Camera Technology Predictions of Intramuscular Fat Percentage in American Wagyu

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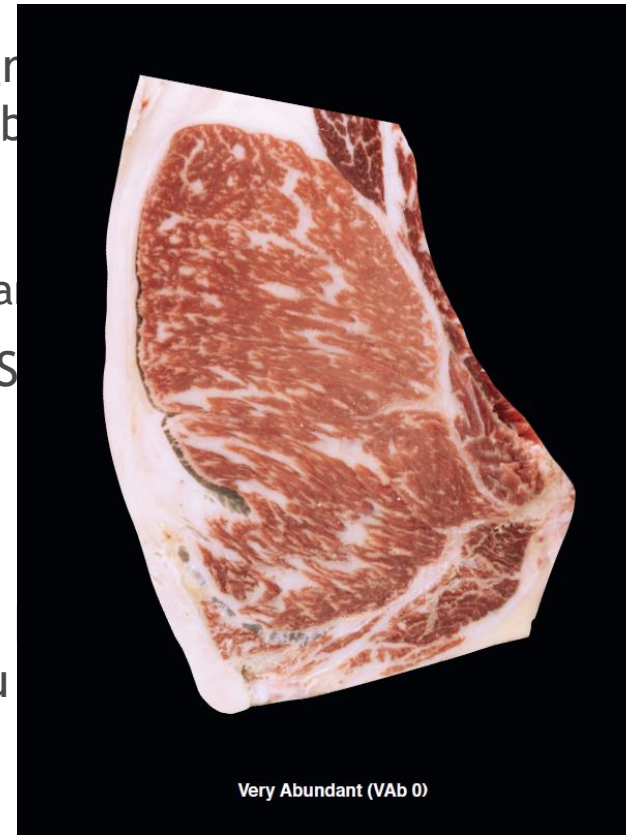
Grading Camera Technologies

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- Gr...
  - ...MF ra...
- Wa... he US...
- *Ho...*

  - ...alue ...Yagyu

Very Abundant (VAb 0)

# Current Camera Technologies

MIJ

MEQ
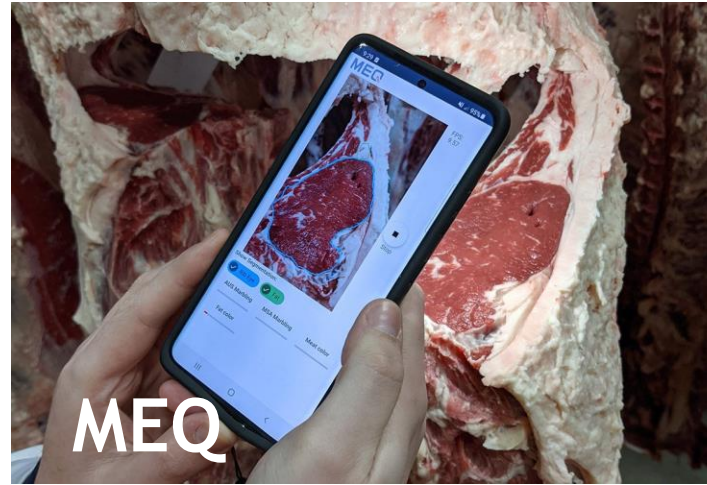
Video that collects image from frames collected

MasterBeef

E+V

General Breakdown of AI

▶ Artificial Intelligence general theory – create an algorithm that looks for characteristics in a reference group (in this case, of images)

