Efforts by the Rendering & Pet Food Industries & Scientists Including the New Pet Food Alliance

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Presentation Overview

- History: How the Pet Food Alliance came to be?
- Structure and Initiatives of the Alliance
- Work to date
- Future plans/actions
Fats and Protein Research Foundation Mission

• Fund research to help ensure a strong future for rendering industry and industry partners
  • Enhance current uses of rendered products
  • Improve rendering process
  • Develop novel applications

• Previous FPRF research funding → significant advances in industry

• Need to enhance and develop additional research relationships
  • Develop collaborative relationships with pet food industry
  • Increase funding resources
  • Expanding ideas
Alliance for Research and Innovation in the Rendering and Pet Food Industries

Relies on:

**Transdisciplinary** collaboration & participation

- pet food
- meat industry
- rendering industries
- researchers
- others: antioxidant suppliers, analytical labs and methods, ingredient suppliers (lactic acid)

- **Collaboratively** identify research challenges
- Discuss *realistic and implementable solutions*
- **Explore** novel funding mechanisms
Inaugural Meeting at Colorado State University
May 2017

Stakeholders:
Darling, Nestle Purina, Seaboard, Tyson Foods, Diamond Pet Foods, Sanimax, Pilgrim’s Pride, CFS North America, Corbion, Pet Food Institute, Smithfield, Mississippi State University, Iowa State University, Clemson

Primary goals:
- Extend and build networks
- Identify research challenges
- Discuss research priorities
Identify challenges for each sector:

**Packing Industry Challenges:**
- Perception of Raw Ingredient Quality
- Oxidation Testing- Identifying New Markers

**Pet Food Industry Challenges:**
- Pathogen Free Tallow
- Relative Risk of Salmonella

**Rendering Industry Challenges:**
- Antioxidant Efficacy
- Meeting Near Food-Grade Regulations

**Academia Challenges:**
- Research Funding
- Lack of understanding of industry problems

Develop Strategic Initiatives in Small Groups
Small Group Strategic Initiatives Were Developed

- Sustainability of Rendering Working Group
- Public Perception Working Group
- Oxidation Working Group
- *Salmonella* and Product Safety Working Group
Meeting Priorities:

- Increase industry representation
- Refine strategic initiatives for the 4 working groups
- Generate Action Items
Meeting Priorities:

• Increase industry representation
• Focus efforts of working groups
• Utilize Alliance network to accomplish working group goals
• Identify new funding mechanisms
January 2019 Meeting

- 85 Attendees
- Grown over 450%
Sustainability & Consumer Perception Working Group

- Work on development of website to educate consumers, explore “Mo Knows” created by Sarah Hubler and Dr. George Collings

- Reinforce development of internship program

- Continue sustainability work performed at Iowa State will be highlighted on new NRA website and new PFA website.

- Plan to begin literature database for rendering and pet food
List of Priorities:
1. Check Sample Program
2. Representative Sampling
3. Database
4. Rendering Best Practices
5. Stability Future
6. Methodology - Extraction

5 Sub Working Groups:
• Check Sample Program
• Representative Sampling/Best Practices
• Rendering Best Practices
• Methodology (Current/Future
• Database
Salmonella and Product Safety Working Group

- Drafted Bulk Fat Transportation Survey
  - *Initially released October 24th by a 3rd party email*
  - *Will be released again next month*

- Non-pathogen safety challenges
  - *Foreign materials: identify training opportunities for plant employees to aid in development of training videos and materials*

- Review pre-proposals submitted to hazard reduction RFP
  - *6 research proposals received and under review with reviews by March 15, 2019*

- Revise 2019 RFP to solicit research involving microbiome-based investigations of rendering and pet food industries
Research proposals received & under review:

- The effects of chemical treatments and different levels of fat and unsaturation on Salmonella species in rendered animal fats and oils.

- Piloting Silver Magnetic Nanoparticles toEliminate Salmonella in Rendered Poultry Fat.

- Synergistic effect between UV-A and antimicrobials to inactivate Salmonella spp. on animal fats

- A potassium sorbate and sodium acid sulfate antimicrobial mix on mitigation of Salmonella spp. on pet food

- Thermal inactivation of Salmonella in rendered animal fats and subsequent use of dry sanitation to remove microbial hazards on pet food processing equipment

- Assessing Factors Affecting Salmonella in Beef Tallow and CWG
Progress Thus Far....and Future Steps

• Since its inception in 2017:
  – Pet Food Alliance has grown over 450%
  – From 30 to over 145 members representing more than 50 companies across the pet food, rendering, and meat industries.

