Creating a Paradigm Shift in Handling Meat Ingredients

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The New York Times

"F.D.A. Bids to Regulate Animal Food, Acting After Recall and Deaths"

"Outbreak of *Salmonella Heidelberg* Infections Linked to Mechanically Separated Chicken"

CDC, Centers for Disease Control and Prevention, Salmonella, Salmonella Homepage. 2014. (www.cdc.gov/salmonella/outbreaks-2024.html)

Why Meat?

Benefits of Using Meat Ingredients

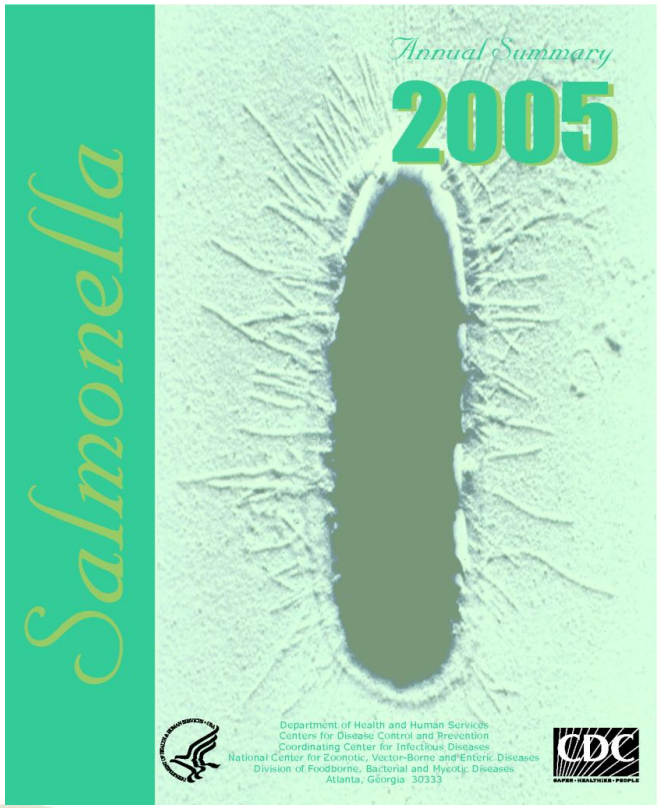
Why Meat?

- High quality and readily available source of protein
- Excellent palatability
- Consumer desirability
- Driving growth in all pet food segments

Risks & Challenges with Meat Ingredients

Bacterial Pathogens

Salmonella!



And "Friends":

- Pathogenic Escherichia coli
- Listeria monocytogenes
- Staphyloccus aureus
- Clostridium botulinum
- Campylobacter jejuni
- Clostridium perfringens

