Performance Data Collection Guide

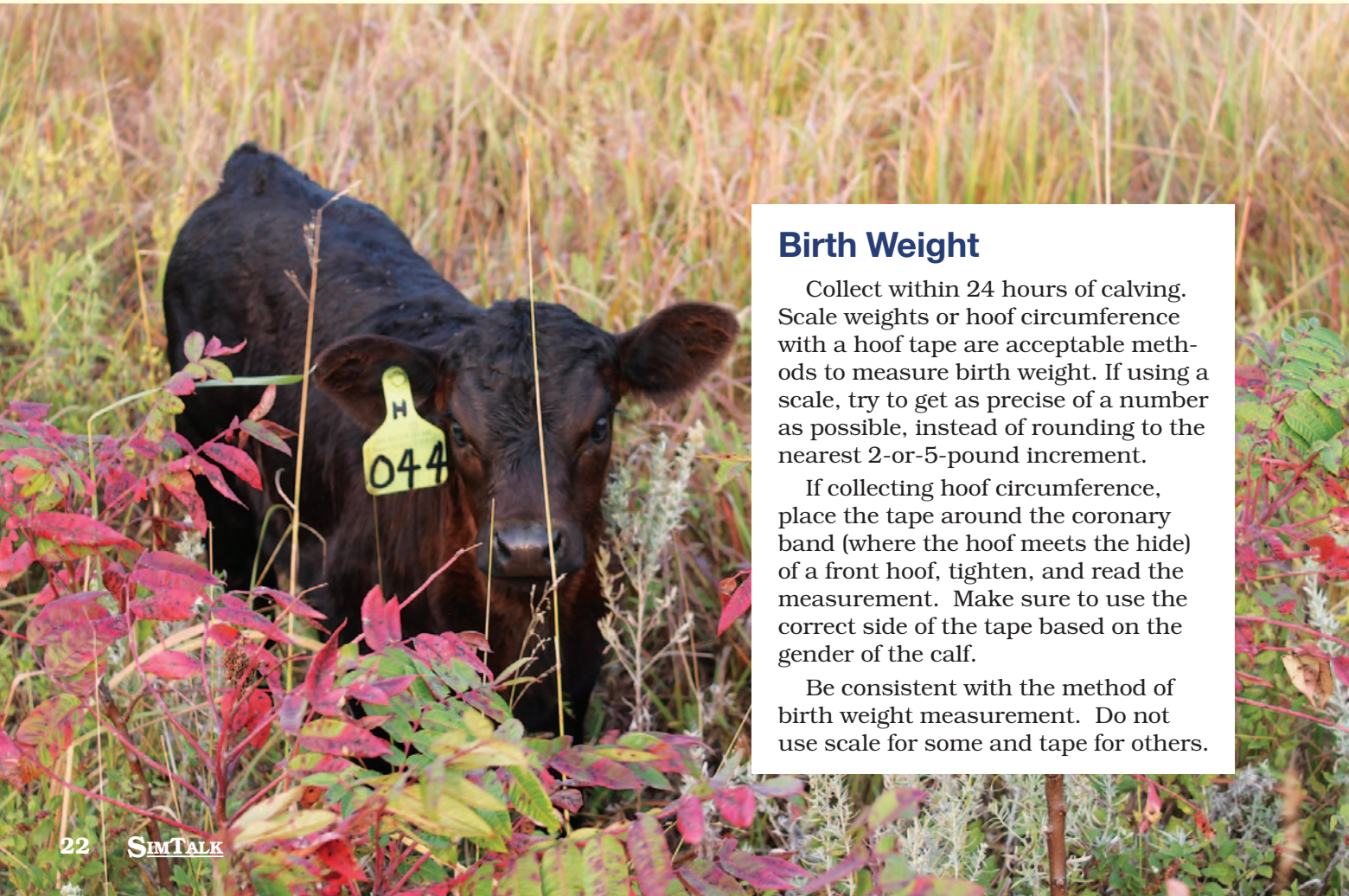
Definitions, Tips, Timelines, and Use

by Jackie Atkins, PhD, director of Science and Education

When it comes to performance data collection, the seedstock breeders, cow-calf operators, managers, and hired hands all play a pivotal role in collecting phenotypic measurements and reporting them into a system to use the information to its fullest extent. This rests on your shoulders, my friends. If you want to get the most complete picture of the genetics of your herd, then you have to commit yourself to collecting the most complete set of records AND using them to analyze your operation and your genetics.

