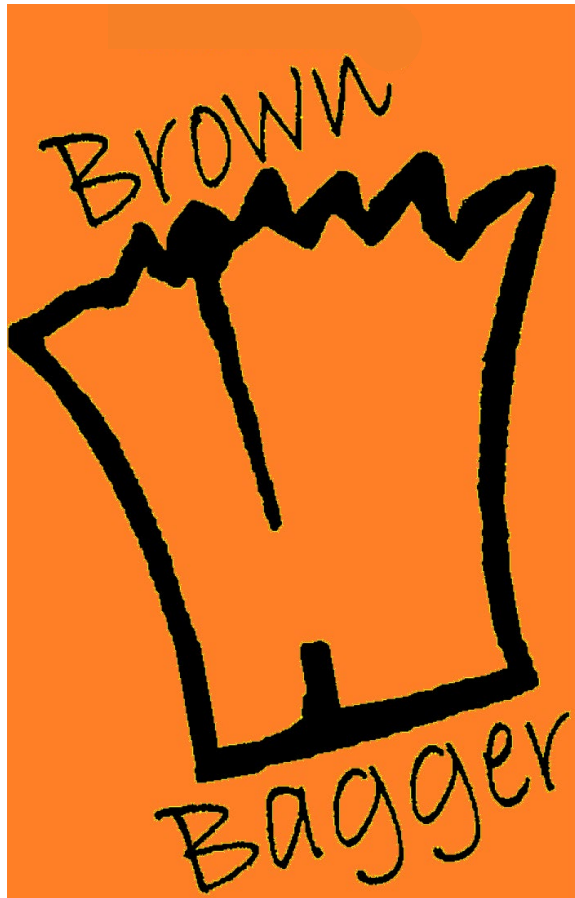


***Welcome to
Session 2***



2024

**Future-proofing Beef
Selection Decisions**

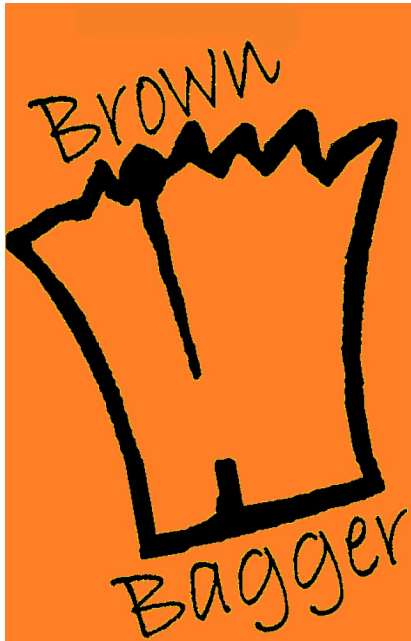




Session 2-Part 2

Strategic Selection Decision Making

**Make sure your selection decisions match
YOUR breeding objective**



Dr. Matt Spangler
University of Nebraska



Make sure your selection decisions
match **YOUR** breeding objective

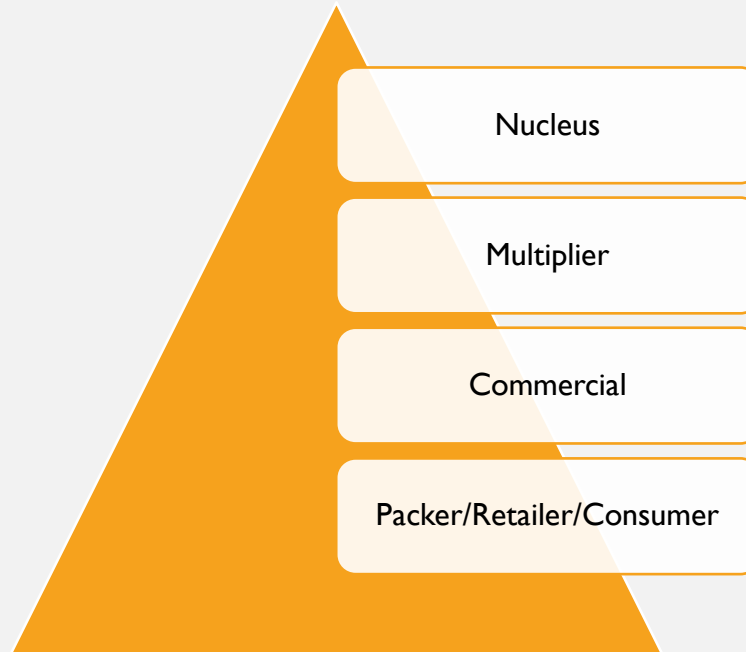
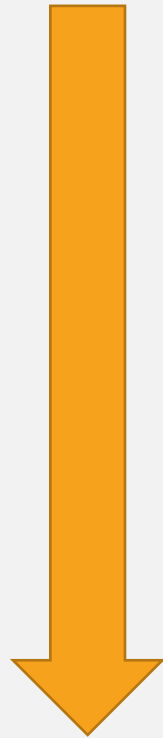
Matt Spangler