▶ Camera takes a picture and is run through the algorithm which has learned how to output data for carcass evaluation
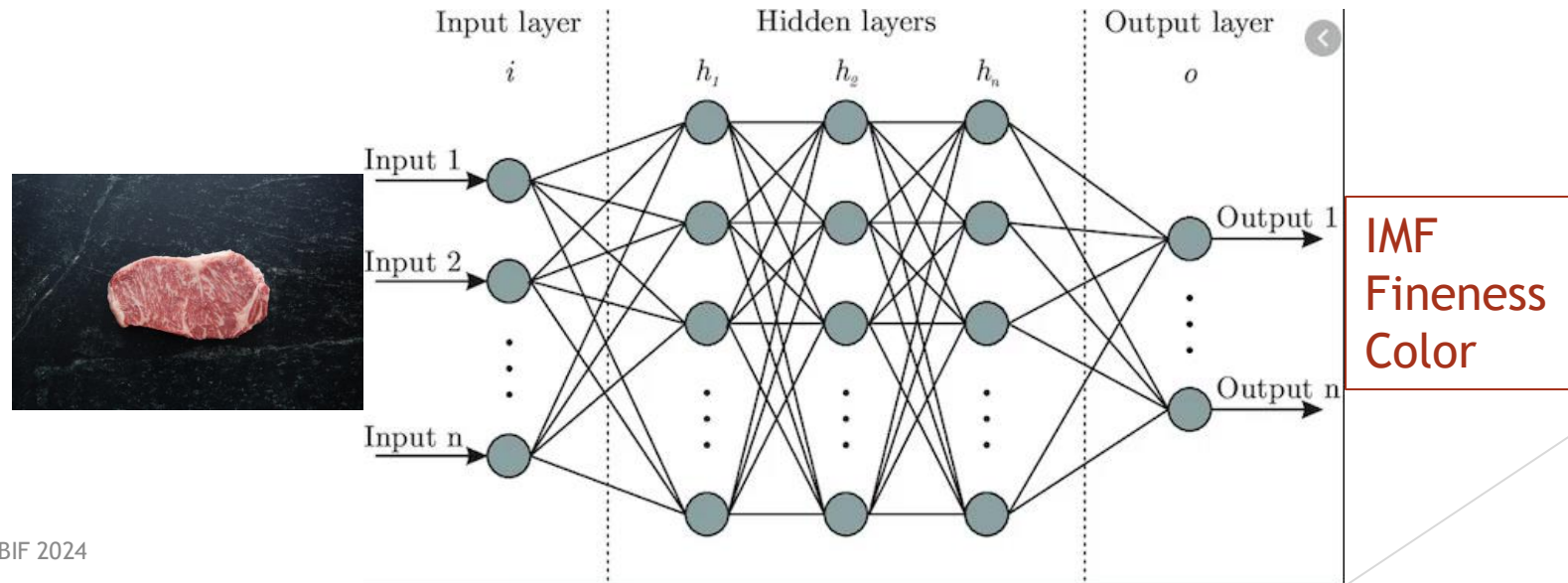
Camera Project Objectives

▶ Are these cameras usable?

▶ More specifically:

The objective of this study was to understand the accuracy of prediction of IMF of these cameras compared to traditional grading methods (USDA) and a baseline (proximate analysis).

▶ Currently in final review in Meat and Muscle Biology, David Velazco, et. al. 2024

Data Utilized

- All animals were F1 Wagyu x Angus crossbreds

- 173 usable points after quality control

- All animals were graded at the same time with:

  - USDA grader

  - MIJ Camera

  - MasterBeef Camera

  - E+V Camera

- Sample from grading area sent to run proximate analysis – lab method to get fat % in sample

