

# Genetic differences related to production traits in *Bos taurus* or *Bos indicus* influenced cattle

L.L. Okamoto<sup>1</sup>, M.R. Stegemiller<sup>3</sup>, C.C. Reichhardt<sup>1</sup>, A.F. Alberto<sup>1</sup>, L.A. Motsinger<sup>1</sup>, S.A. Bayles<sup>2</sup>, B.W. Roholt<sup>1</sup>, M.D. Garcia<sup>1</sup>, B.M. Murdoch<sup>3</sup>, K.J. Thornton<sup>1,2</sup>

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<sup>1</sup>Department of Animal, Dairy and Veterinary Sciences, Utah State University, Logan, UT 84322

<sup>2</sup>School of Veterinary Medicine, Utah State University, Logan, UT 84322

<sup>3</sup>Department of Animal, Veterinary and Food Sciences, University of Idaho, Moscow, ID 83844



## Introduction

Global climate change has and will continue to negatively impact cattle production in the U.S. and around the world. With the world population expected to exceed 9 billion by 2050, there is a need to improve production to conserve resources and meet production needs. Increasing *Bos indicus* (BI) genetics in the beef herd is one method to potentially improve sustainability. Compared to *Bos taurus* (BT) cattle, BI cattle are better able to withstand higher temperatures, are better adapted to nutritional stress, and consume less water. Despite these positive attributes, BI influenced cattle have a more excitable temperament, and exhibit decreased production performance and carcass quality compared to BT cattle. This research aims to better understand how breed type and genetics contribute to production performance, feeding behavior and carcass quality.

## Objective

**Gain insight into how genetic differences between cattle of different breed types contribute to feeding behavior, feedlot performance and carcass quality characteristics.**

## Methods

- 115 steers of two different breeds, Angus (AN; n=83; 100% BT) or Santa Gertrudis-influenced (SG; n=32; 19% BI, 81% BT), were fed over a two-year period in pens equipped with Vytelle bunks to assess feedlot performance and feeding behavior.
- Steers were harvested at a commercial facility once industry backfat standards were achieved. Carcass data was obtained from the plant.
- A Bovine GGP 100k assay was conducted using DNA isolated from the ear notches of 88 of the 115 steers (AN=58, SG=30) for a genome wide association study (GWAS).
- Traits related to feedlot performance and carcass characteristics were analyzed using SVS
- For each trait, further analysis was conducted on the top three SNPs with the highest P-values

## Live Animal Trial Results

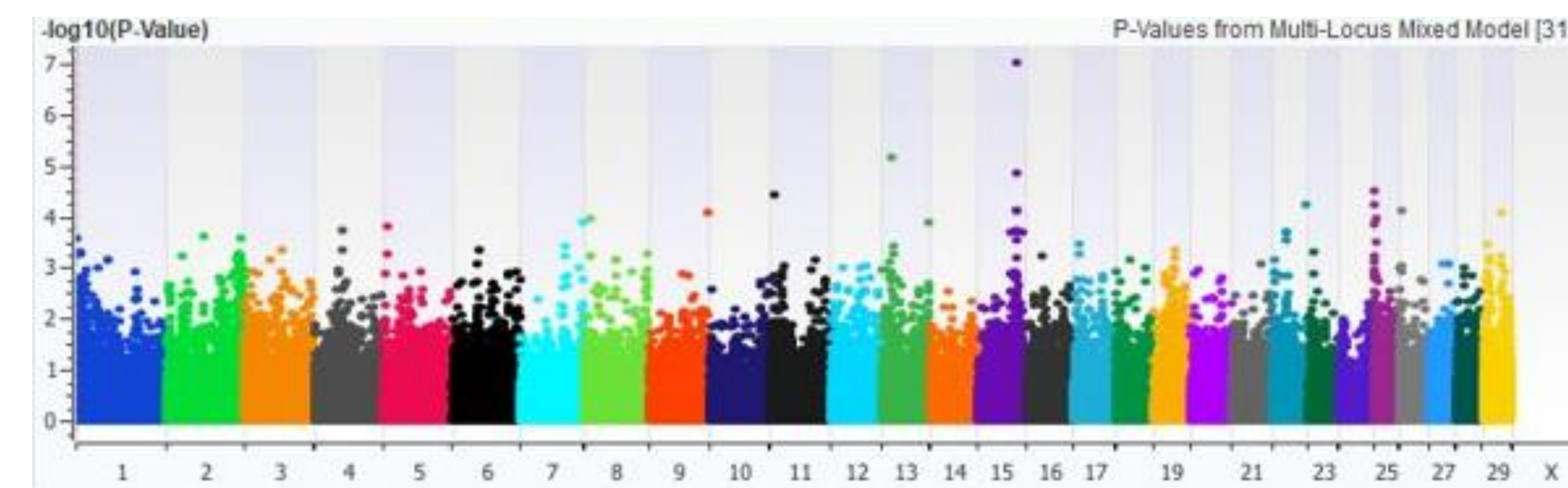
**Table 1.** Feedlot Performance & Carcass Characteristics of AN and SG Influenced Steers

