serve as location reference points for gene mapping and marker – assisted selection.

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 record, and the repeatability of weaning weight.

MULTIPLE TRAIT EVALUATION -- A genetic prediction in which phenotypic merit for two or more genetically correlated traits (birth weight, weaning weight and post-weaning gain, for example) is used simultaneously to estimate breeding values for each of the traits. Compared to single trait evaluations, multiple trait evaluations produce EPDs with higher accuracy and less bias from selection.

N

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

NONADDITIVE GENE EFFECTS -- Effects or actions produced by specific gene pairs or combinations. Non additive gene action is the primary cause of heterosis. One type of nonadditive genetic effect occurs when the heterozygous genotype is not intermediate in phenotypic value to the homozygous genotypes.

NUMBER OF CONTEMPORARIES -- The number of animals of similar breed, sex and age, against which an animal was 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.

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 out crossing by periodically adding new sires that are unrelated to their cowherd. This out crossing reduces the possibility of loss of vigor caused by 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.

OVUM -- The female reproductive cell (gamete).

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PALATABILITY -- Degree to which food (e.g., beef) is acceptable to the taste or sufficiently agreeable in flavor to be eaten.

PARTURITION -- The act of giving birth (calving).

PEDIGREE -- A tabulation of ancestors, usually those of the three to five most recent generations.

PERCENTAGE INTERMUSCULAR FAT % IMF -- Percentage of fat in the rib-eye muscle (marbling).

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 --The record of the individual animal for reproduction, production, and carcass traits. These traits include birth, weaning, yearling weights, calving ease, rib-eye area, back fat, etc.

PERFORMANCE PEDIGREE --A document that includes performance information for the individual, its ancestors, progeny, and collateral relatives, in addition to the usual pedigree information. Expected progeny differences may also be included.

PERFORMANCE TESTING -- The systematic collection of comparative production information for use in genetic evaluation and decision making to improve efficiency and profitability of beef production.

PHENOTYPE --The visible or measurable expression of a character; for example, weaning weight, post weaning gain, coat color, reproduction, etc. Phenotype is influenced by genotype and environment.

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.

POSSIBLE CHANGE -- An alternative way to express accuracy of an EPD. The amount by which an individual's current EPD might reasonably be expected to change (either upwards or downwards) as more information becomes available in subsequent national cattle evaluations.

POSTPARTUM -- After the birth of an individual.

POSTPARTUM INTERVAL -- The number of days between parturition and the first postpartum estrus.

POSTWEANING GAIN -- Weight gained after a calf is weaned. Often expressed as ADG.

PREPOTENCY -- The ability of a parent to transmit its characteristics to its offspring so that they resemble that parent more than usual. Homozygous dominant individuals are prepotent. Also, inbred cattle tend to be more prepotent than outcrossed cattle.

PREWEANING GAIN -- Weight gained between birth and weaning.

PROGENY -- Offspring of the parents.

PROGENY RECORDS -- Average comparative performance of the progeny of sires and dams.

PROGENY TESTING -- Evaluating the genotype or estimating the breeding value of an individual by evaluating the comparative phenotypic merit of its progeny.

PUBERTY -- The age at which the reproductive organs become functionally operative 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 -- Those traits in which there is a sharp distinction between phenotypes, such as black and white or polled and horned. Usually, only one or few pairs of genes are involved in the expression of qualitative traits.

R

RANDOM MATING -- A system of mating where every cow and (or) heifer has an equal or random chance of being assigned to any bull used for breeding in a particular breeding season. Random mating, or an adjustment for the genetic potential of mates, will reduce bias in a progeny test.

RATE OF GENETIC IMPROVEMENT -- Amount of improvement per unit of time (year) due to selection. 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 -- A gene whose effect is masked by the presence of a dominant allele. 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 them can be observed.

REDUCED ANIMAL MODEL -- A genetic prediction procedure in which EPDs are computed directly for all parents in the population, while EPDs for non-parents and progeny are computed from the parent solutions. Predictions are equal and equivalent to those from the animal model.

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, rib-eye 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 the relationship between parent and offspring.

RIB-EYE AREA (REA) -- The expected difference, in square inches, of carcass rib eye area between the 12th and 13th rib. Rib eye area is a component of carcass lean meat yield.

RIB-EYE AREA (REA) EPD -- The expected difference in rib eye area (cm²) measured between the 12th and 13th rib of a sire's progeny. Higher values may be an indication of higher lean meat yields on slaughter progeny.

ROTATIONAL CROSSBREEDING -- Systems of crossing two or more breeds where the breed of sire is rotated in a systematic fashion. In a conventional rotation, sire breeds are rotated each generation so that females are mated to sires of the breed least represented in their own genotypes. Rotation systems maintain relatively high levels of heterosis and produce replacement heifers from within the system.