Next Meeting – New Format:

  – Scientific Symposium Format
  – Symposia based on Working Group Priorities
  – Registration costs used to fund research

June 26-28, 2019 in Denver, CO

http://fprfalliance.agsci.colostate.edu
Determine the location and influence of physical characteristics on Salmonella in poultry fat intended for pet food use.

**Principle Investigators:**
Dr. Jennifer Martin & Dr. Dale Woerner Colorado State University

**Purpose:**
Enhance understanding of distribution within and influence of physical and environmental parameters on populations of *Salmonella* within rendered poultry fat.
Study Objective 1 of 3

Objectives:

– (i) Utilize fluorescently-tagged *Salmonella* to assess the distribution of *Salmonella* in a rendered fat matrix.

– In Study I(a), a green fluorescent protein (GFP)-expressing strain of *Salmonella* Typhimurium was used to visually and microbiologically map the organism within warmed (45°C) poultry fat formulations comprised of a low impurity level (0.2%) and three moisture contents (low: 0.5%; medium: 2.2%; high: 4.5%).
Microbiological sampling schematic for poultry fat at five sampling intervals

Sequential 10 ml samples (n = 5) were collected from each burette at each sampling interval.
Photographs of burettes after inoculation. Fluorescence was noted at the point of inoculation.
Photographs of burettes after sampling was completed. Fluorescence was noted along the sides of the empty burettes.
Study Objectives 2 and 3

Objectives:

(ii) Assess the influence of post-inoculation time and moisture content on the distribution of fluorescently-tagged Salmonella in rendered poultry fat.

(iii) Assess the influence of post-inoculation time and physical parameters (i.e., impurity level and moisture content) on the survival of three Salmonella serotype strains in rendered poultry fat stored at 25°C or 45°C.
Salmonella in 1.0% impurity level poultry fat incubated at 45°C for 48 h.
Study Conclusions:

- Control of **moisture content, temperature, impurity level and water activity** is important for controlling survival of *Salmonella* spp. in poultry fat.
- Lower impurity levels of fat were not better at controlling survival of *Salmonella*.
- Storage of fat with **medium or high moisture** content at 25°C allowed survival of *Salmonella*, and permitted growth at a high impurity level, high moisture content and high water activity.
- **Low impurity fat with low moisture content** that is stored at a high temperature 45°C for a period of time would effectively control *Salmonella* contamination in poultry fat.
- Burette portion of the study resulted in the visual observation of fluorescently-tagged *Salmonella* Typhimurium on the sides of the burette – suggesting potential for biofilm formation, or persisting *Salmonella* in storage vessels.
Assessing factors affecting *Salmonella* in poultry fat

**Principal Investigators:**
- Dr. Valentina Trinetta, Dr. Cassandra Jones Kansas State University

**Study Purpose:**
- Evaluate the effects of moisture levels and storage temperatures on the growth and survival of *Salmonella* in poultry fat.
- Study effects of 4 moisture levels (0, 0.5%, 1%, and 3), 2 inoculum type (wet and dry) and 2 temperatures (48°C and 76°C) were evaluated in poultry fat inoculated with a low (~$10^5$ CFU/mL) and high (~$10^8$ CFU/mL) *Salmonella* cocktail (*S.* Newport, *S.* Thompson and *S.* Infantis).
Salmonella in poultry fat challenged at 48°C with high dry inoculum levels and different moisture level (0%, 0.50%, 1% and 3%) over time.
**Salmonella** remaining in samples at 76°C with high dry inocula levels and moisture level (0%, 0.50%, 1% and 3%) over time

![Graph showing Salmonella levels at 76°C over time]

**Salmonella** remaining fat samples at 48°C with low dry inoculum levels and moisture level (0%, 0.50%, 1% and 3%) over time

![Graph showing Salmonella levels at 48°C over time]
Assessing factors affecting *Salmonella* in poultry fat

**Summary**

- Significant and rapid reduction in *Salmonella* observed as a function of increased temp.

- Regardless of moisture level, inoculum level, or contamination level, holding poultry fat at 76°C resulted in minimal detectable *Salmonella* spp. after 24 hours.

- If storing poultry fat at 48°C, post-processing contamination should be minimized as *Salmonella* contamination can persist for several days.

- If storing poultry fat below 48°C, particular care should be taken to prevent excess moisture as it can lead to *Salmonella* growth.