

# Animal Science 101

## Talkin' the Talk

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# Introduction

- Livestock terms
- General management
- Breeding and genetics
- Reproductive management
- Animal health
- Carcass traits

# Livestock

- **Bovine:** Term for the species of cattle
- **Bull:** A male (un-castrated) bovine
- **Calf:** A baby bovine
- **Cow:** A female bovine that has had one or more calves
- **Heifer:** A young female bovine that has not had a calf
- **Steer:** Castrated male bovine
- **Sire:** The father of an animal
- **Dam:** The mother of an animal

# General management

- **Adjusted weaning weight (WW):** An unshrunk, off-the-cow calf 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.
- **Average daily gain (ADG):** Measurement of the average daily body weight change over a specified period of time of an animal on a feed test.
- **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.
- **Weight per day of age (WDA):** Weight of an individual divided by its age in days.
- **Average daily gain:** Amount of weight gained per day during a specific period of time (i.e., from weaning to yearling age)
- **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.

# General management

- **Calving ease:** The opposite of calving difficulty. An easy calving is one that does not require assistance and does not impose undue strain on the calf or dam.
- **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.
- **Compensatory gain:** Rapid, subsequent gain of cattle that have been nutritionally deprived for some portion of their life.
- **Contemporary group:** A group of cattle that are of the same breed and sex, are similar in age, 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.
- **Dehorning:** The process of removing the horns from an animal when they are young. This is often done to help minimize injury to other cattle and handlers.

# General management

- **Brand:** A permanent mark applied to an animal.
- **Branding iron:** The tool used to apply a brand.
- **Concentrate:** Feed grains and other processed feed materials that contain a high proportion of nutrients and are low in fiber, such as corn, oats or soybean meal.
- **Double muscling:** A simply inherited trait evidenced by an enlargement of the muscles with large grooves between the muscle systems especially noticeable in the hind leg.
- **Ear tag:** Method of identification by attaching a tag to the ear.
- **Frame score:** score based on subjective evaluation or actual measurement of hip height.

# General management

- **Ratio:** An expression of an animal's performance for a particular trait relative to the herd or contemporary group average.
- **Roughage:** High fiber plant materials that contain a low proportion of nutrients and are usually bulky and coarse, such as hay, silage and forages.
- **Supplement:** Nutritional additive intended to remedy deficiencies of the diet, such as salt, minerals, protein.
- **Feed conversion (feed efficiency):** Units of feed consumed per unit of weight gained.
- **Conformation:** A description of the shape of body parts of an animal.
- **Maintenance energy requirement:** The amount of feed energy required per day by an animal to maintain its body weight and support necessary metabolic functions.

# Breeding and genetics

- **Breed:** Animals with a common origin and selection history. Animals within a breed have physical characteristics that distinguish them from other breeds or groups of animals within that same species.
- **Purebred:** An animal of known ancestry within a recognized breed that is eligible for registry in the official herd book of that breed.
- **Backcross:** The mating of a two-breed crossbred individual back to one of its parental breeds. Example: A Hereford-Angus crossbred cow bred back to an Angus bull.
- **Crossbreeding:** The mating of animals of different breeds or subspecies, frequently resulting in heterosis (hybrid vigor) for many economically important traits.



# Breeding and genetics

- **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 increases the proportion of homozygous gene pairs. It increases the frequency of expression of genetic defects caused by recessive genes. Inbreeding may increase prepotency for simply inherited and highly heritable traits.
- **Linebreeding:** A form of inbreeding in which an attempt is made to concentrate the inheritance of some favored ancestor in descendants within a herd. The average relationship of the individuals in the herd to this ancestor is increased by linebreeding, but at the cost of an increased level of inbreeding.
- **Outbreeding (outcrossing):** Mating together of animals that are not closely related. Mild outbreeding is illustrated by mating cows to a sire of their own breed but who is not closely related to them. Such outcrossing may widen the genetic base in a herd and reduce inbreeding accumulation. A higher level of outcrossing is illustrated by crossing two *Bos taurus* breeds. This generally would result in beneficial heterosis for economically important traits.