It is not enough to measure the animals and write it down in your record book or in a notebook. Records sitting in a pile of papers on your desk will NOT be used to their fullest extent. I empathize that feeding records into an analysis of your herd's performance or a genetic evaluation is not an easy task, nor do many of us wish to spend hours with a computer working on this step. But in order to use your herd performance to its fullest, this is a necessary step. This might mean you hire someone to help digitize your records, twist the arm of a family member, or simply sit down and do it yourself. There are many approaches and software platforms to use. My advice is to find a system that works for you so that you USE the records you collect.

The following information is to clarify the best approach for collecting various performance records and to provide a one-stop shop with information you need to gather these data points. This article breaks down each type of phenotypic record and the best way and time ranges to collect them to take away any indecision surrounding this essential component of beef cattle improvement.



Birth Weight

Collect within 24 hours of calving. Scale weights or hoof circumference with a hoof tape are acceptable methods to measure birth weight. If using a scale, try to get as precise of a number as possible, instead of rounding to the nearest 2-or-5-pound increment.

If collecting hoof circumference, place the tape around the coronary band (where the hoof meets the hide) of a front hoof, tighten, and read the measurement. Make sure to use the correct side of the tape based on the gender of the calf.

Be consistent with the method of birth weight measurement. Do not use scale for some and tape for others.

Calving Ease Score

This score indicates how easily a calf was born. Only scores 1 through 4 are used in the genetic evaluation of calving ease, but scores 5 through 7 can be used to further describe the calving event. If a calf's birth was unobserved (hence unassisted), use a 1 as the primary score. If entering scores into ASA's Herdbook, every calf should have a primary score (1-4) but two-digit numbers may be used for more thorough accounting of calving. Examples: Use 36 to indicate a hard pull and dead on arrival. Use a 25 to indicate an easy pull with an abnormal presentation.

1 = Born unassisted

2 = Easy pull

3 = Hard pull

4 = Cesarean

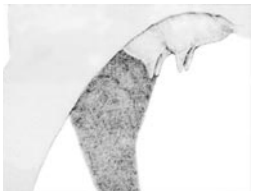
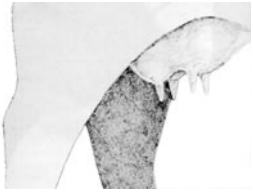
5 = Abnormal presentation (omitted from genetic evaluation)

6 = Dead on arrival (omitted from genetic evaluation)

7 = Premature (omitted from genetic evaluation)

Udder and Teat Scores

Collect udder and teat scores within 24 hours of calving. Two scores are assigned based on udder suspension (1-9, with 1 being very pendulous and 9 being very tight) and teat size (1-9, with 9 being very small and 1 being large and misshapen). Ideally one person scores all the udders/teats during the calving season for consistency.

Score	Udder Suspension		Teat Size	
9	Very Tight		Very Small	
7	Tight		Small	
5	Intermediate		Intermediate	
3	Pendulous		Large	
1	Very Pendulous		Very Large, Misshapen	

Graphic used courtesy of the American Hereford Association.

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Weights

Measure to the nearest whole pound increment. Scale needs to be calibrated and cleaned periodically. Take empty body weights — in other words, cattle waiting to be weighed that are drinking water will be heavier than cohorts weighed without waterfill. Ideally, weigh all cattle the same day or you can take two weights on the animal and use the average.

Weaning Weight: Measure as close to 205 days of age with an acceptable window (with ASA) from 160-250 days of age.

Yearling Weight: Measure as close to 365 days of age with an acceptable window (with ASA) from 330-440 days of age.

Mature Cow Weight: Measure at the same time as collecting a body condition score (BCS). Weigh entire cow herd groups at the same production stage. In other words, do not weigh some at calving, some at breeding, and some at preg check time. Ideally, the entire cow herd is weighed, but if that is not feasible, weigh age groups of cows (for instance, all the two-year-olds and five-year-olds). For genetic evaluation, it is best to have a weight at two years and again by or before six years of age.