mspangler2@unl.edu

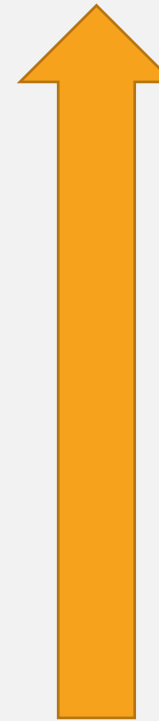
University of Nebraska-Lincoln

SIMPLIFIED BREEDING PYRAMID

Genetics



Economic signal



There is substantial lag in both directions

PROBLEM

- Carcass endpoint indexes place selection emphasis on a different suite of traits compared weaning endpoint indexes.
 - Not only are there additional traits in a slaughter index, but the marginal economic value of weaning weight differs substantially
- Direct payments to cow-calf producers based on (assumed) post-weaning performance do not occur at scale in the U.S. Beef Industry
 - Value differentiation of feeder calves is not directly tied to genetics
 - There is market failure

PERVASIVE THOUGHTS

- The endpoint for all calves is (eventually) a carcass
- If I want buyers to pay more for my cattle I need to select for post-weaning performance

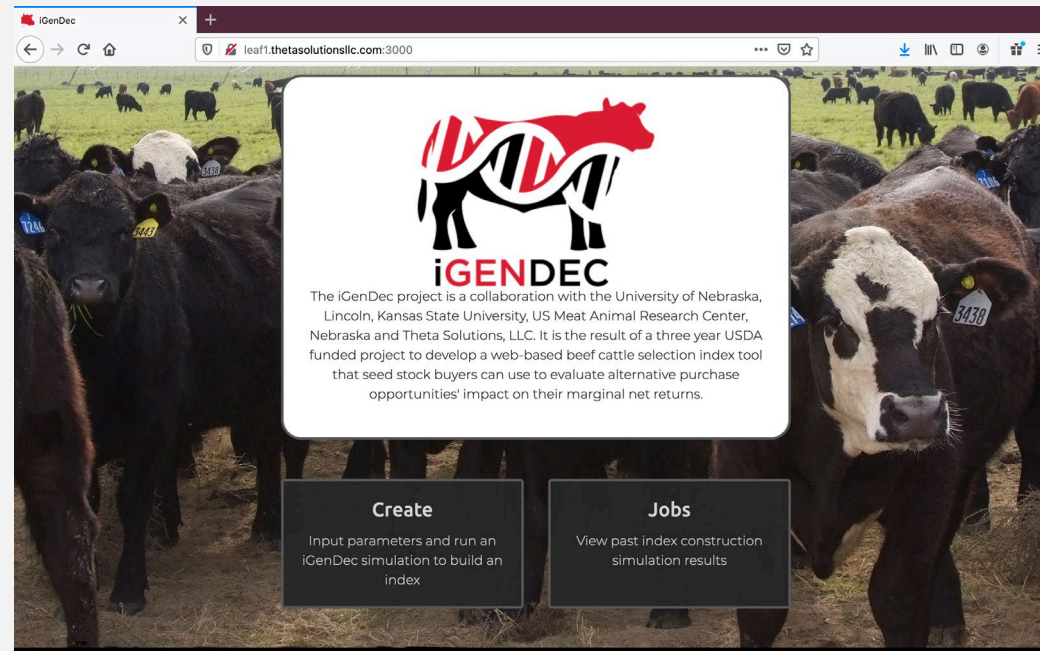
QUESTIONS

- What enterprise should economic selection indexes be economically optimal for?
- Do selection decisions differ if the breeding goal is designed for a producer who sells at weaning vs one who retains ownership?
- What are the options for producers who do sell calves at weaning?

OPTIONS

- Weaning index
- Weaning index with ICL for carcass traits that move with genetic trends to reduce risk
- Carcass index
- Weaning index with carcass traits weighted proportional to direct revenue received from feeder calf buyer
- Retain ownership of calves

iGENDEC SOFTWARE



The screenshot displays the iGenDec software interface. At the top, a browser window shows the URL `leaf1.thetasolutionsllc.com:3000`. The main content area features a central white box with the iGenDec logo, which is a stylized cow silhouette with a red and white DNA double helix running through its body. Below the logo, the text reads: "The iGenDec project is a collaboration with the University of Nebraska, Lincoln, Kansas State University, US Meat Animal Research Center, Nebraska and Theta Solutions, LLC. It is the result of a three year USDA funded project to develop a web-based beef cattle selection index tool that seed stock buyers can use to evaluate alternative purchase opportunities' impact on their marginal net returns."

