Use of Enzymes in Marinades

Prepared Foods R & D Conference

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Types of Enzymes

- Papain
- Bromelain
- Ficin
- *Aspergillus oryzae* protease
- *Bacillus subtilis* protease

Papain

- Derived from latex of unripe papaya
- Longest history of use
- Highest Temperature of inactivation

Bromelain

- Derived from Pineapple
- Slightly lower temperature of inactivation compared to papain
- No odor
- No added sulfites
- More effective on connective tissue

Ficin

- Derived from latex of fig tree
- Lowest temperature of inactivation of the botanical proteases
- Limited production/ highest cost

Aspergillus oryzae Protease

- Fungal protease
- Limited use in market
- May have amylase side activity
- Low temperature of inactivation
- Very mild tenderizer

Bacillus subtilis Protease

- Only recent USDA approval
- Mild tenderizer
- Low temperature of inactivation
- Possible alternate to Ficin

Formulation with enzymes

- Most hazardous – “Match the Label”
  - Activity of the enzyme is NOT consistent
    - Example Add .01% Papain on dry wt. basis
      - Supplier One 70 MCU/mg
      - Supplier Two 300 MCU/mg
      - Supplier Three 1,400 MCU/mg

      - One Gram from #3 is 20X that of #1

Formulation with enzymes

- Typical Dose with botanical proteases 500 – 3000 MCU per pound of meat
- Need to calculate uptake of marinade per pound of meat

Other Factors that influence

- Hold time before cooking
- Hold temperature before cooking
- Maximum cook temperature
- Storage after cooking
  - Immediate consumption or further hold time