	AN	SG	SEM	P-Value
Steers (n)	83	32		
Hot Carcass Weight (lbs)	723.07	736.68	14.04	0.34
Ribeye Fat Thickness (mm)	9.02	8.89	0.50	0.81
Marbling Score	424.49	368.2	41.02	0.0019
Total DMI (kg)	9.44	9.80	0.32	0.26
Total G:F	0.14	0.14	0.006	0.59
Total ADG (kg)	1.38	1.38	0.08	0.98

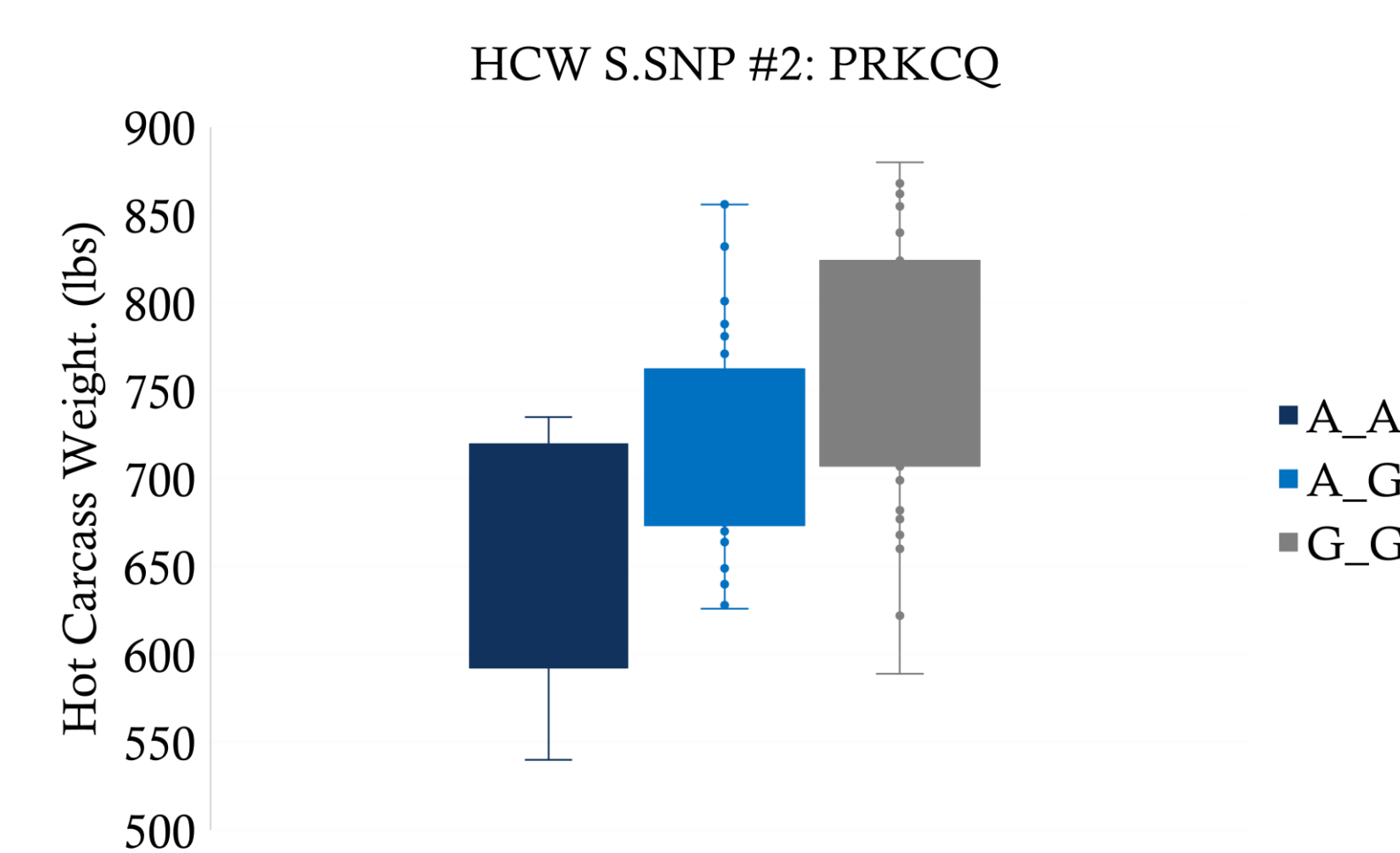
AN; Angus, 100% BT

SG; Santa Gertrudis influenced, 19% BI, 81% BT

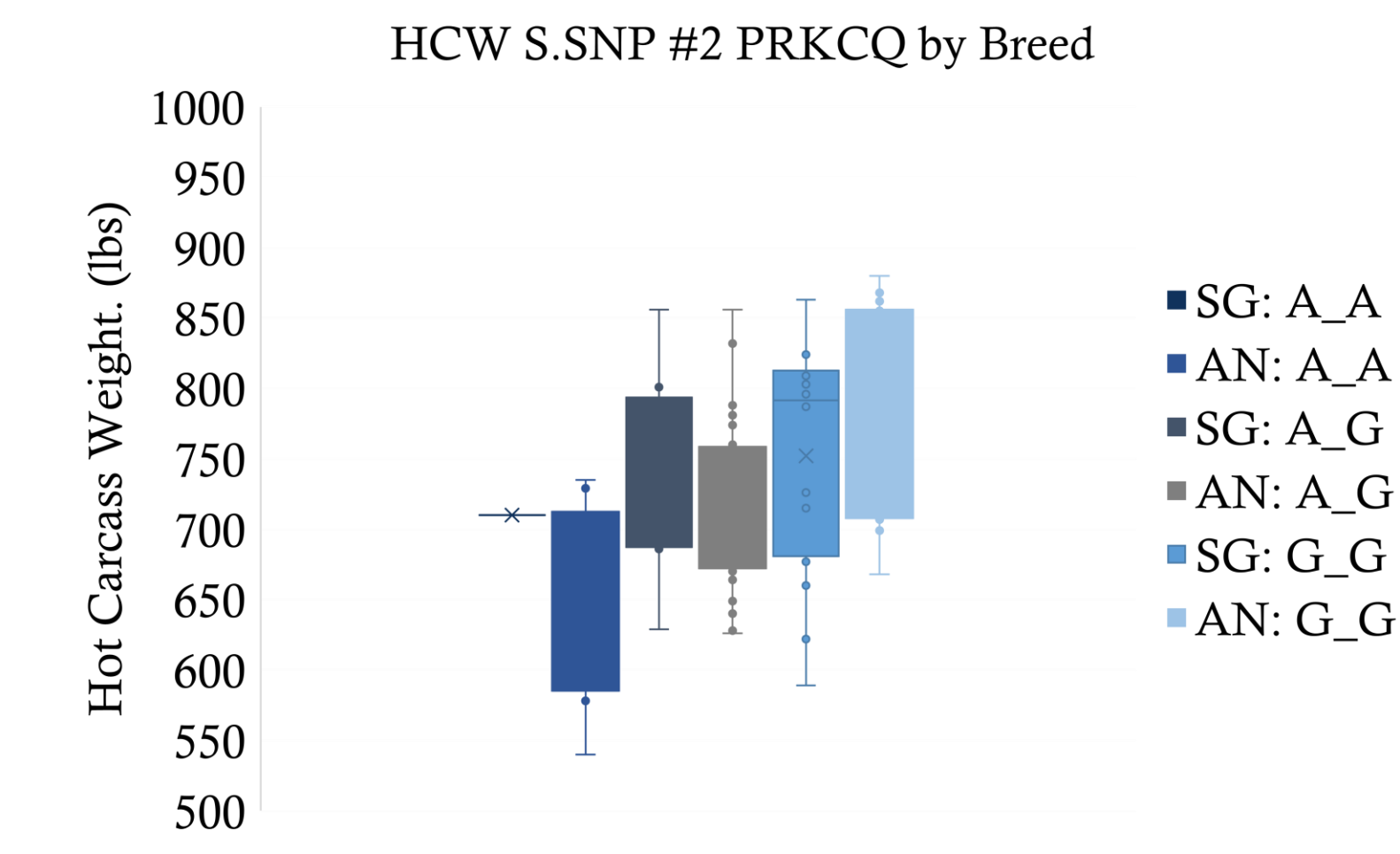