Below the text box are two dark grey buttons with white text:

- Create**
Input parameters and run an iGenDec simulation to build an index
- Jobs**
View past index construction simulation results

<https://beefimprovement.org/resource-center/igendec/>

PREVIOUS WORK

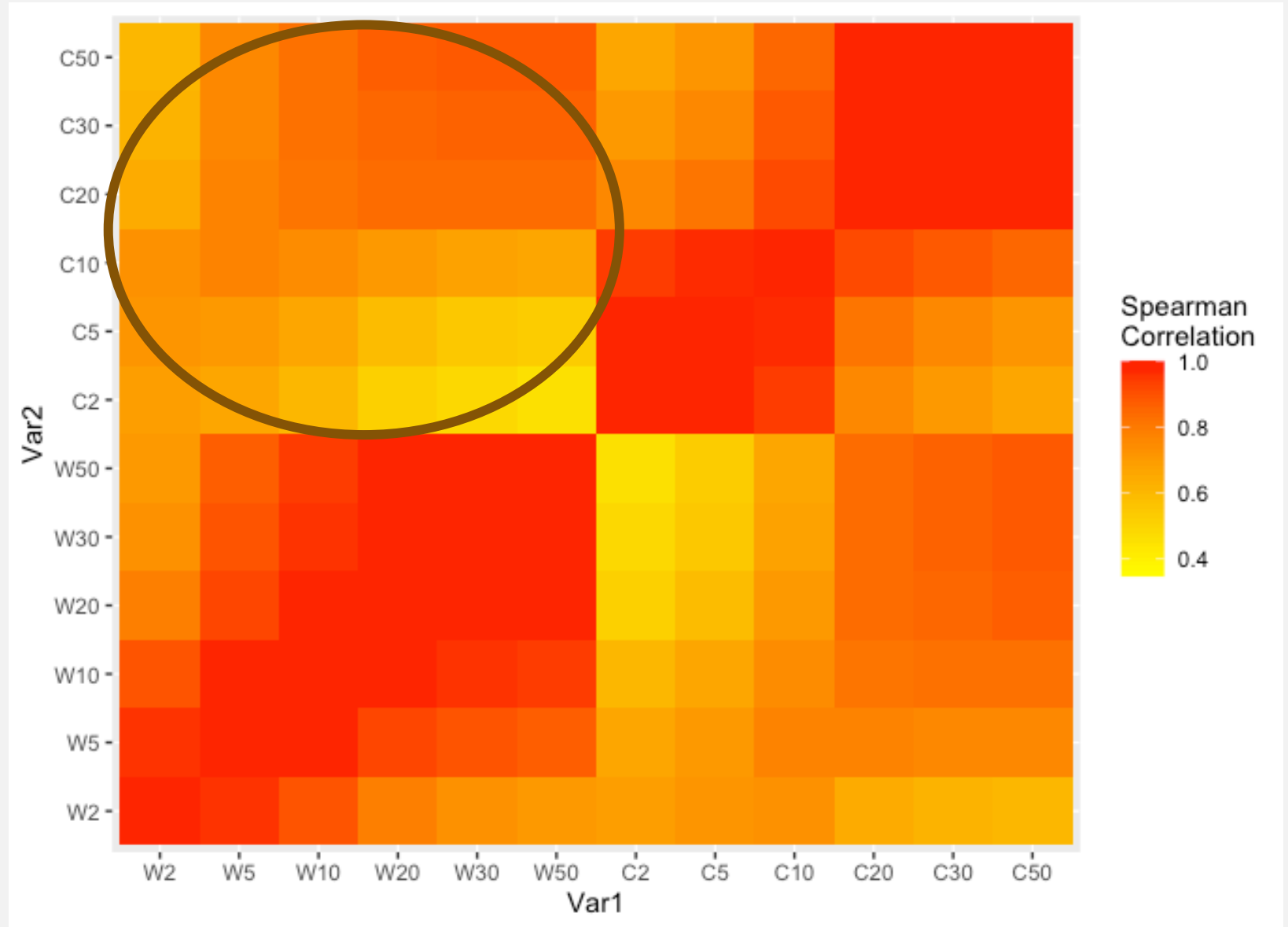
(Valasek et al., 2024)

Trait	Endpoint	
	Weaning	Carcass
Weaning Weight-Direct (WW-D)	✓	✓
Weaning Weight-Maternal (WW-M)	✓	✓
Mature Weight (MW)	✓	✓
Stayability (STAY)	✓	✓
Heifer Pregnancy (HP)	✓	✓
Calving Ease-Direct (CE-D)	✓	✓
Calving Ease-Maternal (CE-M)	✓	✓
Hot Carcass Weight (HCW)		✓
Ribeye Area (REA)		✓
Fat Depth (FAT)		✓
Marbling Score (MS)		✓
Feed Intake (FI)		✓

COMPARING RANKS OF BULLS

PLANNING HORIZON AND ENDPOINT

Average rank correlation
between endpoints
= 0.71 (0.1)



