



# STRUCTURAL SOUNDNESS. WHAT DO WE KNOW?

## STAKEHOLDER UNDERSTANDING AND OPPORTUNITIES FOR LEARNING ABOUT STRUCTURAL SOUNDNESS IN BEEF CATTLE: A MIXED METHODS STUDY

### ABSTRACT

- Structural soundness in beef cattle affects both animal well-being and profitability. Using an explanatory mixed-methods design, data was collected from August 2024 - March 2025. A quantitative survey, based on extension manuals, breed association materials, and expert input, was distributed. We received 466 responses from 36 states, with 59.66% male (n=275) and 40.34% female (n=186). Females and individuals with greater experience in the industry each scored higher in technical knowledge than their counterparts ( $p < 0.01$ ).
- Participants were generally accurate in identifying front leg, hoof, and pastern defects, but responses on hindleg and shoulder angle were more varied. Most respondents (67.80%) ranked structural soundness as a top priority, and 84.44% consider structure in their culling decisions. Notably, 84.55% agreed that more education on the topic is needed.
- Feedback on a follow-up short-answer survey (n=19) highlighted three main themes: (1) educational preferences, (2) phenotypic selection criteria, and (3) the importance of firsthand experience in evaluation. These findings suggest that educational materials on this topic would be relevant, useful and well received by beef cattle enthusiasts.

**Key words:** education, beef cattle, structural correctness

### INTRODUCTION

Structural soundness, defined as an animal who moves comfortably as a result of correct skeletal and lower limb construction, is a key component of animal merit (Beeson et al., 1970).

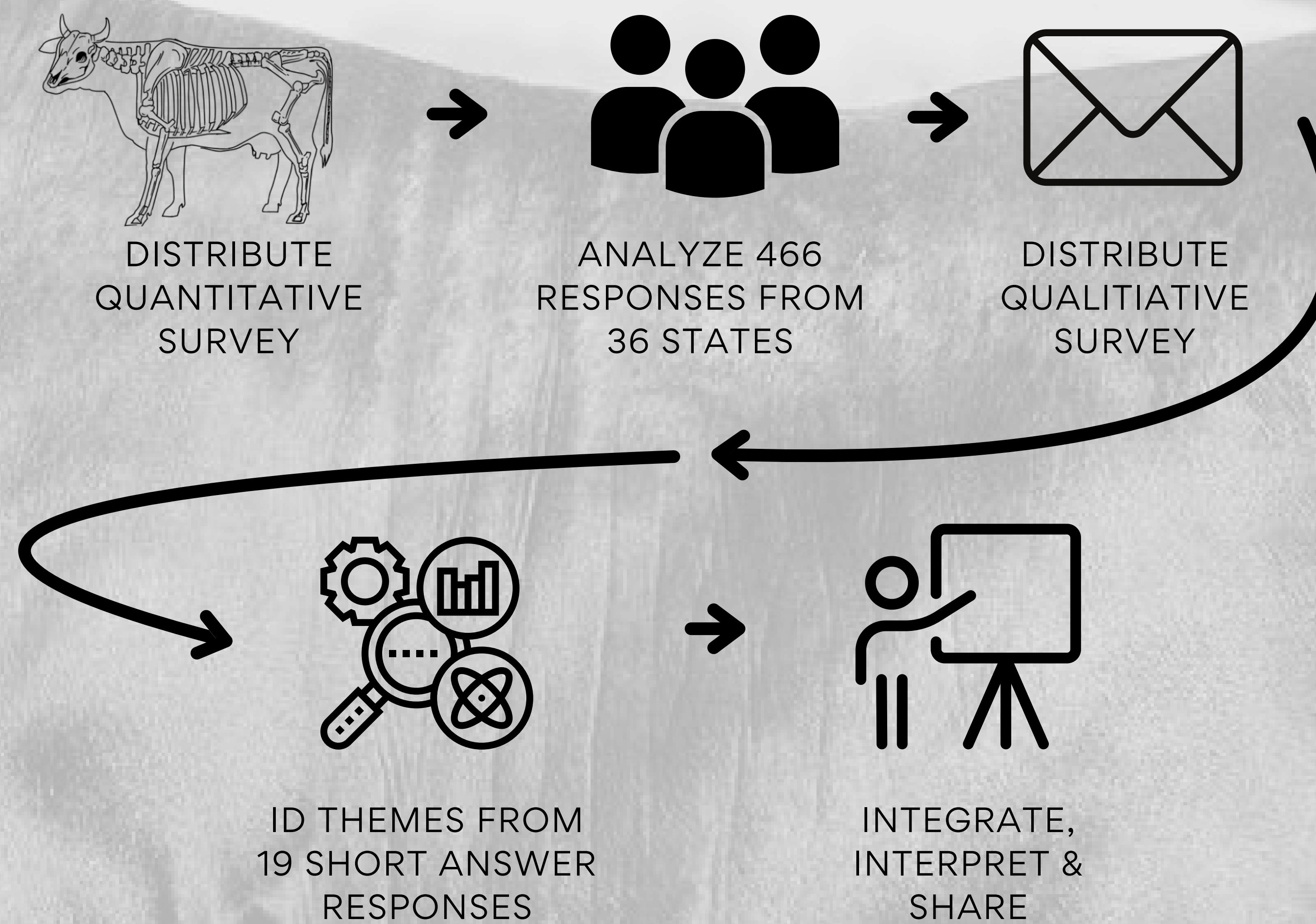
Lameness issues are economically detrimental causing diminished performance and decreased longevity (Langova et al., 2020)

