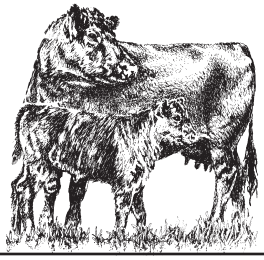

Western Beef Resource Committee *Fourth Edition*

Cattle Producer's Handbook

Genetics Section 830

How to Select Cattle for Temperament

Reinaldo Cooke, Oregon State University
Eastern Oregon Agriculture Research Center, Burns

Temperament defines the fear-related behavioral responses of cattle when exposed to human handling (Fordyce et al. 1988). As cattle temperament worsens, their response to human contact or any other handling procedures becomes more excitable. Besides personnel security and animal welfare, temperament has significant implications on cattle performance (Cooke 2014). Therefore, evaluating cattle for temperament can be used as a management decision tool to enhance overall safety and productivity of beef operations. This article reviews some of the most common and practical methods used to assess temperament in beef cattle.

Methods to Evaluate Temperament in Beef Cattle

In recent years, several methods to evaluate cattle temperament have been developed. These vary from simple visual observations to assessments that would require computerized apparatuses and can be divided into three main categories: (1) restrained techniques, (2) non-restrained techniques, and (3) phenotypic evaluations (Burrow and Corbet 2000). In this article, only methods that have been shown to be repeatable within animals (therefore, reliable to quantify cattle temperament) and also relatively simple to carry out during cattle handling procedures will be described in detail.

Restrained techniques evaluate temperament when cattle are physically restricted, such as in a squeeze chute. The major problem with these techniques is that cattle with excitable temperament may "freeze" when restrained, and consequently, not express their true behavior during these assessments. In addition, restrained techniques are influenced by type and quality of the squeeze chute. For example, hydraulic chutes typically apply more pressure to the animal's body compared with manual chutes, which will influence how cattle behave while restrained. However, the restrained techniques are typically safer for evaluators and cattle, easy to conduct, and also easier to incorporate into common management procedures, such as when cattle have to be processed for vaccination.

Non-restrained techniques evaluate cattle temperament according to their fear or aggressive response to humans when they are free to move within the evaluation area. Because "freezing" behavior is not a concern with non-restrained techniques, these assessments are commonly considered more accurate in determining cattle temperament compared to restrained techniques. However, non-restrained techniques require additional equipment, labor, and security measures.

Phenotypic evaluations account for external body features of cattle that have been associated with temperament. These assessments can be conducted when cattle are restrained in the chute and are, therefore, safe and easy to incorporate into common management procedures. However, phenotypic evaluations do not assess behavioral responses of cattle. Consequently, they are indirect measures of temperament.

Chute Score

Chute score is a restrained technique in which cattle are individually restrained in the chute and scored on a 1 to 5 scale according to their behavior (Voisinet et al. 1997):

1 = calm with no movement,

2 = restless movements,

3 = frequent movement with vocalization,

4 = constant movement, vocalization, shaking of the chute, and

5 = violent and continuous struggling.

More simplistic or detailed scales (1 to 3 or 1 to 7, respectively) can be utilized, depending on the evaluator's preference. However, scoring consistency is essential for an accurate evaluation because chute score is a sub-

jective assessment, which means that chute score of an individual animal can vary from evaluator to evaluator.

To increase consistency and accuracy, evaluators should be trained and comfortable with this assessment. Also, more than one evaluator (up to three) can be utilized and the scores combined.

Chute Exit Velocity

Exit velocity is a non-restrained technique that evaluates the speed of an individual animal immediately after it leaves the squeeze chute (Fig. 1) (Voisinet et al. 1997). As the speed increases, the more frightened the evaluated animal may have been due to the human handling in the chute.

Exit velocity can be evaluated in actual speed measures (i.e., feet/second) or on visual estimates. To determine actual speed, the evaluator needs to establish a known distance, or route, that the animal will travel after leaving the chute (measured in feet), and then calculate the time required for the animal to travel the route (in seconds). The evaluator can use a chronometer or infrared electronic timers, such as those used in rodeo events.

How the route is established is an important consideration. If it begins too close to the chute, temperamental cattle can stumble when exiting the chute and, therefore, need more time to travel through the route. Also, the route should not be too lengthy and/or established too far away from the chute. Otherwise, calm cattle may stall, whereas temperamental cattle can calm down and decelerate in the middle of the route.

