# Influence of Akaushi Genetics on Color and Sensory Attributes of Beef from Grain and Grass-Finishing Systems

**MICHIGAN STATE UNIVERSITY**

PSV-29

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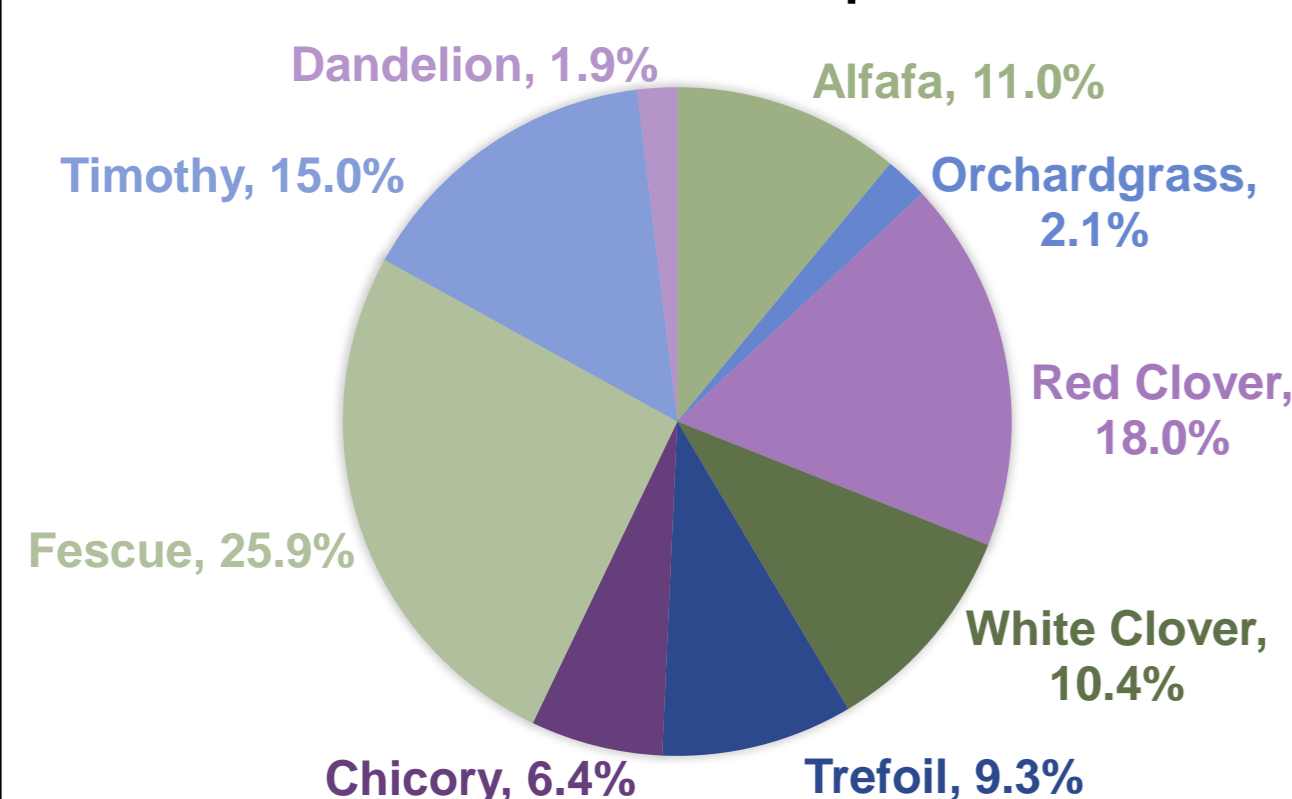
## Introduction

