

# Comparing the Size of Adipocytes in Different Bovine Fat Depots

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## Introduction

- Subcutaneous fat, visceral fat, and intramuscular fat are three major white fat depots in cattle. They differ not only in location but also in function, metabolism, development, and growth.
- Economically, intramuscular fat is more valuable than the other two types because it greatly increases the flavor and juiciness of the beef.

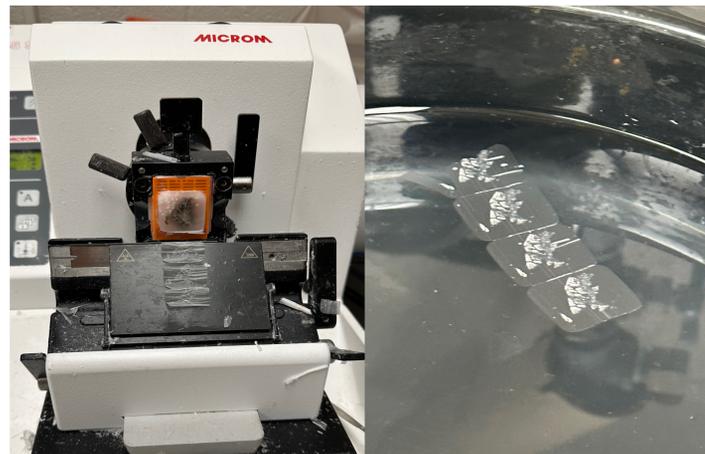
## Objective

- The long-term goal is to understand the mechanism that controls the development and growth of different fat depots in cattle.
- The specific objective is to determine the average size of adipocytes in the subcutaneous fat, visceral fat, and intramuscular fat in adult cattle.

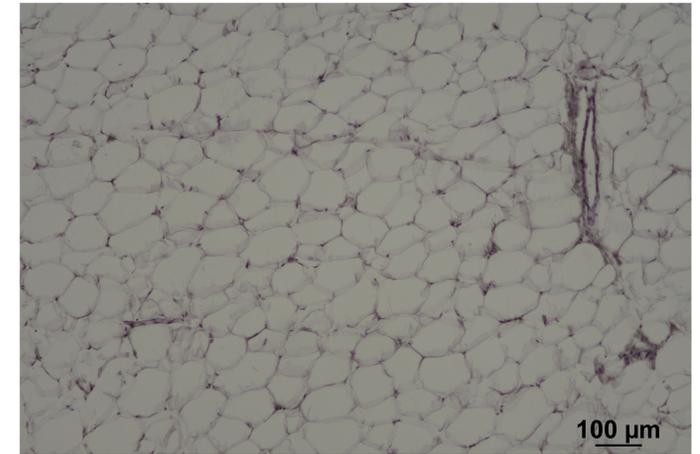
## Materials and Methods

- Tissue collection. The three types of fat were collected from cattle slaughtered at a local slaughterhouse. Adipose tissue was stored in PBS on ice before being transported to the lab.
- Histology. This included the following steps:
  - Tissue fixation in formalin
  - Tissue processing, making the sample dehydrated and clear
  - Paraffin embedding
  - Sectioning
  - H & E staining: 1% Eosin and 50% Hematoxylin.
- Examination and photographing. Slides were examined and photographed with a Nikon microscope.
- Counting. The areas of adipocytes in micrographs were counted with the image-processing program ImageJ.
- Data analysis. Data were analyzed with the Post-hoc Tukey HSD test.