Bacterial Food Spoilage Organisms

Organisms

- Pseudomonas
- Acinetobacter
- Clostridium

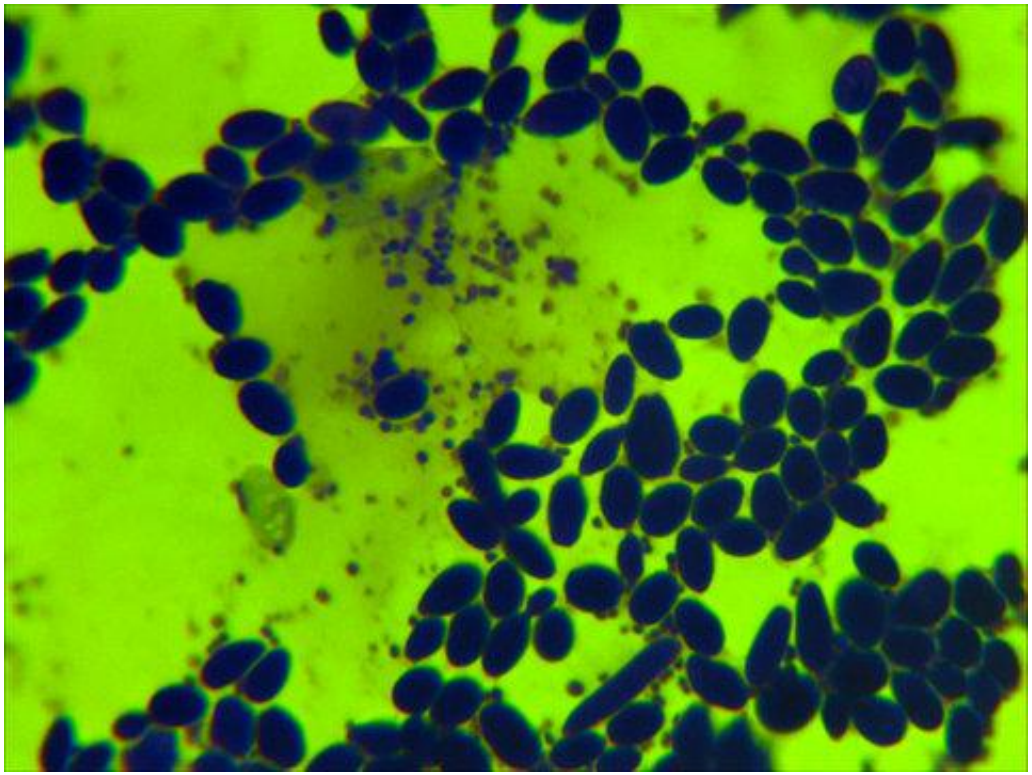
Picture of Pseudomonas

Mold Spoilage Organisms

- Penicillium
- Altenaria
- Cladosporium

Yeast Spoilage Organisms

- Candida
- Pichia
- Debaryomyces



And…

Growing Regulatory Action

The Food Safety Modernization Act:

It aims to ensure the US food supply is safe by shifting the focus of Federal Regulators from responding to contamination to preventing it.

FDA FOOD SAFETY MODERNIZATION ACT

So What's the Big Deal?

- You have solid GMPs and HACCP Plans
- People are well trained
- Protocol is always followed
- Factory renovations and upgrades
- You have a handle on potential contamination

…RIGHT?!