Body Condition Scores (BCS)

Scores can be used for both management decisions and to input information about the genetics for size and intake into a genetic evaluation. Like other subjective measurements, consistency is key. Ideally, the same person is assessing the BCS, and scores on cattle are collected during the same production stages (pre-calving, calving, breeding, etc.).

Bulls: Best timing is at least six weeks prior to breeding season and throughout the breeding season.

It is ideal for bulls to enter into the breeding season in a BCS of 5.5 to 6.5 (neither under- nor overconditioning is good for the success of the breeding season). A bull may lose 100-200 pounds during the active breeding season so evaluating BCS throughout breeding helps to determine if the bulls require supplementation.

Cows: Best timing is 60-90 days before calving, at calving, and at weaning or pregnancy diagnosis.

For genetic evaluation purposes, scoring cows at the same time as mature weight collection is ideal. For management purposes, scoring at weaning helps to know how to feed cattle leading up to calving, as the ideal time to add body condition is between weaning their current calf up to the last trimester of pregnancy. Assessing body condition 60-90 days prior to calving helps to determine nutrient requirements, as ideal calving BCS is 5 to 6. This helps the cow recover during the postpartum period and breed back in a timely manner.

See next page for a descriptive table of each BCS.

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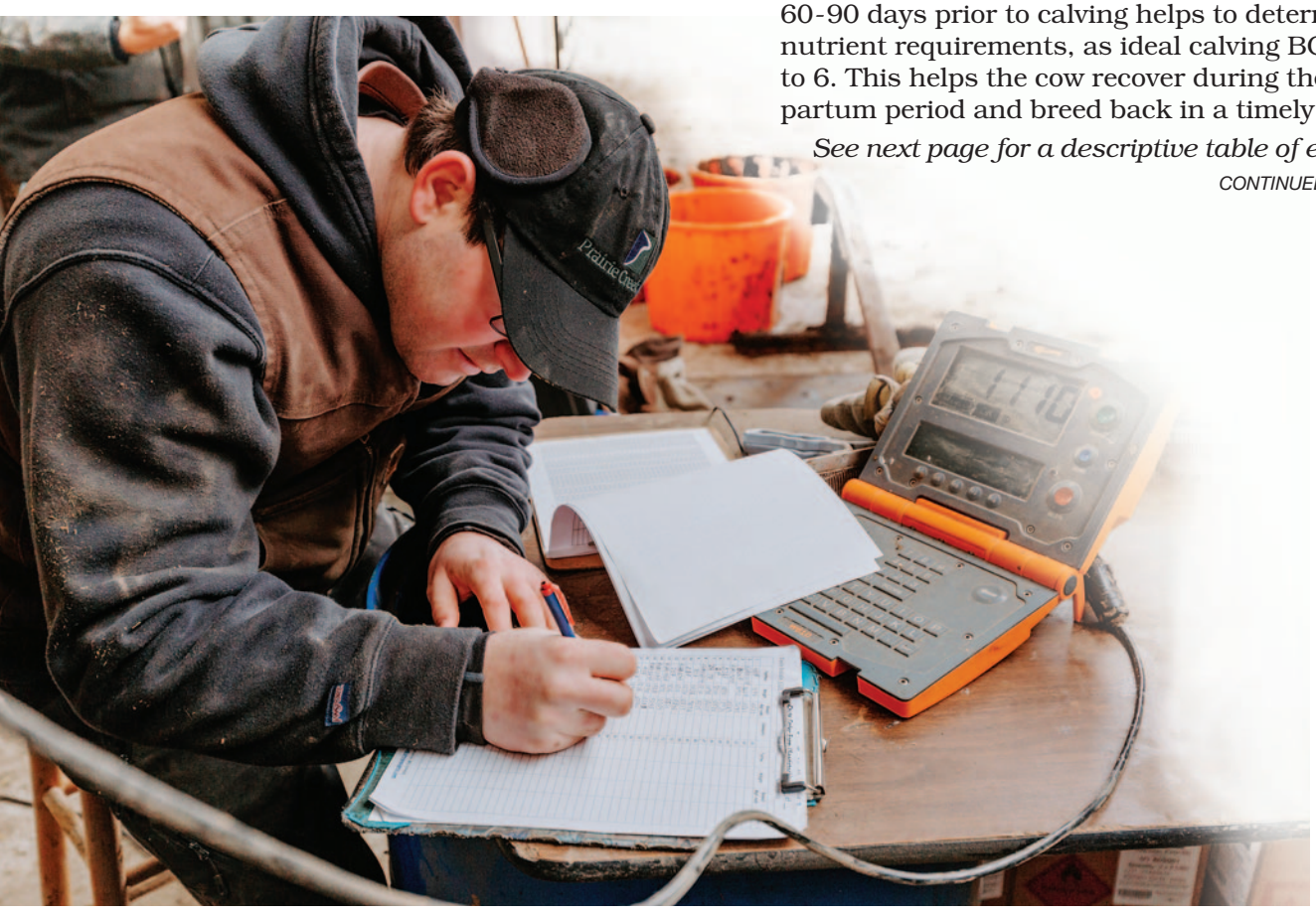

