

## AND ILLNESS IN BEEF CATTLE

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### Overview

- Feedlot cattle experience a higher incidence of metabolic disorders and infectious disease due to high-energy diets and close quarters (Fell et al., 1999)
- Identification of animals with subclinical illness is difficult and compromises productivity (Fell et al., 1999)
- Animal temperament impacts both animal health and animal performance.
- NMR can identify small blood metabolites that could be used to identify illness and temperament.

### Objectives

- The purpose of this study is to evaluate the relationship between blood metabolites and temperament based on chute scores, exit velocity, and blood lactate.
- Determine if blood metabolites will predict animals with subclinical illness.
- Determine if blood metabolites can predict temperament and performance.

### Background

- Temperament is defined as the reactivity of cattle to humans or other stimuli. (Fordyce et al., 1988)
- Animals with flightier temperament have been reported to have a higher stress response, slower growth rates and impaired immune response. (Fell et al., 1999; Fordyce et al., 1985; Voisin et al., 1996, Burrow et al., 1997)
- Small molecule metabolites have been associated with feedlot feed efficiency (Karisa, 2014)
- Metabolomics refers to global analysis of low molecular weight, small molecule intermediates and products of cellular metabolism. Furthermore, metabolomics more accurately reflects living phenotypes and utilization of this technology may allow for biomarkers of temperament and animal health to be identified.

### Methods

- Blood was collected from steers (n=143) when processed into the feedlot.
- The steers all originated from the BAIR Ranch in Martinsdale, MT and represented a single contemporary group.
- Blood samples were collected via venipuncture. Both plasma and serum will be run using NMR as they provide different potential biomarkers.
- Chute Score, blood lactate and exit velocity were evaluated chute side.
- NMR metabolites will be used to identify potential markers associated with exit velocity, blood lactate, animal health, and feedlot performance.

### Results

- Results from this study showed that exit velocity had a significant positive correlation between exit velocity and blood lactate ( $P < 0.0001$ ). RFI was significantly correlated with exit velocity ( $P = 0.051$ ) and blood lactate ( $P < 0.05$ ). Suggesting that animals with higher RFI, less efficient animals, had more flighty temperaments as determined by blood lactate and exit velocity.
- Metabolite data is currently being analyzed to determine if there are any relationships with temperament, feedlot health, feed efficiency, and carcass traits.

### Take-Home Message

- This research aims to identify biomarkers associated with animal health, temperament, and feedlot performance.
- Potential biomarkers will allow improved selection for healthier cattle and cattle better suited for all environments.
- Biomarkers in addition to more traditional genetic evaluation will increase the accuracy and the rate of genetic improvement for economically important traits along with animal health.
- Development tools and guidelines for better selection and management of temperamental animals that are not performing well in the feedlot setting compared to calm counterparts.

### Acknowledgements

Financial support from the BAIR Foundation is greatly appreciated. We would also like to thank Tom Williams and workers at the Chappell Feedlot. A special thanks to Dr. Jennifer Thomson and Dr. Jane Ann Boles for all the help and guidance along the way and throughout the entire project. Dr. James Berardinelli for all his knowledge in the field of NMR and genetics.

#### Citations

- G. Fordyce, M. E. Goodard, R. Tyler, G. Williams, and M. A. Toleman, "Temperament and bruising of *Bos indicus* cross cattle," *Australian Journal of Experimental Agriculture*, vol. 25, pp. 283-288, 1985
- G. Fordyce, R. M. Dods, and J. R. Wythes, "Cattle temperaments in extensive beef herds in northern Queensland. 1. Factors affecting temperament," *Australian Journal of Experimental Agriculture*, vol. 28, pp. 683-687, 1988
- L. R. Fell, I. G. Golditz, K. H. Walker, and D. L. Watson, "Associations between temperament, performance and immune function in cattle entering a commercial feedlot," *Australian Journal of Experimental Agriculture*, vol. 39, no. 7, pp. 795-802, 1999
- B.D Voisinet, T. Grandin, J. D. Tatum, S. F. O'Connor, and J.J. Struthers, "Feedlot cattle with calm temperaments have higher average daily gains than cattle with excitable temperaments," *Journal of Experimental Agriculture Science*, vol. 75, no. 4, pp. 892-896, 1997
- H. M. Burrow and R. D. Dillon, "Relationships between temperament and growth in a feedlot and commercial carcass traits of *Bos indicus* crossbreds," *Australian Journal of Experimental Agriculture*, vol. 37, no. 4, pp. 407-411, 1997.