There is a gap in the research when it comes to understanding the educational needs of adults in the beef industry (Bailey, 2013; Knowles et al., 2011)

### OBJECTIVES

- **Quantify understanding** of structural correctness in United States beef cattle industry stakeholders
- Gain insight on how structural soundness plays into **decision making**
- Provide actionable recommendations for educators to effectively **disseminate training** to this population

### METHODS



### DATA ANALYSIS

1. Descriptive statistics were ran on demographic information, each question, and total score
2. One-way ANOVA and an independent sample t-test was used to evaluate the relationship between demographic variables (i.e., gender, years of experience, self-assigned knowledge level) and technical knowledge scores.
3. Using inductive content analysis, qualitative transcripts were coded using a three-phase coding process (Glaser & Strauss, 1967).

### RESULTS

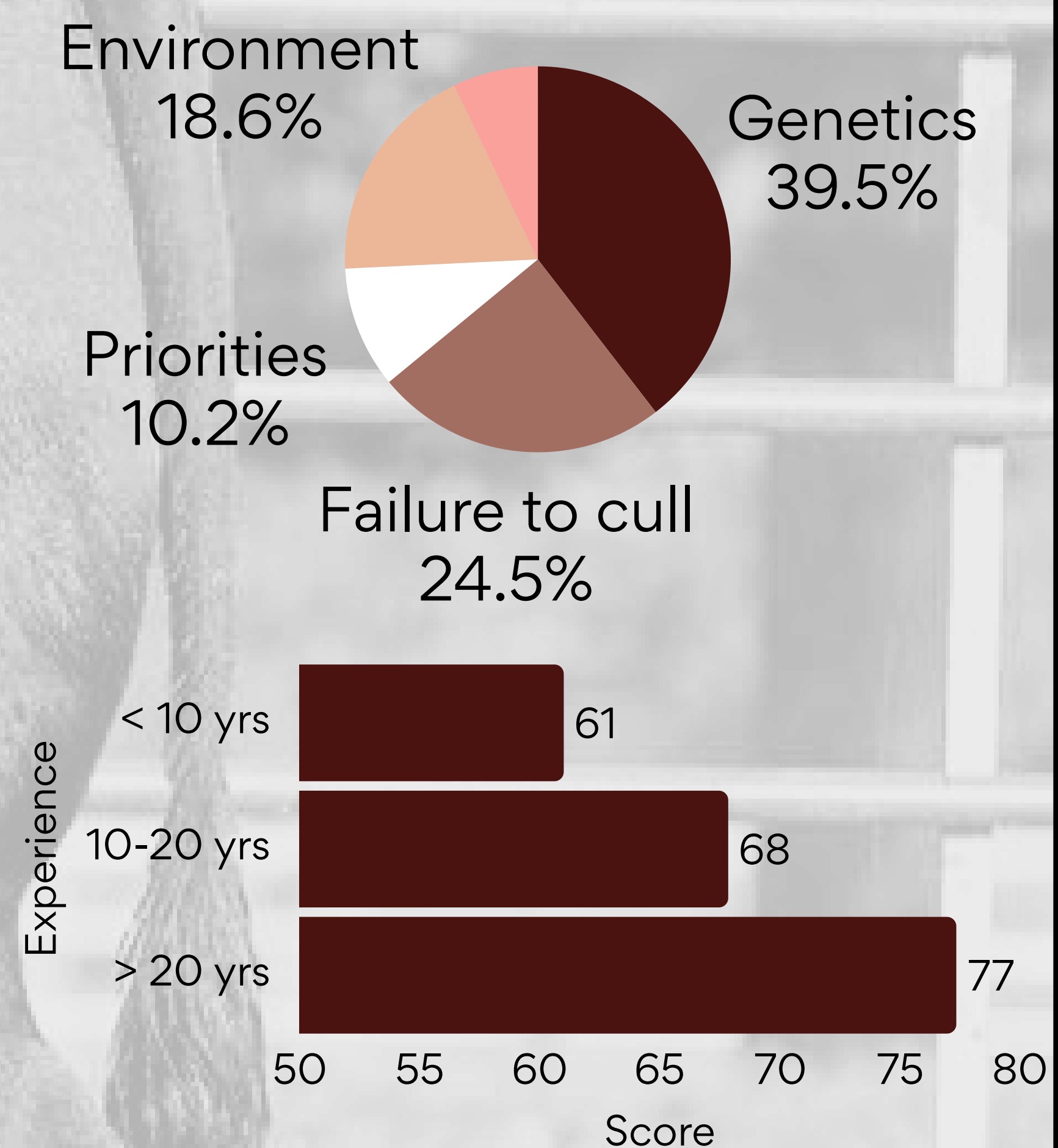
- Respondents' self-perceived knowledge of structural correctness (average 69.50) was in line with actual quiz scores (average 69.65).
- Years of experience in the industry positively correlates with knowledge score ( $p < 0.01$ ) and females tended to score higher than males ( $p < 0.01$ ).
- 67.80% rank structural soundness of foremost importance, but still 84.44% make culling decisions based on structure.
- 84.55% agreed that there is a need for further education on this topic.