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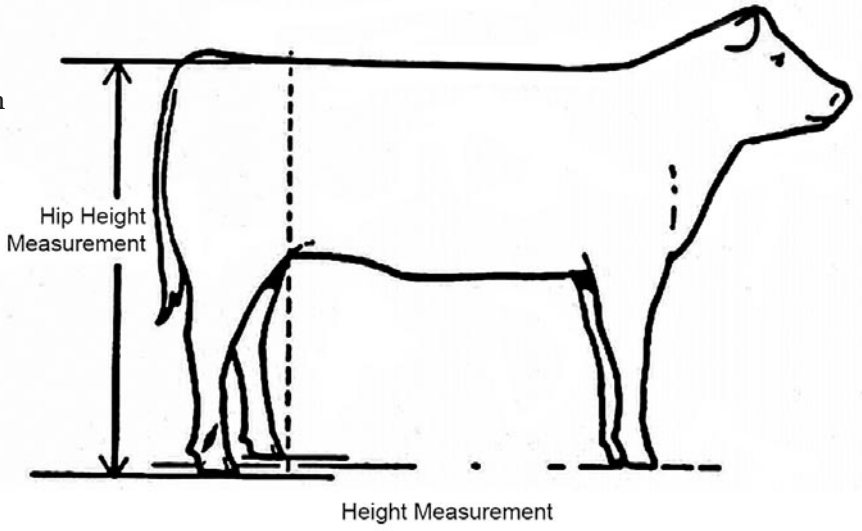
Visual indicators to Evaluate Body Condition Scores (BCS)

	BCS	Spine	Ribs	Hooks/Pins	Tailhead	Brisket	Muscling
Thin	1	Visible	Visible	Visible	No fat	No fat	None/Atrophy
	2	Visible	Visible	Visible	No fat	No fat	None/Atrophy
	3	Visible	Visible	Visible	No fat	No fat	None
Borderline	4	Slightly visible	Foreribs visible	Visible	No fat	No fat	Full
Optimum Condition	5	Not visible	Not visible	Visible	No fat	No fat	Full
	6	Not visible	Not visible	Visible	Some fat	Some fat	Full
	7	Not visible	Not visible	Slightly visible	Some fat	Fat	Full
Over-conditioned	8	Not visible	Not visible	Not visible	Abundant fat	Abundant fat	Full
	9	Not visible	Not visible	Not visible	Extremely fat	Extremely fat	Full

Adapted from Herd and Sprott, 1986; BCS = body condition score

Hip Height

Hip Height/Frame (weaning, yearling, or with mature weight): The recommended site for hip height measurement is a point directly over the hooks (see image). Cattle should be standing on a flat and even surface. A word of caution about hip heights: the use of body condition score is a better genetic predictor of size and intake than hip height. According to the BIF Guidelines, "Caution should be taken when using the frame score equations and tables. These calculations were developed from cattle data from the 1970s. Cattle have changed tremendously since then, and the growth curve has likely changed, as well. The relationships of height as animals age may no longer be correct. Additionally, predictions of expected carcass weights or mature cow weights based on these frame scores that appear in many publications are likely incorrect today. Cattle today tend to be heavier, at similar heights, to cattle used to develop the frame score equation." Consult the BIF guidelines (guidelines.beef-improvement.org) for conversion of hip heights to frame scores at various days of age.