**COMMONALITY OF BULLS SELECTED
BETWEEN ENDPOINTS
(JACCARD INDEX)**

PH	Top 0.5%	Top 1%	Top 5%
2	12.5 ± 2.6	12.8 ± 4.2	22.1 ± 6.9
5	9.6 ± 3.7	11.1 ± 4.9	21.3 ± 7.5
10	10.1 ± 4.1	15.1 ± 4.4	25.1 ± 5.1
20	19.9 ± 2.7	24.7 ± 3.9	38.9 ± 4.0
30	24.6 ± 4.5	30.6 ± 2.8	44.7 ± 0.7
50	31.1 ± 4.9	36.5 ± 3.3	48.8 ± 1.7

DIGGING DEEPER

- Previous work showed:
 - Rank of selection candidates differed but was “high”
 - Bulls actually selected would differ
- Questions remain:
 - What is the opportunity cost of using an index that does not match the breeding objective?
 - What are the alternatives to contemplate post-weaning merit when animals are sold at weaning?

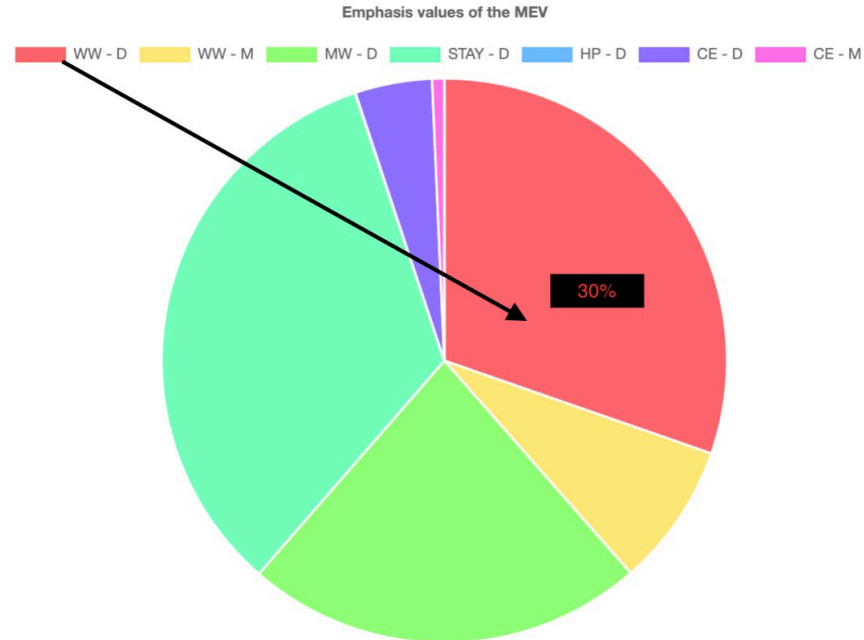
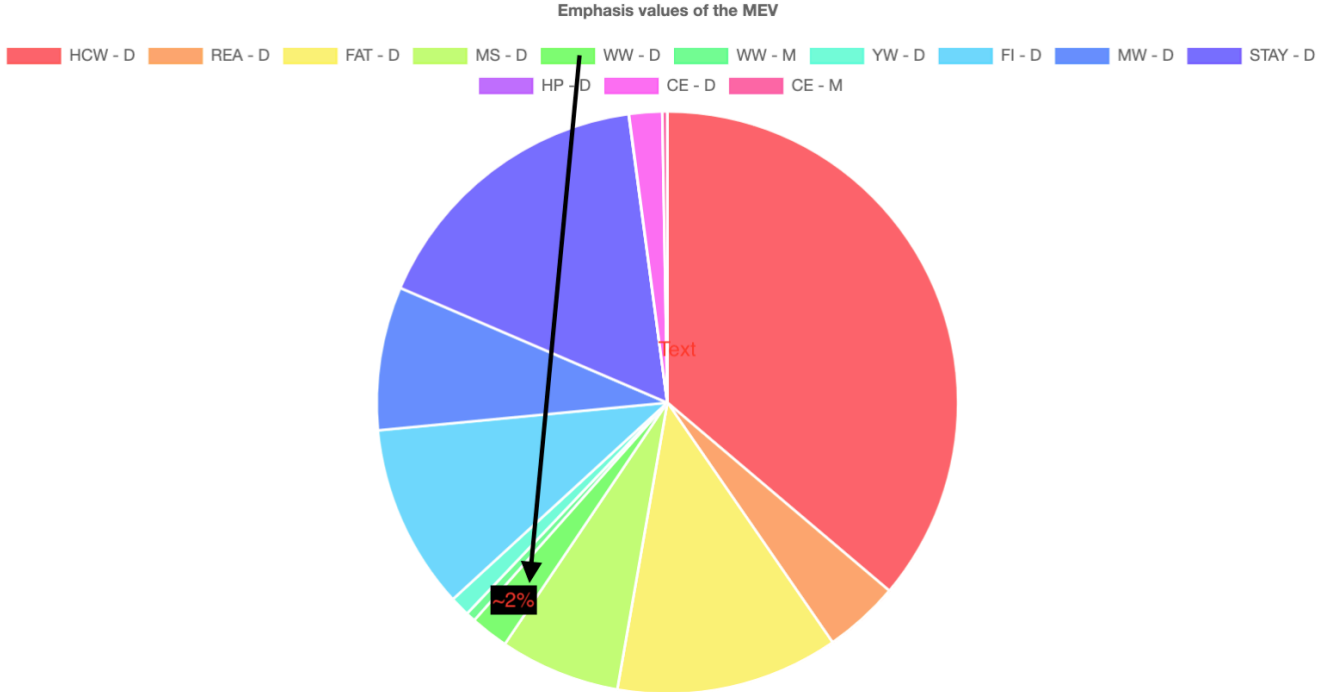
DETAILS OF SCENARIOS