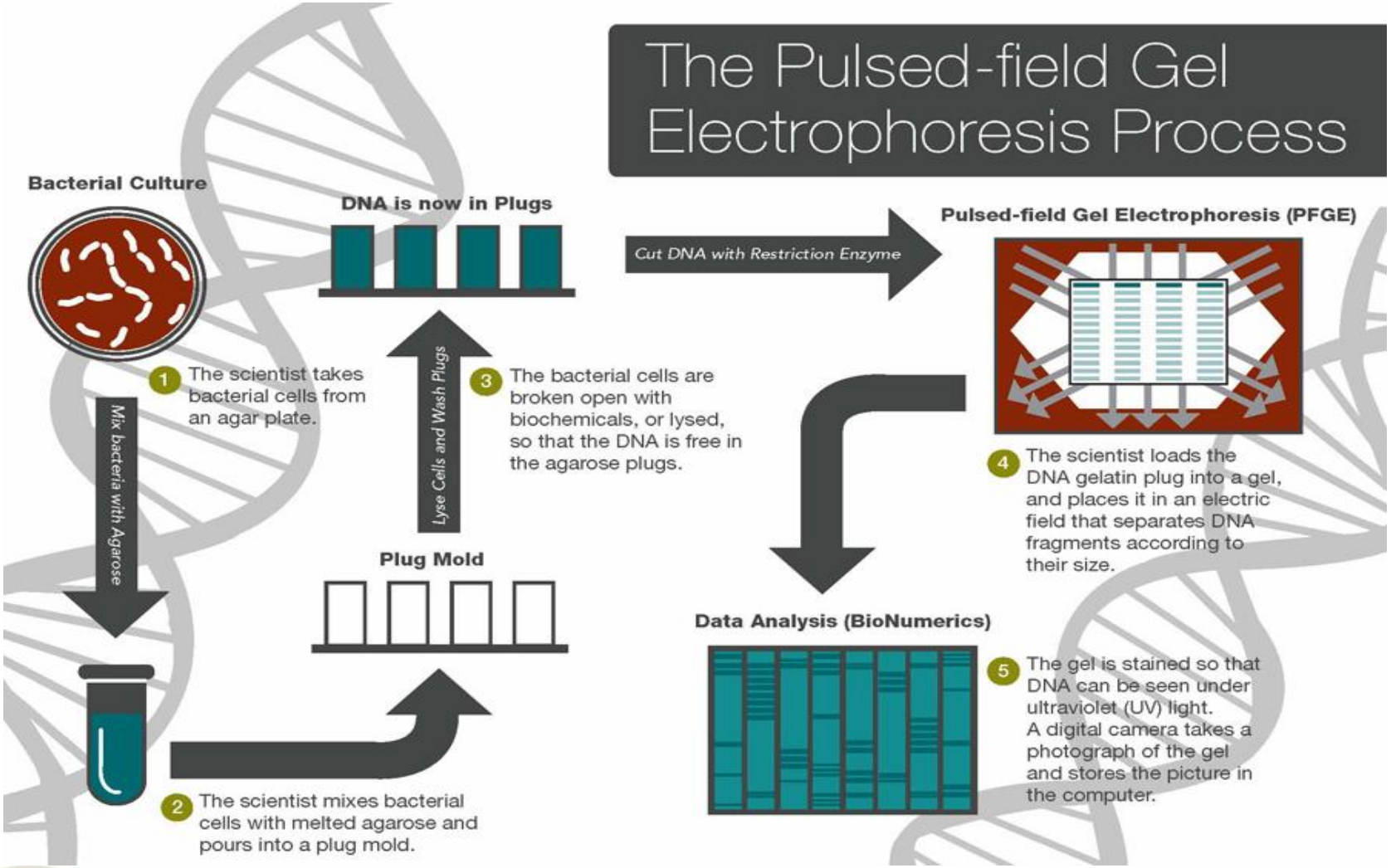
It Is a BIG Deal

- Pathogen and spoilage risk are everywhere:
  - Daily pathogen load in raw material supply chain
  - Imperfect handling and storage practices
  - Pathogens niches' can exist after validated CCP
  - "Human factor" despite training and best efforts
- Most plants not designed for new regulations

GMP, HACCP and validated CCPs are good…

…but not good enough

wwwnc.cdc.gov./eid/article/7/5/01-0526f1-htm



Have You Been Fingerprinted?

- What is your Serotype or PFGE?
- Do you know all sources of pathogen risk?
- Can you supplement your current GMP and HACCP programs?

Paradigm Shift Required

"Meat must be heated to > 165°F to kill Salmonella."
~USDA

"Adding bacteria to ingredients is the most effective way to ensure ingredients stability & safety."
~Dick Smittle

"That thing will never fly!"
~Goober Smith, Outer Banks, NC

"The world is flat!"
~Flat Earth Society

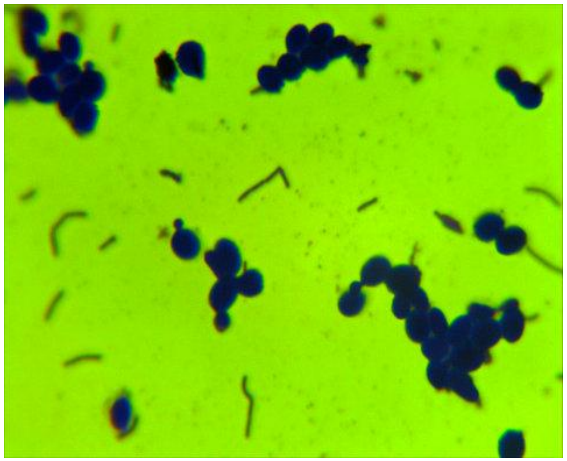
Re-Think Bacteria

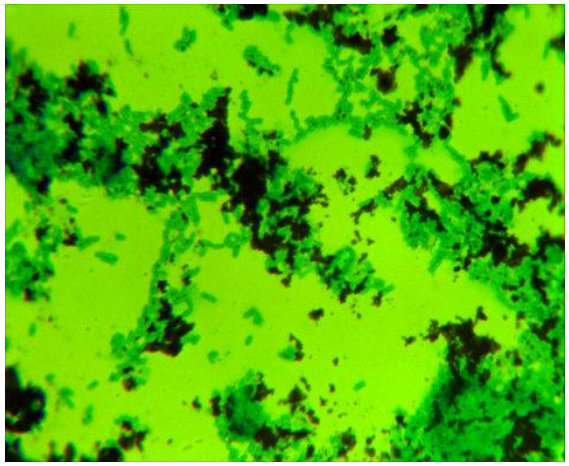
- Conventional wisdom states that any bacterium is bad in a manufacturing environment
- We enjoy the presence of beneficial bacteria in many products: yogurt, pickles, cheese, sourdough bread, etc.
- Bacteria are an important part of our body in order for it to function properly, especially in the lower G.I. tract
- Selective application of beneficial bacteria to a manufacturing process can help control spoilage