Diving Deeper…
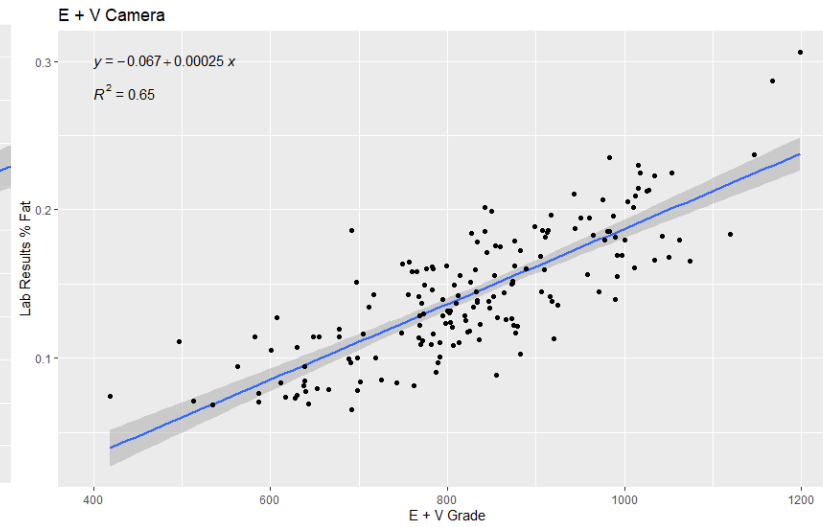
	MasterBeef IMF	MIJ IMF (%)	E+V Cam Marb Score
Minimum	10.90	0.02	418
Median	21.54	0.12	826
Mean	22.78	0.13	824
Maximum	40.12	0.32	1147

Comparison Across Techniques
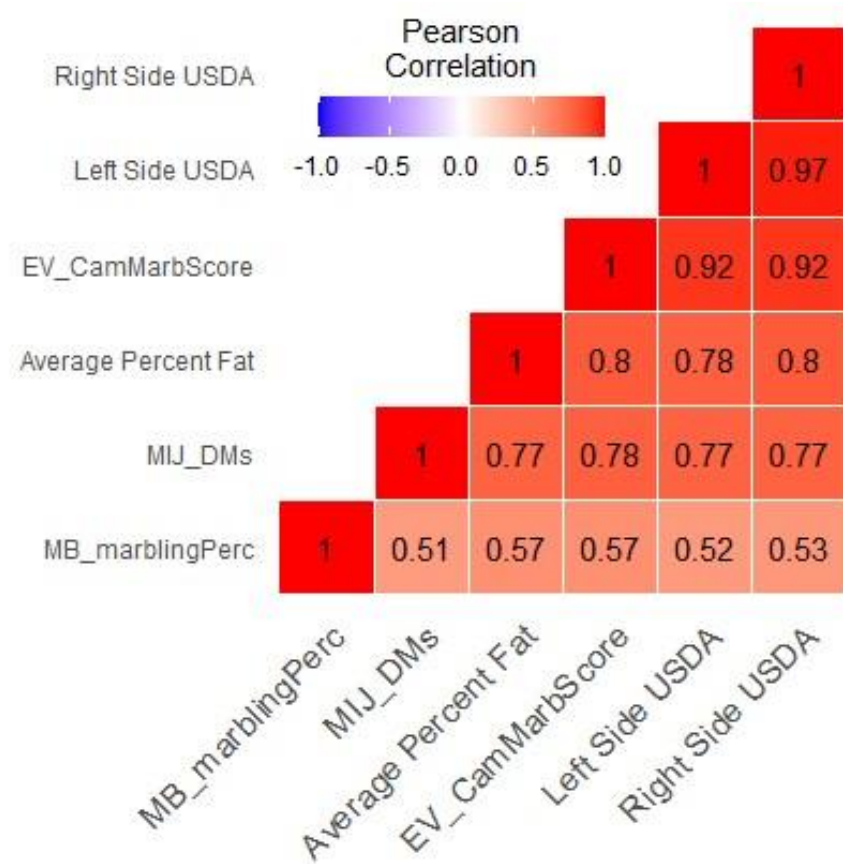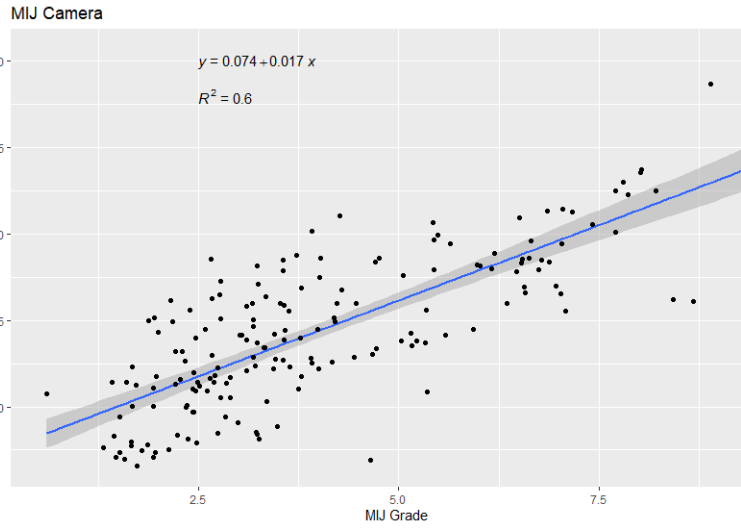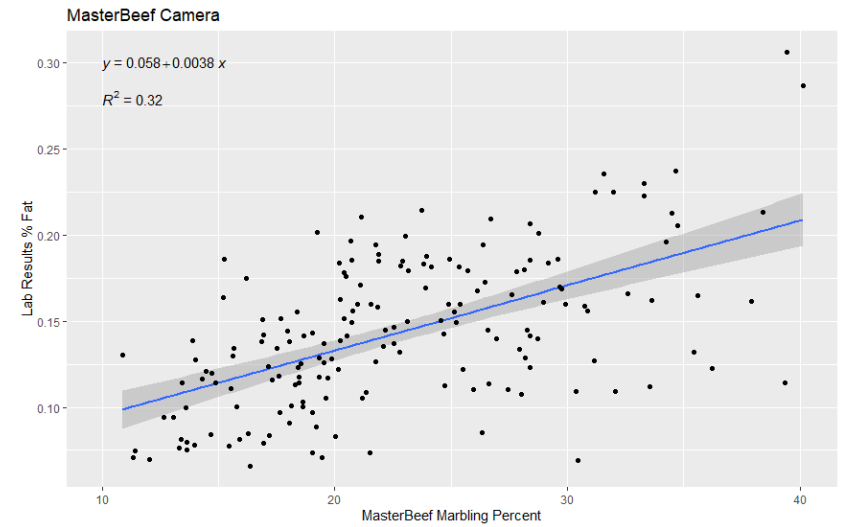
$R^2 = 0.6$ $R^2 = 0.65$ $R^2 = 0.32$