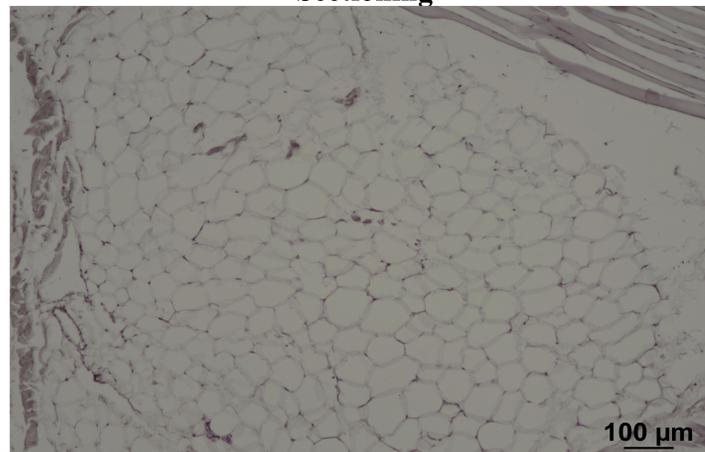
## Data and Results



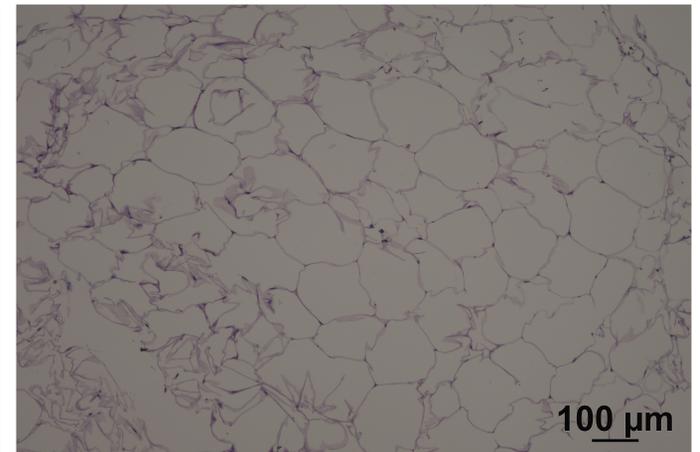
Sectioning



Subcutaneous Fat



Intramuscular Fat



Visceral Fat

- The average area of visceral adipocytes was  $7654.2 \mu\text{m}^2$
- The average area of subcutaneous adipocytes was  $7216.6 \mu\text{m}^2$
- The average area of intramuscular adipocytes was  $4818.0 \mu\text{m}^2$

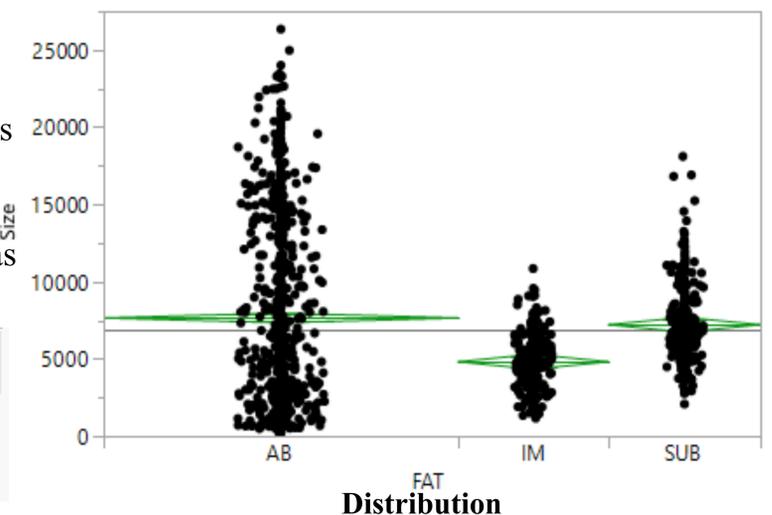
Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
FAT	2	2045264273	1.0226e+9	47.9793	<.0001*
Error	1544	3.2909e+10	21314023		
C. Total	1546	3.4954e+10			

ANOVA Test

Level		Mean
AB	A	7654.1503
SUB	A	7216.5791
IM	B	4817.9893

Tukey HSD Test

- Both visceral and subcutaneous adipocytes were larger than intramuscular adipocytes ( $P < 0.05$ ).
- Visceral and subcutaneous adipocytes were not different in size.



## Conclusion

Overall, the research shows that intramuscular fat is different from subcutaneous fat and visceral fat in terms of adipocyte size. During this research, I have learned lots of skills and earned lots of experimental experience. I have learned lots of things outside the book and classroom. This research experience has also improved my ability to communicate with and work with others, and it has also increased my interest in research and graduate school study.