Ideally, the travel route should be a straight line with minimum visual distractions to the animal, starting 3 feet after the chute's head gate, and be 6 feet long. Exit velocity can also be estimated visually such as in a 1 to 3 scale:

1 = cattle that walk away from the chute,

2 = cattle that trot away from the chute, and

3 = cattle that run away from the chute.

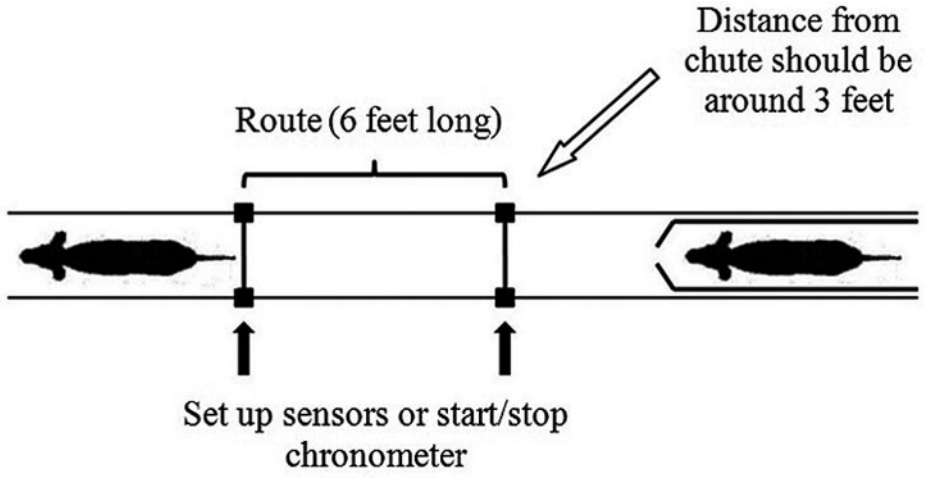

Fig. 1. Scheme of the exit velocity calculated in feet/second.

Again, more detailed evaluation systems can be utilized, depending on the evaluator's preference.

Pen Score

Pen score is a non-restrained technique that evaluates the behavioral response of an individual animal when it enters a small pen and interacts with a single evaluator standing inside the pen (Fig. 2) (Arthington et al. 2008).

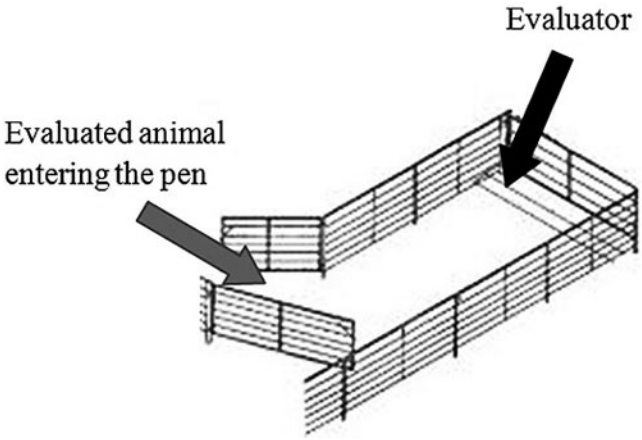

Fig. 2. Scheme of the pen score.

Once the evaluated animal notices the evaluator, the evaluator moves 3 to 5 steps directly toward the animal and assesses its response on a 1 to 5 scale:

1 = unalarmed and unexcited animal that walks slowly away from the evaluator,

2 = slightly alarmed animal that trots away from the evaluator,

3 = moderately alarmed and excited animal that runs away from the evaluator,

4 = very alarmed and excited animal that runs with head held high and may charge the evaluator, or

5 = animal very excited and aggressive in a manner that requires evasive actions by the evaluator to avoid contact.

Caution and security measures should be adopted if the pen score will be used to assess cattle temperament, such as a pre-established escape route for the evaluator. It is also important that no other animals should be present inside the pen because the evaluated animal may ignore the evaluator and bunch up with cohorts, and temperament of the evaluated animal may be influenced by the temperament of the non-evaluated cattle. Again, more simplistic or detailed evaluation systems can be utilized, depending on the evaluator's preference.