- Purebred breeding system with a 20-yr. planning horizon
- Indexes and selection schemes investigated
 - Self-replacing index with animals sold at harvest
 - Self replacing index with animals sold at weaning
 - Self replacing index with animals sold at weaning and ICL imposed for marbling
 - Self replacing index with animals sold at weaning and ICL imposed for hot carcass weight
 - Only ICL used for traits in weaning index
 - More stringent ICL set for traits in weaning index

ICL DEFINED

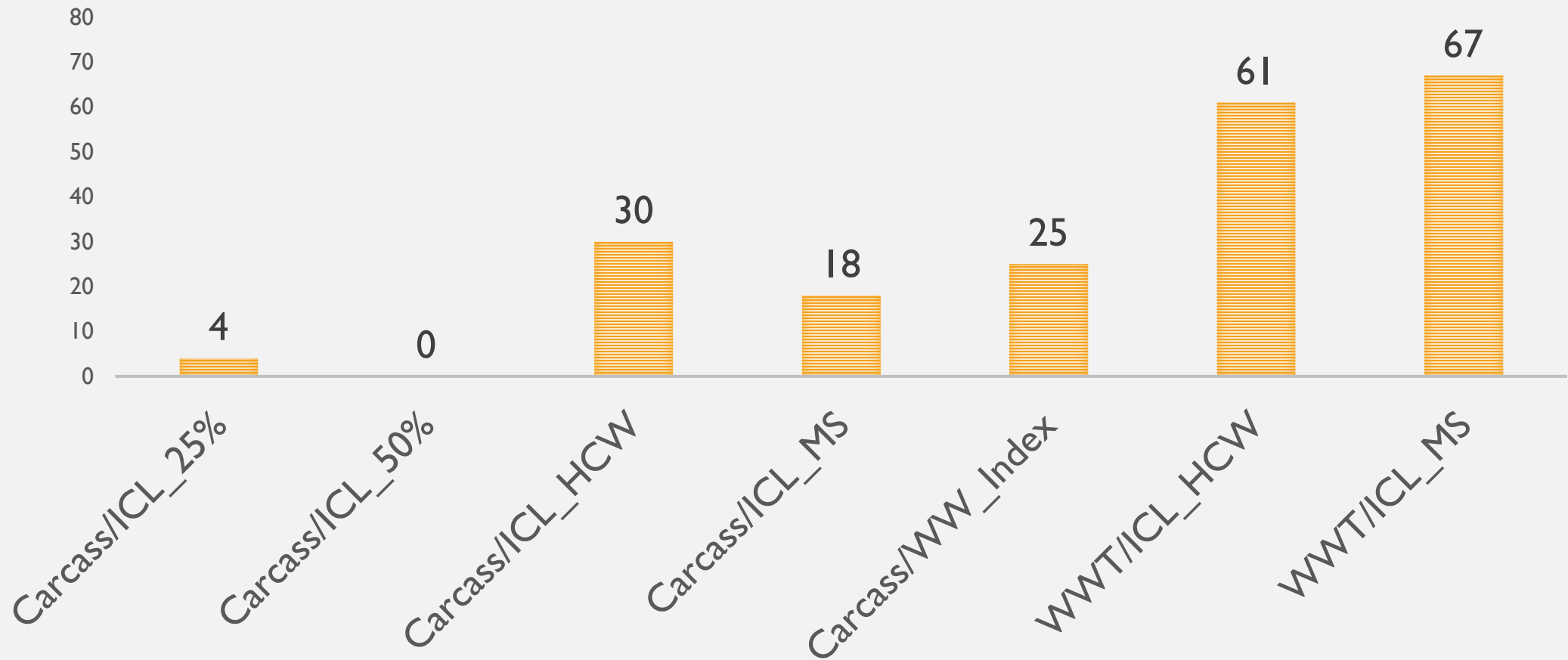
- Weaning index with ICL for MS
 - Select on index and then impose ICL for MS in top 50% of breed
- Weaning index for ICL for HCW
 - Select on index and then impose ICL for HCW in top 50% of breed
- ICL for all weaning traits
 - Impose ICL for CED, CEM, STAY, MWT, WWd in top 50% of breed
 - Impose ICL for WWm between 25th and 75th percentile
 - Impose ICL for MS in top 50% of breed
 - Random selection (5x number of bulls needed before random selection)
- More stringent ICL for weaning traits
 - Impose ICL for CED, WWd, STAY in top 25% of breed
 - Impose ICL for MWT in top 50% of breed
 - Remove outliers for WWm

