STUDING MICROSTRUCTURE OF MEAT EMULSIONS AND BATTERS

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Why it is Important to Study the Mechanisms of Meat ‘Emulsification’

• Meat products in this category (bologna, frankfurters) represent a large segment of the processed market

• ‘Emulsion breakdown’ (fat separation during cooking) is costly in high volume lines
Mono-layer of proteins

Fat

Hydrophobic

Hydrophylic portion
Conventional Electron Microscopy

(fat dispersion in a meat product)

Barbut in J. Food Sci
Cryo Scanning Electron Microscopy
(fat dispersion in a meat products with salt and phosphate)
Is Bologna/ Frankfurter a Real Emulsion?

I. Emulsion Theory

- need protein
- form a protein coat around fat globules
EFFECT OF CHOPPING TIME ON PORK

Time (min)

Volume Loss (ml)

Liquid Loss Fat Loss

See: Barbut Italian J. Food Sci
Example II

• Objectives: study the effects of using beef fat vs. vegetable oil on emulsion stability and products’ performance
  – Compare between canola oil and beef fat at different protein levels
  – Compare between beef fat, rendered beef fat, canola oil, palm oil, and hydrogenated palm oil at different protein levels
Effect of protein levels and fat/oil on emulsion stability of meat emulsions

Youssef and Barbut (2009) Meat Science 82, 228-233
Effect of protein levels and fat/oil type on meat emulsion microstructure

Beef Fat

Canola Oil
Some Conclusions

• The mechanism of meat emulsion stabilization is complex and multi factorial
  — depends on the physicochemical properties of the fat phase, the interfacial protein film around fat globules, and the protein matrix.

• Use of non-meat proteins which have low gelling ability and high emulsifying capacity can produce more stable meat emulsions when prepared with canola oil