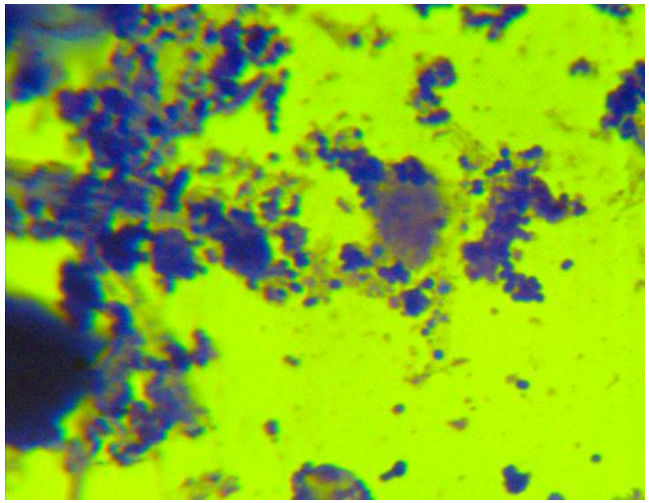
ActiveEcology™ Technology

- Beneficial bacteria based technology
- Leverage beneficial bacteria to fight food borne pathogens and spoilage organisms
- A natural and non-GMO technology
- Not a replacement of GMP and HACCP protocols; an effective adjunct consistent with FDA/FSMA
- *Patents Pending*

Beneficial Microbes for the Gut







How Does ActiveEcology™ Work?

- Changes the ecological factors to kill Salmonella and spoilage microorganisms without added chemicals or high heat treatments
- Develops the pH of the product to kill pathogens and prevent spoilage bacteria from growing
- Naturally developed by-products boost efficacy (metabolic by-products; Lantibiotic and non-Lantibiotic Class II Bacteriocins)

Raw Ingredient to Finished Product

- ActiveEcology™ is metered into the meat source
- Meat transported to the product manufacturer
- Upon arrival the meat is stable for weeks without refrigeration (minimum of 10 days)
- Manufacturer combines meat with other ingredients and processes dry, moist or wet product forms
- Promotes healthy colonization of beneficial bacteria
- Stable at room temperature

Example: Mechanically Deboned Meat

Example

- ActiveEcology™ treats mechanically deboned meat in any environment
- After a few hours meat is stable and pathogen free
- Pathogen control can be achieved throughout the vertical supply chain—from slaughterhouse to shelf

Before Treatment

Meat Source is Mechanically Deboned Chicken

After Treatment

Meat Source is Mechanically Deboned Chicken

Creates a Stable Meat Ecology

- Meets Ready-to-Eat food standard of Salmonella kill (100,000 cfu/g)
- Far exceeds our goal of at least 10 Days
- Provides an all natural ingredients clean label
- Based on GRAS cultures and no added preservatives