"I LOOK TO EXTENSION RESOURCES FIRST THEN YOUTUBE TO LEARN NEW SKILLS"

"MATING CATTLE IS AN ART, YOU CAN BREED A LOT OF TRAITS OUT OF CATTLE, BUT FEET IS A NON-NEGOTIABLE."

"PEOPLE NEED TO SEE CATTLE WITH GOOD STRUCTURE AS WELL AS THOSE W/ FLAWS SO THEY CAN ID THE DIFFERENCES."

### "In your experience, what are the common causes of structural issues?"



### CONCLUSION

- Participants were **accurate** in identifying front leg, hoof, and pastern defects whereas questions on shoulders & hindlegs produced varied responses.
- Participants find this topic **relevant** and immediately applicable to their position in the beef cattle industry.
- There is a **need for education** in this area. Online modules, print publications, videos, and in-person events are all viable methods for sharing materials with this audience.

### REFERENCES

Alexander, J. (2014). Evaluation of breeding soundness: The physical examination. *Bovine Reproduction*, 64-67.

Bailey, N. E. (2013). Educating the future of agriculture: A focus group analysis of the programming needs and preferences of Montana young and beginning farmers and ranchers [Doctoral dissertation, Montana State University-Bozeman, College of Agriculture].

Beeson, W. M., Hunsley, R. E., & Nordby, J. E. (1970). *Livestock judging and evaluation: a handbook for the student*. Interstate Printers & Publishers.

Bullock, D. (2020). *Practical Guide for Using EPDs in Selection Decisions*. Beef Reproduction Task Force. <https://beefrepro.org/wp-content/uploads/2020/09/Bullock-Practical-Guide-for-Using-EPDs-in-Selection-Decisions.pdf>

Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Aldine Publishing Company.

Knowles, M. S. (1984). *The adult learner: A neglected species* (3rd ed.). Houston: Gulf.

Knowles, M. S., Elwood, E., and Swanson, R. A. (2011). *The adult learner: The definitive classic in adult education and human resource development*. Elsevier.

Langova, L., Novotna, I., Nemcova, P., Machacek, M., Havlicek, Z., Zemanova, M., & Chrast, V. (2020). Impact of nutrients on the hoof health in cattle. *Animals*, 10(10), 1824.

Merriam, S., & Bierema, L. L. (2014). *Adult learning: Linking theory and practice*. Jossey-Bass.

Merriam, S., & Tisdell, E. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). Jossey-Bass.

Smith, T. (2011). Consider structural integrity. *Angus Journal*, 171-177.