DIFFERENCES IN BREEDING OBJECTIVES



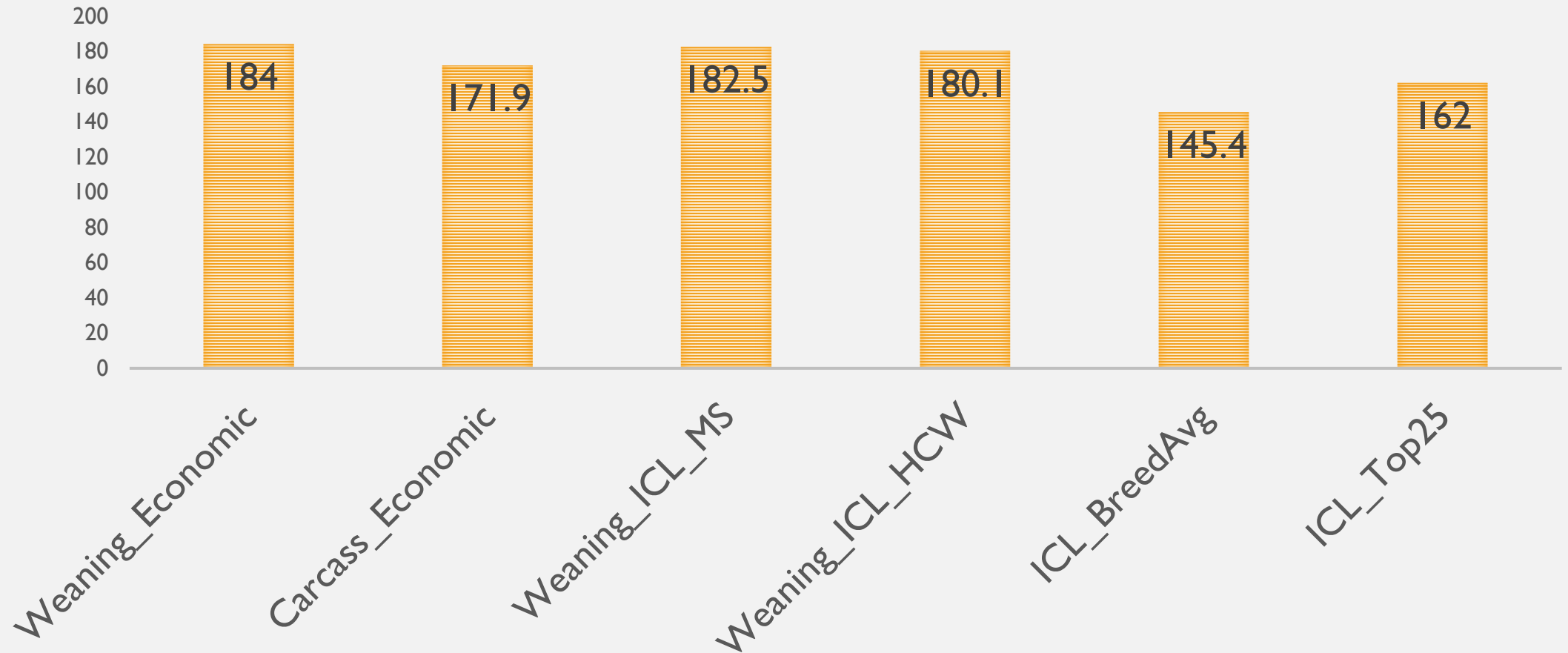
SELECTION CANDIDATES IN COMMON AMONG SCENARIOS