Efficacy Data

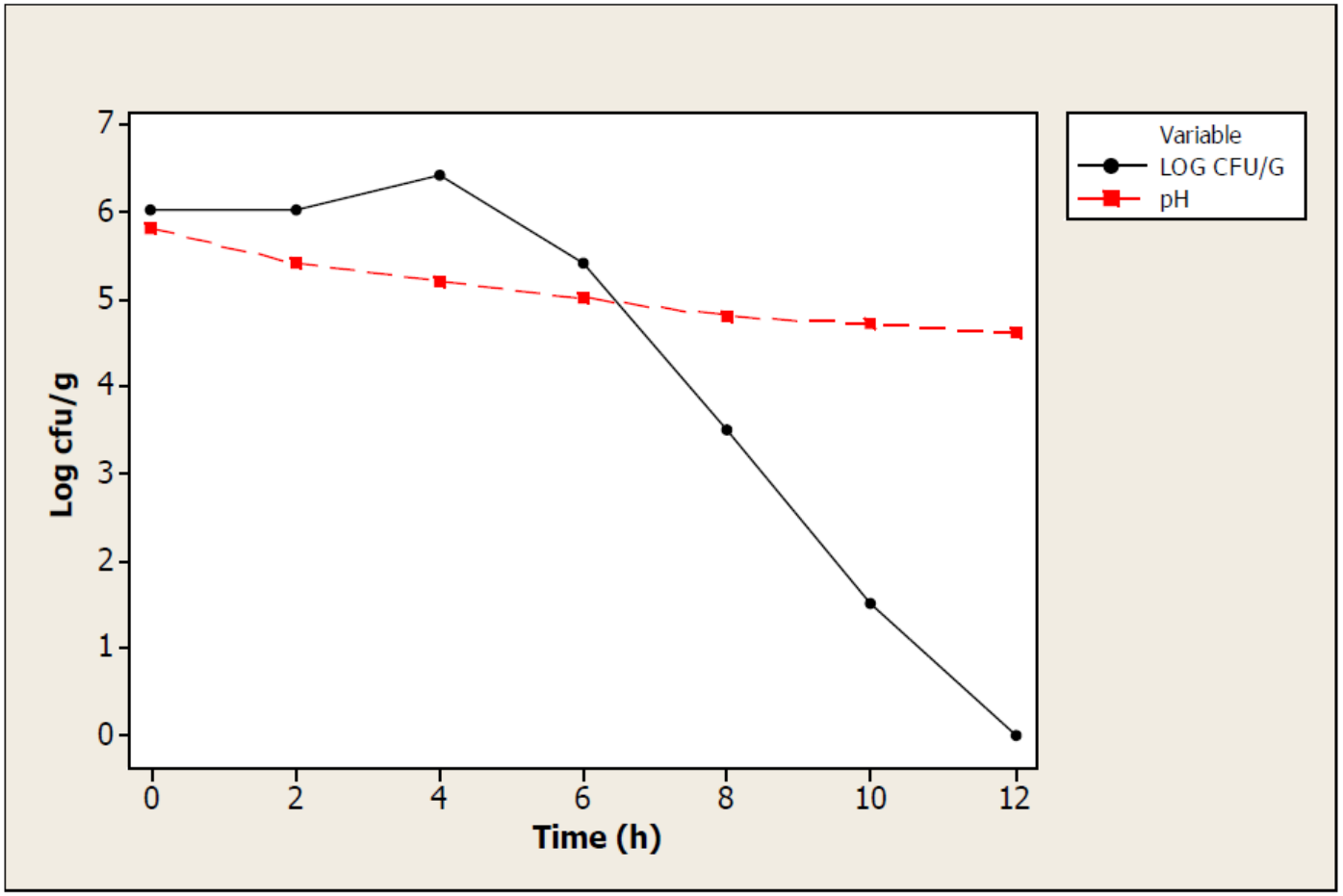
Use of Salmonella Surrogates

- The following slides refer to Salmonella "surrogates": E.coli ATCC BAA 1427, 1428, 1429 1430, 1431.
- Surrogates are non-pathogenic E. coli used in place of Salmonella in fermented meat process validation when used in the laboratory or plant.
- Surrogates are an acceptable substitute for Salmonella to validate fermented meat processes in the laboratory or processing plant.