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Docility

Assess docility at either weaning or yearling (see "Weights" section for acceptable age windows). Score an entire age group of cattle at the same time (don't score some at weaning and others at yearling). The following table describes the chute scoring method used by the ASA. Have one person do all the scoring (avoid one person doing some of the cattle and another person scoring the other portion). Being consistent is key to subjective measurements like docility.

1 = Docile	Mild disposition. Gentle and easily handled. Stands and moves slowly during processing. Undisturbed, settled, somewhat dull. Does not pull on the headgate when in a chute. Exits the chute calmly.
2 = Restless	Quieter than average, but may be stubborn during processing. May try to back out of chute or pull back on headgate. Some flicking of tail. Exits chute promptly.
3 = Nervous	Typical temperament is manageable, but nervous and impatient. A moderate amount of struggling, movement, and tail flicking. Repeated pushing and pulling on headgate. Exits chute briskly.
4 = Flighty (Wild)	Jumpy and out of control, quivers and struggles violently. May bellow and froth at the mouth. Continuous tail flicking. Defecates and urinates during processing. Frantically runs the fence line and may jump when penned individually. Exhibits long flight distance and exits the chute wildly.
5 = Aggressive	May be similar to score 4, but with added aggressive behavior, fearfulness, extreme agitation, and continuous movement, which may include jumping and bellowing while in a chute. Exits the chute frantically and may exhibit attack behavior when handled alone.
6 = Very Aggressive	Extremely aggressive temperament. Thrashes about or attacks wildly when confined in small, tight places. Pronounced attack behavior.

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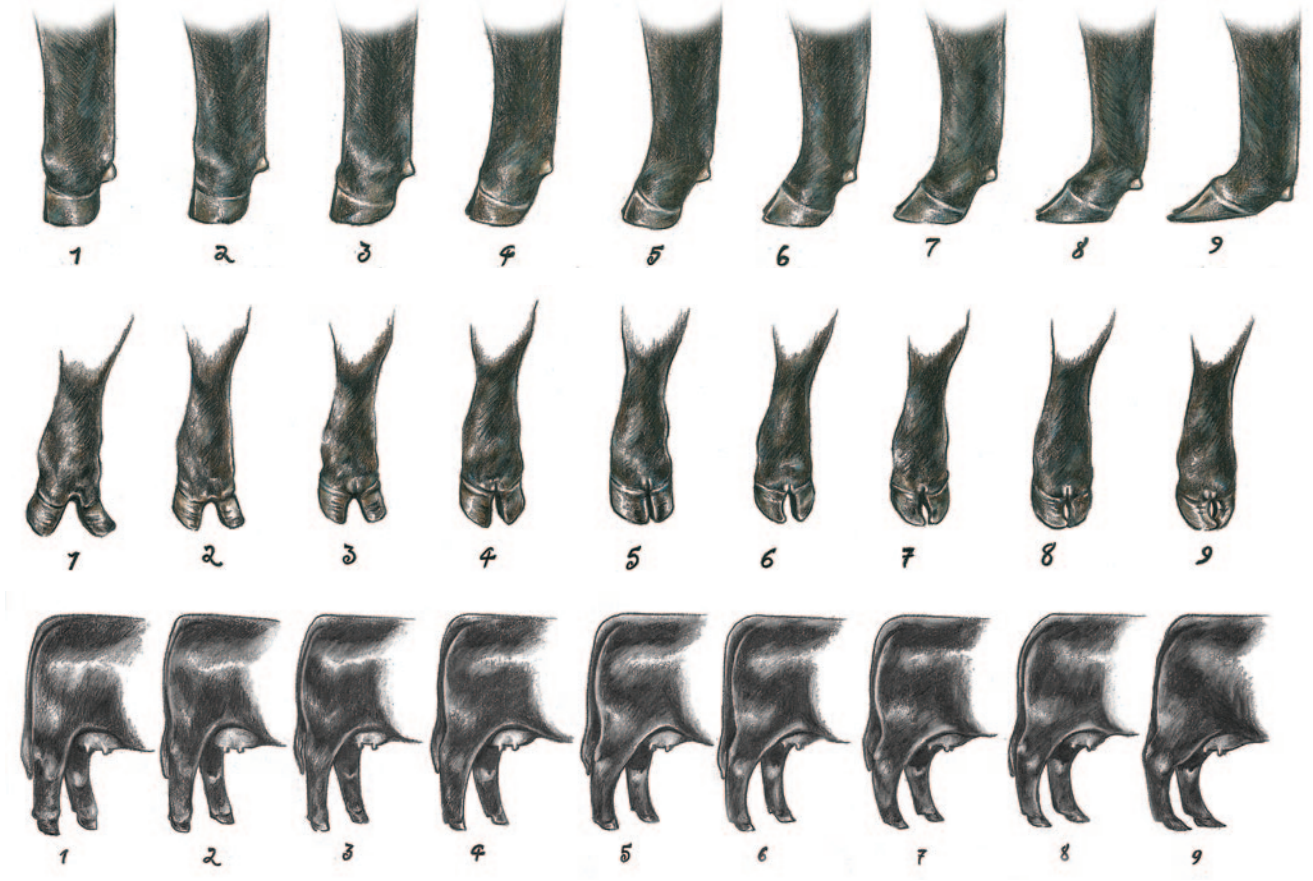
Feet and Leg