- Grass-fed beef has been reported as a potentially healthier alternative and contains an altered fat content and fatty acid profile when compared to grain-fed beef (Duckett et al., 2009; Harmon et al., 2020).
- Introducing beef genetics for high marbling could help the grass-fed carcass more consistently grade choice.
- The study objective was to investigate the impact of finishing systems and beef genetics on color and sensory attributes of *longissimus dorsi* steak.
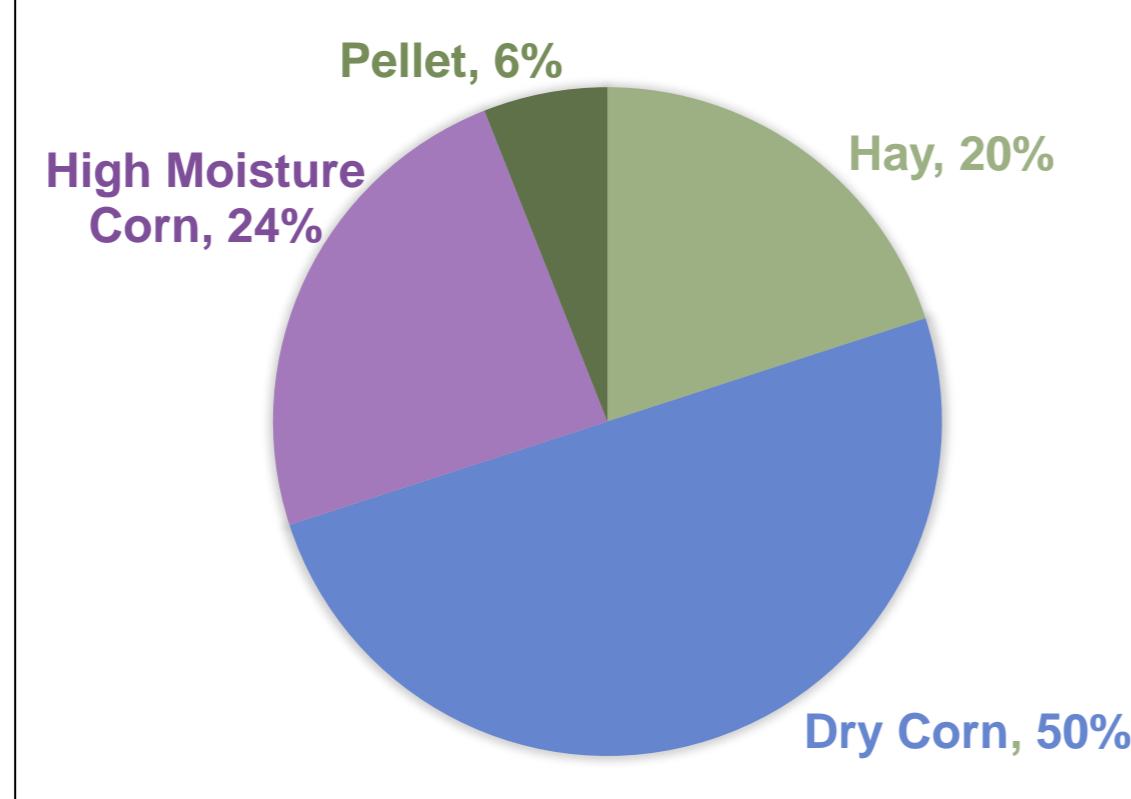
## Material and Methods

- Steaks were collected from Red Angus (RA, n = 30) and RA x Akaushi (AK, n = 30) sired steers fed with a mixed-species pasture forage (GRASS) or a total mixed feedlot ration (GRAIN).
- All cattle were slaughtered on the same day. To insure both treatments were at a point of compositional maturity, there was an 8 mo difference of age in the grass (26 mo age) and grain-fed cattle (18 mo age) at slaughter.
- Rib sections (11th and 13th) were collected 48 h *postmortem*, cut into two 2.54 cm-thick steaks, vacuum packaged and aged 14 d.
- Instrumental color analysis then steaks cooked to 71°C for sensory attributes (consumer panelists, n = 105) using a 9-point hedonic scale.
- Water holding capacity and Warner Bratzler shear force analysis.