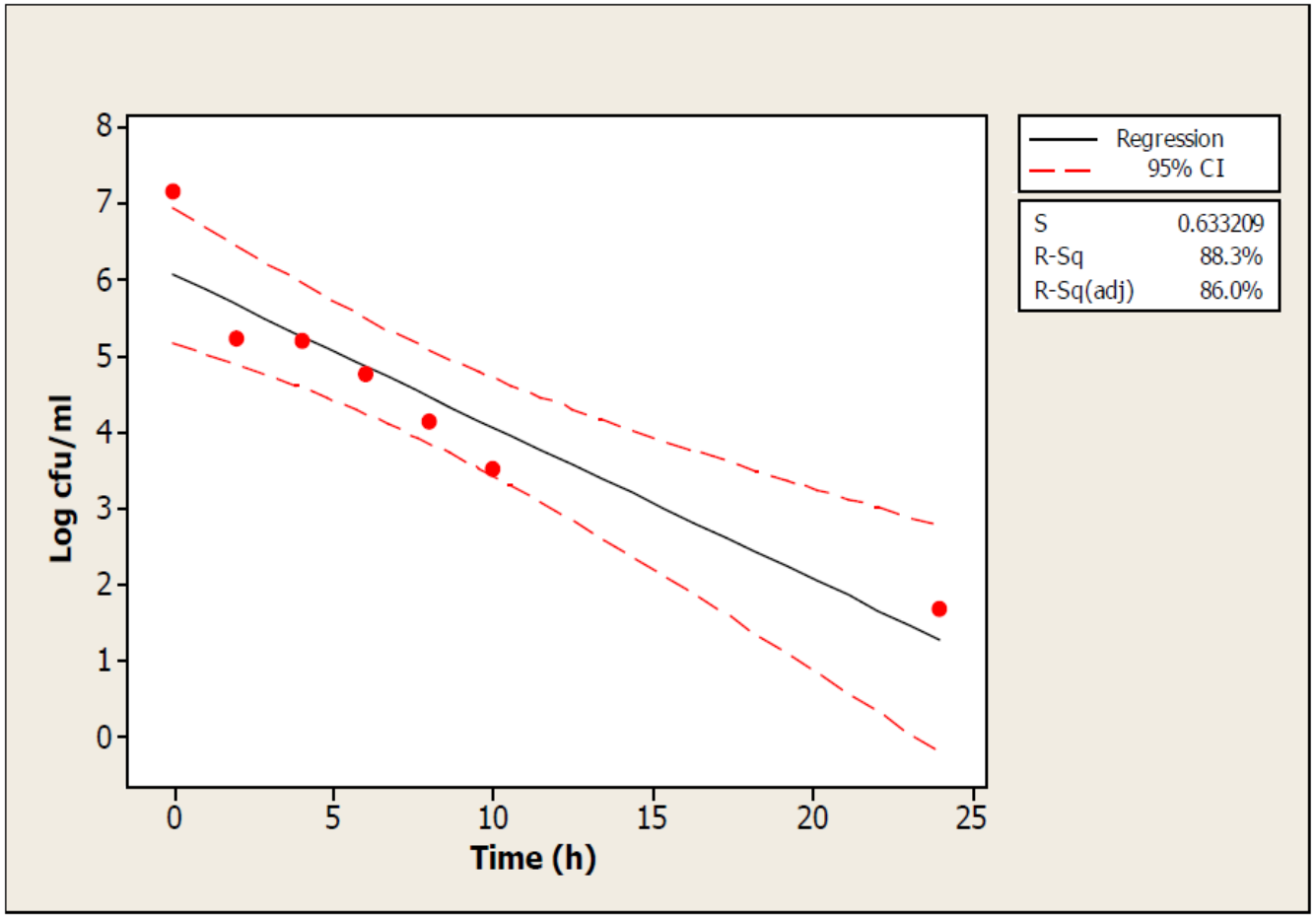
Validation to Kill Salmonella

- Surrogate Death in Fermented Mechanically Deboned Chicken Meal (MDCM)
  - Initial Inoculum
    - Log 7.08 E.coli/g
  - 23 Hrs, 40°C
    - Log 1.70 E.coli/g
- Validated for Salmonella

Fate of Salmonella Surrogates in Meat Longitudinally Assessed Over 12 h



Fate of Salmonella Surrogates in Chicken Broth



Extended Use Test Results

Raw Chicken

No Treatment - After One Week

Spoiled

With MicroNature™ Treatment

Spoilage free for 3 months…
and counting

Benefit Summary

- Pathogen and spoilage organism free
  - Raw materials coming into production facility
  - Finished products headed out of the production facility
- Cost saving (without sacrificing quality or safety)
  - Less waste and more throughput
  - Energy savings (e.g., refrigeration, freezing, etc.)
- Natural process without chemistry or capital intensive CPP “enhancements”
- Enhanced nutritional delivery

Applications

- Raw Materials
- Incorporation Into Finished Products:
  - Dry
  - Canned
  - Plastic Tubs
  - Pouches
  - Semi-moist
  - Treats
  - Raw
  - Chubs

THANK YOU

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