# Breeding and genetics

- **Rotational crossbreeding:** Systems of crossing two or more breeds where the crossbred females are bred to bulls of the breed contributing the lowest proportion of genes to those females. Rotational crossbreeding systems maintain relatively high levels of heterosis and allow for replacement heifers to be produced from within the system.
- **Terminal sires:** Sires used in a crossbreeding system in which all of the progeny, both male and female, are marketed. For example F<sub>1</sub> crossbred dams could be bred to terminal 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.
- **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.
- **F<sub>1</sub>:** Offspring resulting from the mating of a purebred (straight-bred) bull to purebred (straight-bred) females of another breed.

# Breeding and genetics

- **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.
- **Closed herd:** A herd in which no outside breeding stock (cattle) are introduced.
- **Composite breed:** A breed made up of combinations of other breeds.
- **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., cm., etc.).

# Breeding and genetics

- **Heritability:** The proportion of the differences among cattle, measured or observed, that is transmitted, on average, to their offspring. Heritability of different traits may vary from zero to one. The higher the heritability of a trait, the more accurately individual performance predicts breeding value and the more rapid should be the response to selection for that trait.
- **Genotype:** The two alleles present at a locus in an individual. For a locus with only two alleles, three genotypes are possible. For example, at the polled/horned locus in cattle, two common alleles are P (the dominant allele preventing growth of horns) and p (the recessive allele allowing horn growth). The three possible genotypes are PP (homozygous dominant), Pp (heterozygous or carrier), and pp (homozygous recessive).
- **Phenotype:** The visible or measurable expression of a character; weaning weight, postweaning gain, or reproduction for example. For most traits, phenotype is influenced by both genotype and environment.

# Breeding and genetics

- **Heterozygote:** A genotype in which the two alleles at a locus are different, e.g. Pp.
- **Homozygote:** A genotype in which the two alleles at a locus are the same, e.g. PP or pp.
- **Recessive:** Recessive alleles are expressed only when homozygous. They must have been inherited from both parents before the phenotype with which they are associated can be expressed. At the locus affected the growth or absence of horns, for example, homozygous recessive pp individuals are horned whereas PP and Pp individuals are polled.
- **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.
- **Half-sibs:** Individuals having the same sire but different dams (or less commonly the same dam but different sires). Halfbrothers, half-sisters, or half brother/sister.

# Breeding and genetics

- **Pedigree:** A tabulation of names of an individual's ancestors, usually only those of the three to five closest generations. Pedigree information is used to establish genetic relationships among individuals to use in genetic evaluations.
- **Polled:** Naturally hornless cattle. Having no horns or scurs.
- **Qualitative (categorical) traits:** Those traits in which there is a sharp distinction between phenotypes, such as black vs. red or polled vs. horned. Only one or a few pairs of genes are involved in the expression of many qualitative traits.
- **Quantitative traits:** Those traits, such as weaning weight, in which there is no sharp distinction in the range of phenotypes. Usually, many gene pairs are involved as well as environmental influences affect variation for such traits.

# Reproductive management

- **Estrous cycle:** The period of time between ovulations. This averages 21 days in cattle but can range between 18 and 23 days in length
- **Heat:** The recurrent period of sexual receptiveness in cows, when the cow will stand for the bull to breeder her. Also known as estrus.
- **Libido:** Sex drive. In bulls, the propensity to detect and mate estrous females.
- **Ovulation:** Release of the female germ cell (egg or ovum) by the ovary. Cows usually ovulate several hours (up to 15 hours) after the end of estrus or standing heat.
- **Gestation:** The period of pregnancy or the period of time from conception until young are born, averaging about 285 days in cattle.
- **Parturition:** The act of giving birth; calving.