**GRASS - Prevalent Plant Species**

Dandelion, 1.9%; Alfafa, 11.0%; Orchardgrass, 2.1%; Timothy, 15.0%; Red Clover, 18.0%; Fescue, 25.9%; White Clover, 10.4%; Chicory, 6.4%; Trefoil, 9.3%

**GRAIN - Feedlot Diet**

Pellet, 6%; Hay, 20%; High Moisture Corn, 24%; Dry Corn, 50%

## Results and Discussion

**Table 1**. Effects of finishing system and breed composition on color and sensory attributes of *longissimus dorsi* steaks

| Item | System | | Breed | | SEM | P value | | |
|---|---|---|---|---|---|---|---|---|
| | GRASS | GRAIN | RA | AK | | System | Breed | S*B |
| **Color** | | | | | | | | |
| L* (lightness) | 32.25 | 40.31 | 35.90 | 36.67 | 0.70 | 0.001 | 0.187 | **0.010** |
| a* (redness) | 19.40 | 16.42 | 17.75 | 18.07 | 0.40 | **0.006** | 0.397 | 0.098 |
| b* (yellowness) | 17.19 | 17.45 | 17.25 | 17.39 | 0.20 | 0.419 | 0.615 | 0.778 |
| Hue angle[1] | 41.56 | 46.83 | 44.39 | 44.00 | 0.61 | 0.003 | 0.375 | **0.008** |
| Chroma[2] | 25.92 | 23.99 | 24.81 | 25.10 | 0.34 | **0.016** | 0.505 | 0.399 |
| **WHC[3] (%)** | | | | | | | | |
| Thawing loss | 0.78 | 1.02 | 0.90 | 0.90 | 0.06 | **0.056** | 0.978 | 0.420 |
| Cooking loss | 21.12 | 24.18 | 22.79 | 22.51 | 0.74 | **0.043** | 0.697 | 0.990 |
| **Shear Force (kg)** | 4.10 | 3.43 | 3.76 | 3.77 | 0.19 | 0.069 | 0.949 | 0.716 |
| **Sensory[4]** | | | | | | | | |
| Flavor | 6.09 | 6.64 | 6.41 | 6.31 | 0.12 | **0.001** | 0.577 | 0.147 |
| Juiciness | 5.76 | 6.34 | 5.94 | 6.16 | 0.13 | **0.002** | 0.248 | 0.269 |
| Texture | 6.00 | 6.78 | 6.44 | 6.33 | 0.13 | **<0.0001** | 0.543 | 0.447 |
| Acceptability | 5.95 | 6.71 | 6.40 | 6.25 | 0.12 | **<0.0001** | 0.411 | 0.584 |

[1]Hue angle = $\tan^{-1}$ (b*/a*); [2]Chroma = $(a*^2+b*^2)^{1/2}$ (AMSA, 2012); [3]Water holding capacity; [4]Panelists assigned steak attributes using 9-point scales (1 = dislike extremely; 9 = like extremely) for flavor, juiciness, texture/firmness, and overall acceptability.

### System

**The GRASS had:**
- Higher a* and Chroma values
- Thawing loss (-20%)
- Cooking loss (-13%)

### Interaction

- L*
- Hue Angle

- L*: AK had greater L* than RA in GRASS.
- Hue angle: RA had greater value than AK in GRAIN.



Means with different lowercase superscripts indicate statistically significant differences for breed in a given system and uppercase superscripts indicate statistically significant differences for system in a given breed ($P < 0.05$).