1. **Hoof Angle** a description of the angularity that exists between the base of the hoof to the pastern. Can describe steepness, shallowness, and length of toe.
2. **Claw Shape** a description of the digital conformation with regard to shape, size, and symmetry. Can describe divergence and openness, or curling/crossing of claws.
3. **Rear Leg Side View** a description of the angularity that exists in the hock joint in relation to movement. Can describe straightness and rigidness, or overflexion of the hock joint.



Artwork by Amanda Raithel Art

Guidelines recommended for feet and leg data collection:

- **Score the three traits (Hoof Angle, Claw Shape, and Rear Leg Side View) on a 1 to 9 scale using the above rubrics.**
- **If there is variation in conformation of hoof traits between front/rear or left/right, score the worst hoof.**
- **Scores should be collected on all yearling bulls and heifers up to 18 months of age to capture whole contemporary groups. Reminder: animals that contemporary by themselves will not have their scores included in the evaluation.**
- **Scores may be evaluated annually on mature cows (taken in conjunction with mature weights and body condition scores).**
- **Score all animals prior to any hoof trimming.**
- **Score animals on a level and hard surface, devoid of mud or grass to ensure an accurate appraisal.**
- **Score all animals on the same day, from the same evaluator.**

Ultimately, feet and leg appraisal and data collection has a range of benefits, including training membership to become more aware of conformational differences and characteristics in the soundness of their cow herd and annual seedstock offering, building a more robust understanding of feet and leg traits as direct indicators of soundness and longevity, and building a data set for EPD development so all can benefit from more precise genetic selection.

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Carcass

Carcass Ultrasound (yearling age ranges): Scan data typically includes ultrasound back fat thickness, ribeye area, rump fat,and intramuscular fat. Ultrasound data needs to be submitted by a certified ultrasound technician (find one at http://ultrasoundbeef.com/Technicians.php). It is important to note that ultrasound traits are not equal to harvest records. While they help predict carcass traits, emphasis on acquiring harvest records is vital to carcass trait prediction.

Harvest Records (age dependent on feeding, breed, and type of animal): Harvest records are rare and valuable for understanding the end product produced. For genetic evaluation and management decisions, most carcass information boils down to: 1.) the amount of retail product from an animal, and 2.) the quality of the beef on the animal.

Back fat thickness: Indicator of yield grade. External fat measured at the 12th rib, back fat thickness is used to estimate the yield percentage. As back fat increases, the percentage of retail product decreases.

Dressed carcass yield: Calculated as the hot carcass weight divided by the live weight multiplied by 100 and influenced by fill, muscling, fat, hide, etc. Heavier muscled cattle have a higher dressing percentage.

Hot carcass weight: Weight of the carcass as it leaves the slaughter floor.

Ribeye area: Ribeye muscle measured at the 12th rib to indicate yield.

Yield grade: Calculation that indicates the amount of retail product and measured in whole numbers from 1 (most retail product) to 5 (least retail product), although yield grade expressed in tenths is best for comparing animals.

Marbling score: Estimation of the intramuscular fat in the ribeye between the 12th and 13th rib.