# Reproductive management

- **Progeny:** The young, or offspring, of the parents.
- **Postpartum interval:** The number of days between parturition and the first postpartum estrus.
- **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.
- **Artificial insemination (AI):** The technique of placing semen from the male into the reproductive tract of the female by means other than natural service.
- **Estrous synchronization:** Using synthetic hormones to make a group of females come in heat at the same time. They can then be bred at the same time and all the calves will be born in a short period, ensuring uniform ages in calf crop and lower labor requirements.



# Reproductive management

- **Super ovulation:** Process by which a cow is treated with reproductive hormones to induce her to produce more eggs than normal.
- **Embryo transfer:** Removing fertilized ova (embryos) from one cow (the donor), generally in response to hormone-induced superovulation, and placing these embryos into other cows (the recipients). More calves can be obtained from cows of superior breeding value by this technique.
- **Palpation:** A method to determine if a cow is pregnant. A gloved hand is inserted into the rectum and the reproductive tract and fetus are examined using the fingers.
- **Dystocia (calving difficulty):** Abnormal or difficult labor causing difficulty in delivering the fetus and/or placenta. Difficult births lead to increased calf and cow mortality and to more difficult rebreeding of the cow.

# Animal health

- **Breeding soundness examination:** Inspection of a bull, including evaluation of physical conformation and soundness through genital palpation, scrotal circumference assessment, and testing of semen for motility and morphological abnormalities.
- **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.
- **Castrate:** To remove the testes of male cattle.
- **Cryptorchid:** Male cattle with undescended testes.
- **Culling:** The process of eliminating less productive or desirable individuals from a herd.
- **Dehorning:** Removal of the horns from an animal using either surgical or chemical methods

# Animal health

- **Vaccination:** Administering a compound to stimulate the immune system and help prevent the animal from contracting a specific disease.
- **Subcutaneous:** Giving an injection just below the skin.
- **Intramuscular:** Giving an injection directly into the muscle, usually the neck or rump.
- **Withdrawal period:** The period of time that is required after any medication has been given to an animal before the animal can be slaughtered for meat. This time period varies by compound and veterinarians or producers should read the product label to determine the withdrawal period.
- **Founder:** A nutritional ailment from overeating; foundered animals become lame with sore front feet and excessive hoof growth.

# Carcass traits

- **Carcass merit:** Desirability of a carcass relative to quantity of components (muscle, fat, and bone), USDA quality grade, and potential eating quality.
- **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.
- **Fat thickness:** Depth of fat in tenths of inches over the rib eye muscle at the 12<sup>th</sup> rib. It consists of a single measurement at a point three-fourths of the lateral length of the rib eye muscle from the split chine bone.
- **Finish:** The degree of fatness.
- **Hot carcass weight:** Weight of a carcass just prior to chilling.
- **Kidney, pelvic and heart fat (KPH):** The internal carcass fat associated with the kidney, pelvic cavity, and heart. It is expressed as a percentage of chilled carcass weight.

# Carcass traits

- **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. It is a major factor in assigning USDA quality grade of a beef carcass.
- **Palatability:** Acceptable to the taste or sufficiently agreeable in flavor to be eaten.
- **Rib eye area:** Area in square inches of the longissimus muscle measured at the 12th rib interface on the beef forequarter.
- **USDA yield grade:** Measurements of carcass cutability categorized into numerical categories with 1 being the leanest and 5 being the fattest.
- **Yield grade:** A numerical score ranging from 1 (high yield) to 5 (low yield) reflecting the expected proportion of boneless, closely-trimmed cuts from the beef carcass. It is estimated from a USDA prediction equation that includes measured or estimated values for hot carcass weight, rib eye area, fat thickness, and estimated percentage of kidney, pelvic, and heart fat.

# Reference material

- American Hereford Association  
<http://hereford.org/node/307>

# Questions?