## GWAS Results



**Figure 1.** Manhattan plot for hot carcass weight.



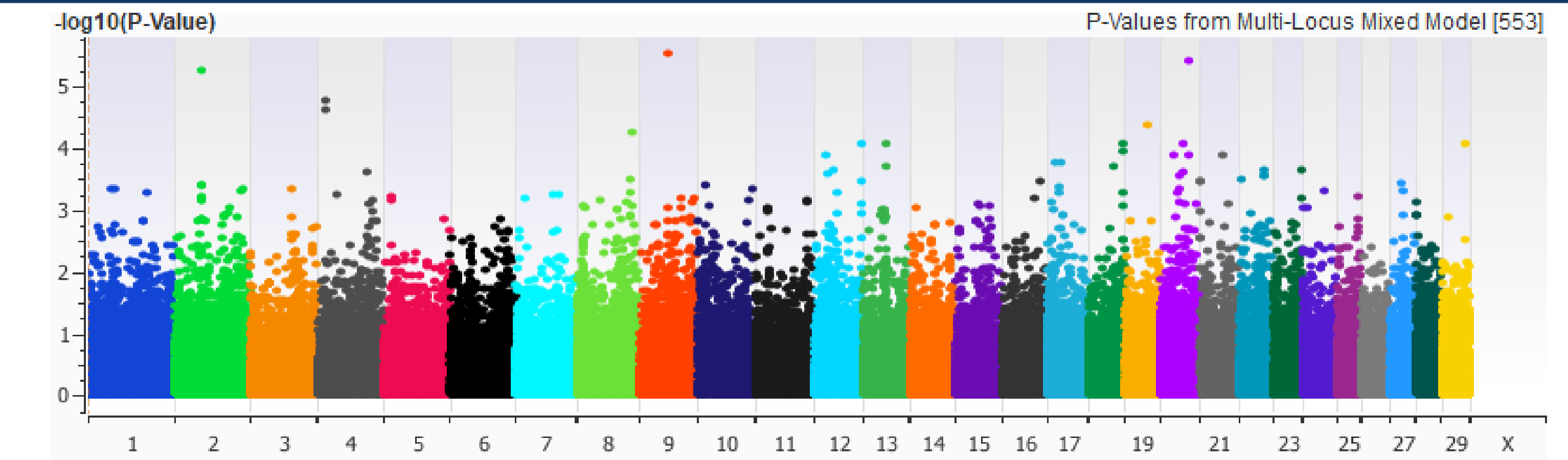
**Figure 2.** Box and whisker plot for SNP located within PRKCQ gene.