Chappell Feedlot

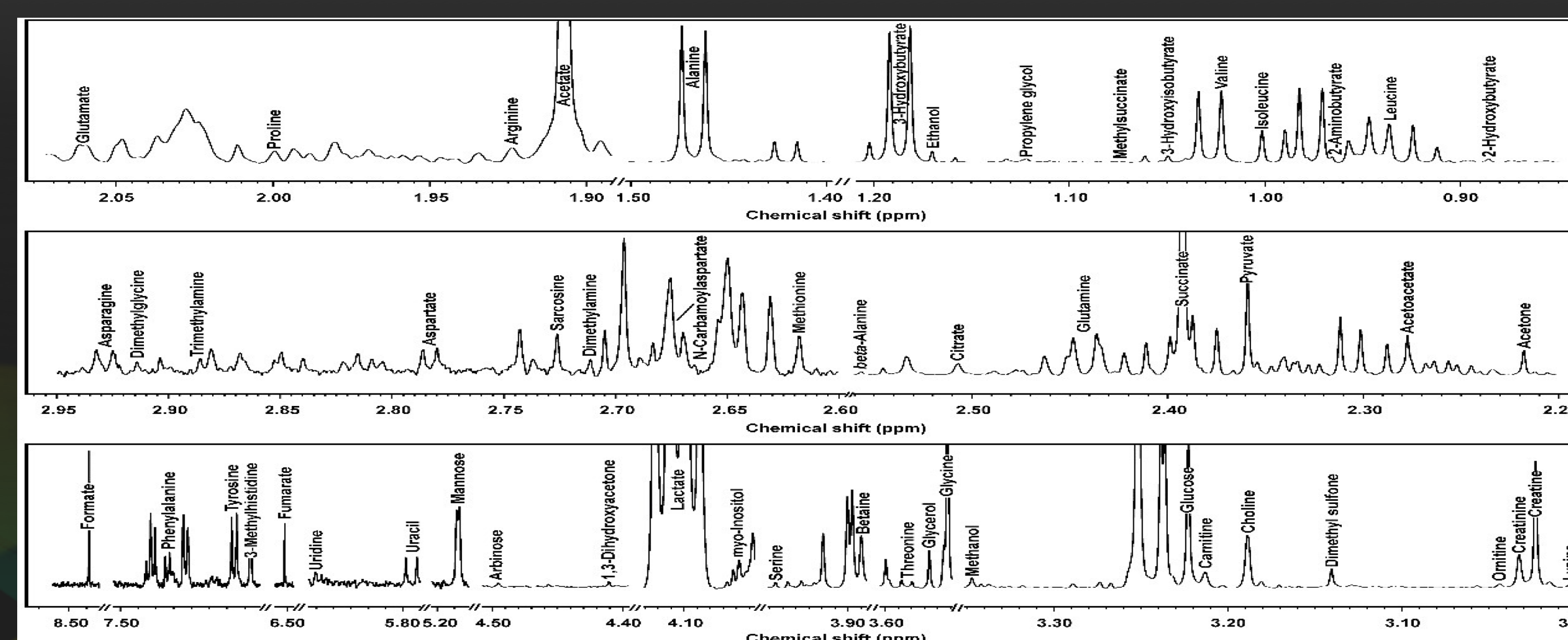


Figure 1: Sample NMR profile from serum indicating specific metabolites of interest.



Chappell feedlot