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

SCURS -- Horny tissue of rudimentary horns that are attached to the skin rather than the bony parts of the head.

SEEDSTOCK BREEDERS -- Producers of breeding stock for purebred and commercial breeders. Progressive seed stock 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 more offspring than others 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 per generation from selection for a trait is equal to selection differential times the heritability of the trait.

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

SELECTION INTENSITY --The selection differential measured in phenotypic standard deviation units of the selected trait. It is inversely proportional to the proportion of available replacement actually selected to be parents of the next generation. For example, with A.I. compared to natural service, only a small proportion of bulls need to be selected, and selection intensity, selection differential, and selection response will be high.

SIBLINGS (SIBS) --Brothers and sisters of an animal.

SIRE -- The male parent.

SIRE SUMMARY --Published genetic predictions (EPDs) of sires for economically important traits from national cattle evaluation programs.

SPERM -- A mature male germ cell.

STANDARDIZED PERFORMANCE ANALYSIS (SPA) --A set of programs that allow producers to collect, process, and interpret information on biological efficiency and economic returns to a seed stock or commercial beef production enterprise.

STAYABILITY (STAY) -- The expected difference, in percent probability, that a bull's daughters will remain in the herd until at least six years of age.

STRAIGHTBREEDING -- The mating of animals within a recognized breed, or matings between animals that are similar in breed-type, as in a grading –up program.

SUPER OVULATION -- Process by which a cow is treated with reproductive hormones to induce her to produce more eggs than normal. Done in embryo-transfer techniques.

SYSTEMS APPROACH -- An approach to evaluate alternative individuals, breeding programs, and selection schemes that involve 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

TANDEM SELECTION -- Selection for one trait at a time. When the desired level is reached in one trait, then selection is practiced for a second trait.

TEMPERAMENT (disposition) -- A measure of the relative docility, wildness, or aggression of an animal toward unfamiliar situations, human handlers, or management interventions.

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 of breeds, replacement females must come from other herds.

THRESHOLD MODEL -- Statistical procedures for analyzing traits that are expressed in an all-or-none fashion (alive vs. dead or pregnant vs. open, for example) but that probably are affected by environmental factors and by genes at many loci. When genetic predictions are conducted for such traits using the threshold model, resultant EPDs reflect the expected proportion of an individual's progeny that will vs. will not express the trait.

TOTAL MATERNAL TM -- Predicts the rancher's actual observation of weaning weights of calves raised by an animal's daughters. TM includes the daughter's milk EPD plus half of her genetic contribution to her calf's weaning weights EPD. The formula for TM EPD is:

$$\text{TM EPD} = \text{Milk EPD} + \frac{1}{2} (\text{WW EPD})$$

TOTAL HERD REPORTING -- An inventory based on performance recording system in which the production of all animals in a breeding herd and the performance of all progeny are accounted for annually. In calf-based systems, by contrast, progeny performance data may be recorded selectively and production information is not gathered on females who do not produce live calves. An inventory based Total Herd Reporting system is necessary to acquire the data for genetic evaluation of some reproductive traits.

TRAIT RATION -- An express of an animal's performance for a particular trait relative to the herd or contemporary group average. It is usually calculated as:

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

U

ULTRASONIC MEASUREMENTS -- Used to estimate carcass and reproductive characteristics. Operates on the principle that sound waves echo differently with different densities of tissue.

USDA BEEF CARCASS EVALUATION SERVICE --Program whereby producers, for a fee, can obtain carcass data on their cattle.

USDA QUALITY GRADE --A grade (e.g., Prime, Choice, Select, etc.) assigned by a Federal grader to predict the palatability of eating characteristics of the meat. The primary components are maturity and marbling score. Texture, firmness and color of the lean are also considered.

USDA 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.

V

VARIANCE -- Variance is a statistic that numerically describes the differences among individuals for a trait in a population. Without variation, no genetic progress would be possible, since genetically superior animals would not be distinguishable from genetically inferior ones.

W

WEANING WEIGHT EPD WW—Predicts the difference, in pounds, for weaning weight (adjusted to age of dam and a standard 205 days of age). This is an indicator of growth from birth to weaning.

WEANING WEIGHT (WW) -- The expected difference, in pounds, for 205 – day, mature dam equivalent weaning weight. This is an indicator of growth up to weaning.

WEIGHT PER DAY OF AGE (WDA) -- Weight of an individual divided by days of age.

Y

YEARLING WEIGHT EPD YW— Predicts the expected difference, in pounds, for yearling weight (adjusted to a standard 365 days of age). This is an indicator of growth from birth to yearling.

YEARLING WEIGHT (YW) --The expected difference, in pounds, for 365-day, mature dam equivalent yearling weight. This is a measure of growth from birth to yearling.