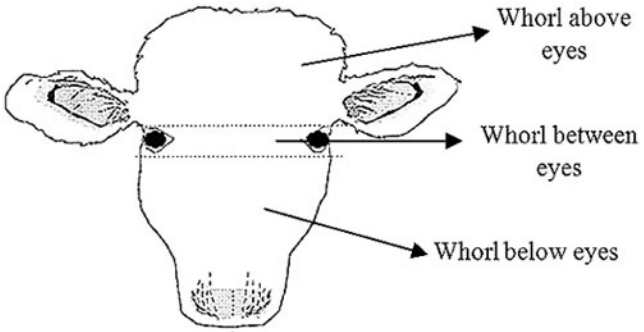

Fig. 3. Scheme of the hair whorl evaluation.

Hair Whorl

Several research studies have demonstrated that cattle temperament is related to the position of the hair whorl on the forehead of the evaluated animal (Fig. 3). Therefore, hair whorl position is classified as a phenotypic evaluation and can be used as an indirect assessment of cattle temperament (Lanier et al. 2001). Cattle with hair whorls above the eyes are typically more temperamental compared to cattle with hair whorls located either between or below the eyes (Table 1). The reason for this relationship is that the genes determining hair whorl patterns in cattle are also believed to be associated with behavioral traits.

Table 1. Chute score (1 to 4 scale) according to the position of the hair whorl on the forehead.[1]

Temperament	Hair whorl type		
	Above eyes	Between eyes	Below eyes
Chute score	2.3	2.0	2.0

[1]Adapted from Grandin et al. 1995.

Eye White Percentage

Recently, it was determined that cattle temperament is related to the amount of white exposed in the eye of the evaluated animal. Similar to hair whorl, this assessment is classified as a phenotypic evaluation and can be used as an indirect measure of cattle temperament. As the amount of eye white revealed increases, cattle temperament becomes more excitable (Core et al. 2009).

The reasons for this relationship, however, are still unknown. Trained evaluators and special equipment, such as digital camera, computer, and special software, are required for adequate quantification of eye white exposed, which can make this assessment difficult to be incorporated into typical beef operations.

Genetic Tools to Select Cattle for Temperament

Temperament is moderately heritable (Shrode and Hammack 1971; Fordyce et al. 1988), indicating that temperament is a genetic trait that is not completely determined by the environment. Hence, genetic tools are available and can also be used by beef producers to select cattle for adequate temperament.

Expected Progeny Differences (EPD)

Breed associations, including Angus and Limousin, developed an EPD (see fact sheet 837, Understanding and Using Sire Summaries) for docility, which is one of the many synonyms for temperament. The docility EPD predicts the differences in probability that offspring will be scored either a 1 (docile) or 2 (restless) instead of a 3, 4, 5, or 6 (nervous to very aggressive) on the docility scale.

The EPD for docility is expressed as a percentage; the higher the EPD value for docility means that the offspring should have genetics for calm temperament. As an example, docility EPD is +13 percent for Bull A and +3 percent for Bull B. This means that, assuming each bull successfully bred 100 comparable females, Bull A would produce 10 more calves with a docility score 1 or 2 compared with Bull B. Always keep in mind that the accuracy for the docility EPD should be evaluated before selecting sires according to this or any other trait(s).

Genetic Tests

With the recent advances in genetic mapping and testing, several candidate genes responsible for cattle temperament have been identified. Based on these novel efforts, commercial tests to determine genetic profile for temperament were developed (i.e. IGENITY®; Merial Ltd., Duluth, GA). These tests consist of various single nucleotide polymorphisms (SNP) panels that predict temperament in cattle via docility score (DeVuyst et al. 2011). The higher the score, the greater the probability is of the animal's genetic potential to be calm or to produce calm offspring.

However, the efficacy of these tests is still not definitively proven. Research studies reported low correlation among performance traits and their corresponding scores in commercial SNPs panel (Van Eenennaam et al. 2007). Not to be overlooked is the lack of studies comparing cattle temperament characteristics with genetic temperament scores from SNPs panels. Nevertheless, with advances in product development through genomic and field research, it is expected that genetic profiling tests soon can be used along with field assessments (i.e. chute score, pen score, exit velocity) to accurately evaluate and select cattle for temperament.

Conclusions

Cattle temperament has significant implications on personnel safety and cattle performance (Cooke 2014). Many alternatives to evaluate cattle temperament are available to beef producers. These can be used as an evaluation tool and/or selection criteria to improve the overall temperament of the herd. Selecting which technique or tool to use will depend on the operation's management system and goals, availability of resources, labor and trained personnel, and also accessibility to specific equipment.

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