Numerical Scores

Quality Grade	Marbling	Score
Prime	Abundant	10.0 – 10.9
Prime	Moderately Abundant	9.0 – 9.9
Prime	Slightly Abundant	8.0 – 8.9
Choice	Moderate	7.0 – 7.9
Choice	Modest	6.0 – 6.9
Choice	Small	5.0 – 5.9
Select	Slight	4.0 – 4.9
Standard	Traces	3.0 – 3.9
Standard	Practically Devoid	2.0 – 2.9

Additional metrics are used to indicate palatability of the beef, and influence quality grade. These include color, firmness, texture, and tenderness estimates like Warner-Bratzler shear force.

Individual Feed Intake

Individual feed intake records are often taken post-weaning or around yearling age. Growth is also measured during the intake test period.

Warm-up period: Depends on the background of the cattle and the type of feed intake system. If calves are already accustomed to eating out of bunks, a seven-day warm-up period with the feed intake system is likely adequate. For cattle that have not been bunk-broke yet, they could need up to a 21-day warm-up period.

Feed Intake Test: Recommend a 42-day minimum which allows for missed days due to weighing or problems with the intake measurement.

Weights: Animals should be weighed two days in a row (to adjust for fill) at the start of the test and at the end of the test, or cattle can be weighed five times throughout the test period.

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Fertility Records

Fertility is a lowly heritable trait, influenced by many factors. The fastest way to increase fertility is to use a crossbreeding system. Breeding soundness exams (BSE), reproductive tract scores (RTS), and pregnancy records are all valuable records for managing reproductive outcomes in your herd. These also take specialized training, and in many states require veterinarians to perform the service. Scientists at Kansas State University are looking into the genetics of fertility in bulls and are seeking both BSE and pregnancy records from producers to contribute to the scope of this study.

Reproductive Tract Scoring and Pelvic Measurements: (four to six weeks prior to breeding). Used to assess pubertal status of heifers and cull problem breeders. Half of the heifers should be cycling (score of 4 or 5) for a successful breeding season. If less than half are cycling, consider adjustments to nutrition, timing of the breeding season, and including products that induce cycling in an estrous synchronization protocol (for instance, MGA or Eazi-Breed CIDR).

Breeding Soundness Exams (prior to breeding season): Performed by a veterinarian or a trained reproductive physiologist. Should include both a physical examination of the bull to determine his ability to move and physically breed plus a semen test to look for potential loss of fertility associated with sperm quality and movement.

Pregnancy Status (timing varies depending on the method): Blood tests can detect pregnancy as early as 30 days post-conception, ultrasound as early as 27 days, and rectal palpation 35 days or later. These require trained personnel and have various degrees of accuracy. Use of ultrasound allows for detection of heartbeat and sex determination of the fetus. If pregnancy rates fall below your expectation, consult with a veterinarian or reproductive physiologist to discuss ways to improve fertility.

Regional Records

Hair Shedding (recorded for yearling during the spring — in most parts of the country May is best timing): Scores are on a scale from 1 to 5 with 1 meaning hair is completely shed (ideal for heat tolerance) and 5 having a full winter coat (worst for heat tolerance). If you missed the yearling age, shedding scores can be taken on mature animals as well. Ideally, the whole herd is scored on the same day by the same person. To date, hair shedding scores are not used routinely in genetic evaluation, but can be used as a culling tool to reduce heat stress (consider culling cows with a 4 or 5 score, especially in warmer climates).

Pulmonary Arterial Pressure (PAP; yearling cattle): PAP is an indicator of high-altitude disease and is used for the screening of animals who are susceptible to pulmonary hypertension. PAP testing is a veterinary procedure used to confirm the presence of pulmonary hypertension by measuring the pressure in the pulmonary artery. These measurements are typically taken at >5,000 feet of elevation in yearling cattle. A lower PAP score indicates less pulmonary stress, reduced susceptibility, and a more desirable phenotype.

PAP scores are used both to determine if an individual animal is at risk for high-altitude disease and now can also be used in genetic evaluation to predict the likelihood of an animal's progeny to have a risk of high-altitude disease.

Hair Shedding

Score	Definition	Description
1	Slick, short summer coat (100% shed)	Hair shedding is complete
2	Coat is mostly shed (~75% shed)	Hair shedding complete except for lower region of rib
3	Coat is halfway shed (~50% shed)	Hair shed down the brisket and along topline
4	Coat exhibits initial shedding (~25% shed)	Hair shed on neck and around tail head
5	Full winter coat (0% shed)	No hair shedding