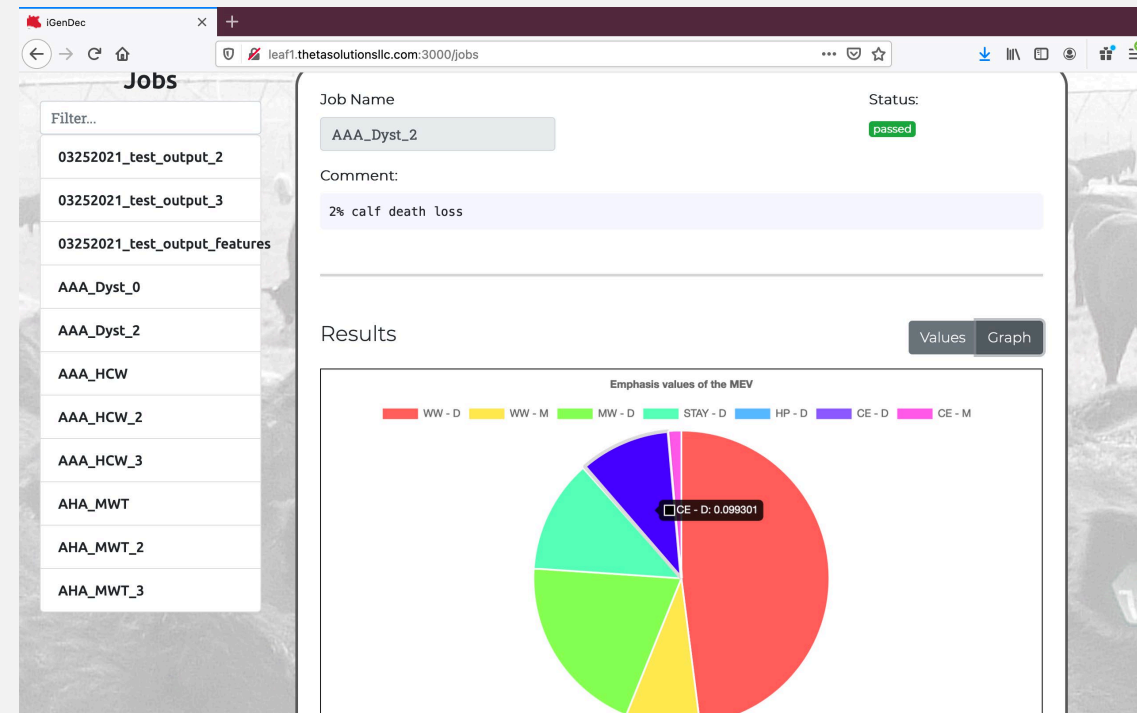
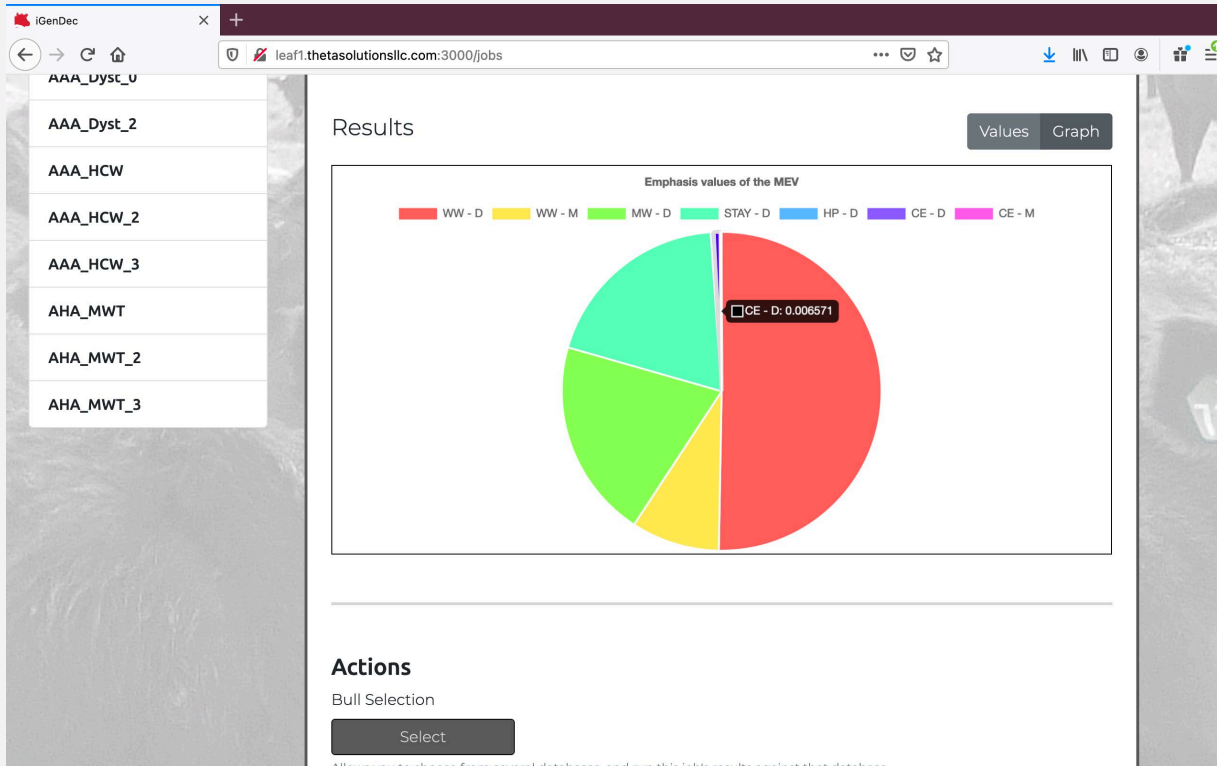
COMMON BULLS