Best Fit with "Truth"

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Conclusions…?

MIJ and E+V did best overall with predicting "the truth"

USDA graders and cameras were "neck n neck" with the truth

Further exploration above the USDA grades needed

Impact on US Beef Industry

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Ongoing Exploration

▶ E+V is only camera that is validated by USDA to assign a marbling score

▶ MIJ and MEQ cameras in process of validation

▶ MEQ camera data yet to be used and compared to other cameras

  ▶ Have not found peer reviewed research – I could be wrong!

▶ Idea has been around for awhile

  ▶ Quick search leads me to papers published in 2003

▶ Need for 3rd party validation for USDA grade

AWA IMF EPD

- ▶ The AWA publishes an IMF Index EPD
  - ▶ Creation was done by the ABG group at UGA
- ▶ Index able to utilize camera outputs weighted by their accuracy
- ▶ Able to output a Marbling EPD based off of IMF %
  - ▶ Each change per unit is ~ to a % IMF change
- ▶ Challenge of getting cameras into all hands – equal opportunity?

Remote Grading Pilot Project

- USDA has launched a pilot project where remote grading via image will be accessible for smaller to medium plants

- Important for Farm to Table type setups

- This is to be in the same vein as the camera grading

  - Camera images from grading devices can be real time graded by a USDA grader

  - Or any image!

Thinking forward...

▶ Camera grading will be the new frontier for small to medium plants

  ▶ Easy to manage (small) and a relatively ease of entrance cost-wise

  ▶ Size of a phone, can be operated by anyone

▶ Output can be directly inserted into genetic evaluations

▶ Pilot Remote Grading will open up doors for an official USDA grade

▶ More cameras come onto market everyday

  ▶ The technology is there – the reference is the important part

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