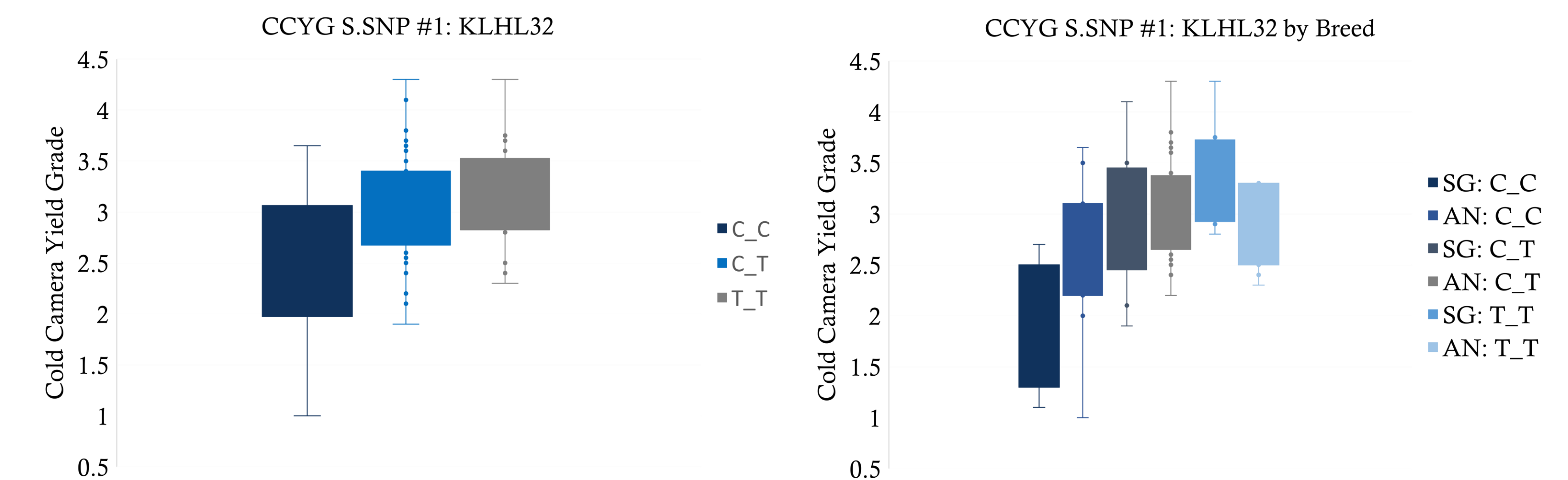
**Figure 3.** Box and whisker plot for SNP located within PRKCQ gene, separated by breed.

- Continued analysis of average daily gain, intake, feed efficiency marbling score, cold camera ribeye size, and ribeye fat thickness are in progress.
- Similar analysis will be conducted with feeding behavior data obtained from the Vytelle bunks.

## GWAS Results



**Figure 4.** Manhattan plot for cold camera yield grade.



**Figure 5.** Box and whisker plot for SNP located within KLHL32 gene.

**Figure 6.** Box and whisker plot for SNP located within KLHL32 gene, separated by breed.

## Conclusions

- AN steers had an improved ( $P=0.0019$ ) marbling score, but all other traits were similar ( $P>0.10$ ) among the two breed types.
- Differences in feeding behaviors were observed such that SG steers tended ( $P=0.09$ ) to spend more time with their heads down during BV
- Differences in allelic combinations that contributed to statistical significance were observed for dry matter intake, hot carcass weight, marbling score, and cold camera yield grade
- Potential breed effect on marbling score, cold camera yield grade, and cold camera ribeye size

## Acknowledgements

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