MEAN WEANING INDEX VALUE OF SELECTED BULLS

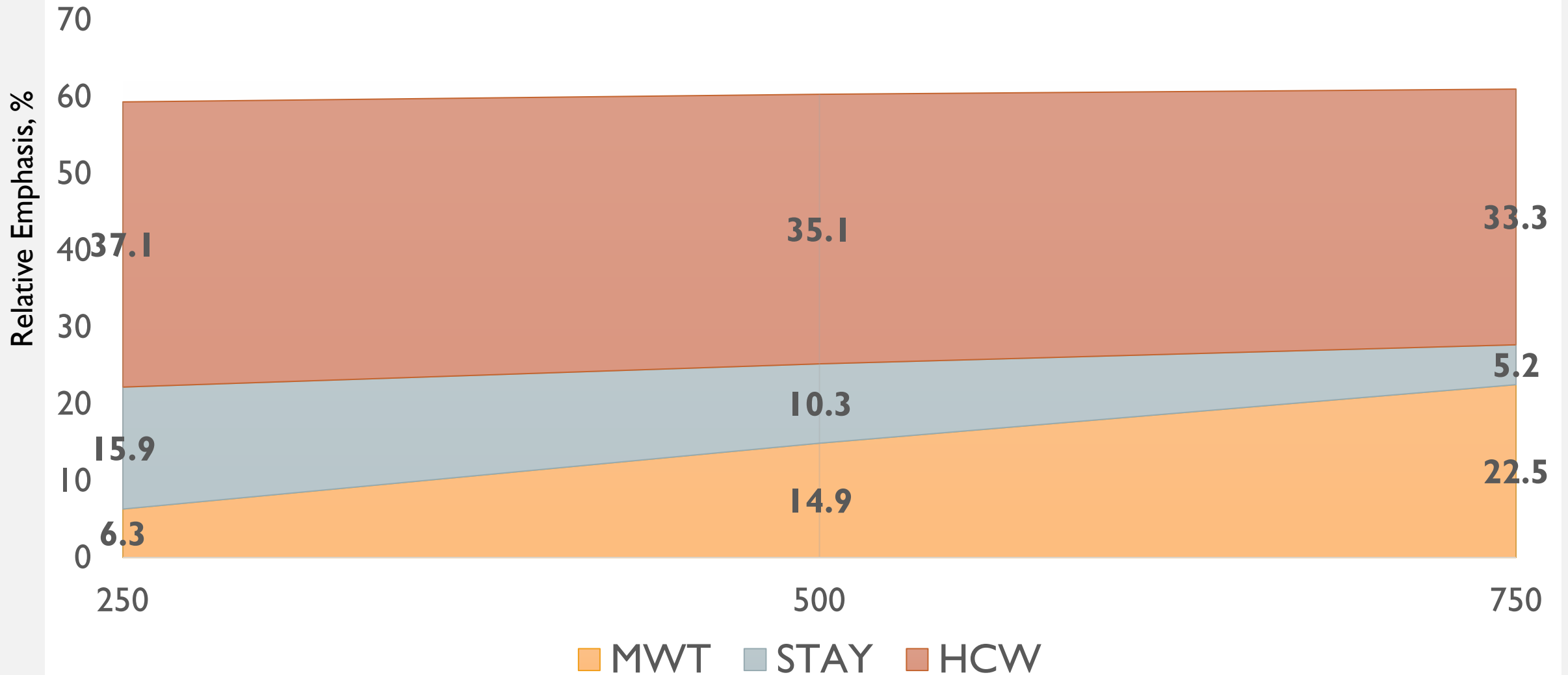
MEAN INDEX VALUE





Change from ~0% to ~10% relative emphasis on CED

Changes in Relative Emphasis by Annual Variable Cow Costs (US \$) for Mature Cow Weight (MWT), Stayability (Stay) and Hot Carcass Weight (HCW)



CONCLUDING THOUGHTS

- My point is not to dissuade anyone from using indexes
 - Clearly only using ICL is sub-optimal
- Use harvest endpoint index if value difference as shown here can be captured by “premiums” for calves
- Illustrations from tools like iGENDEC can aid in communication to producers
- The scenarios herein were not exhaustive
 - But should serve as enough for conversation

THANK YOU

- Darrh Bullock
- Hunter Valasek
- Bruce Golden
- Scott Newman

Session 3 on October 16, 2024

Understanding Methane: From Phenotyping to Selection Opportunities

Tools of a new trade: methane phenotyping for genetic evaluations
Dr. Bailey Engle, USDA-ARS, US Meat Animal Research Center

Selecting for Methane Emissions: Global examples and opportunities in the US beef industry
Dr. Troy Rowan, University of Tennessee