## Conclusions

- Color attributes were influenced by finishing system.
- Beef finishing system had a marked impact on steaks' sensory attributes and consumer acceptability.
- The favorable results for texture and juiciness in GRAIN, which likely impacted overall acceptability, may be related to high marbling.
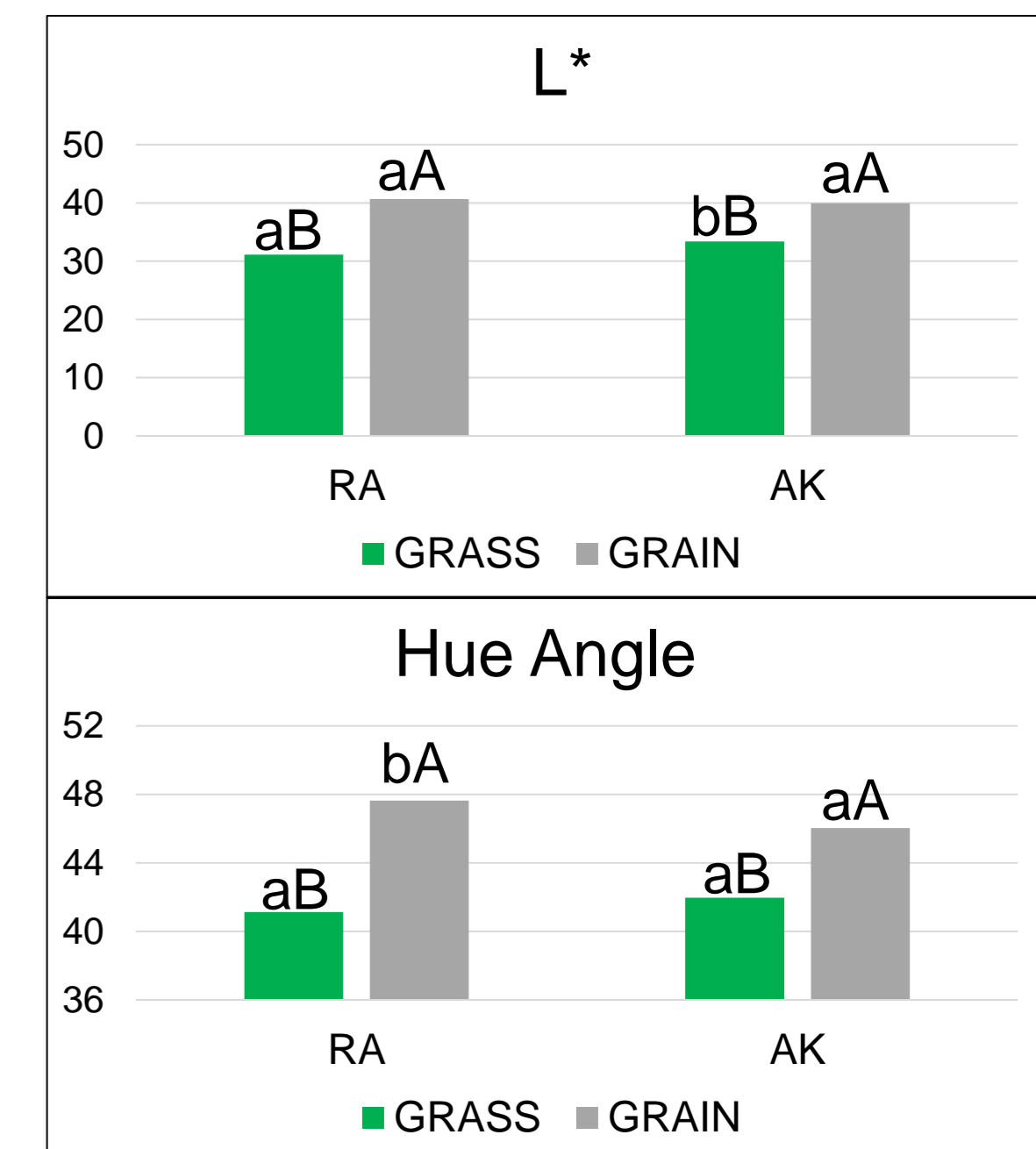
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- Duckett, S. K., et al. 2009. Effects of winter stocker growth rate and finishing system on: III. Tissue proximate, fatty acid, vitamin, and cholesterol content. *Journal of animal science* 87.9: 2961-2970.
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