

# Rendering 101: A Primer on the Rendering Industry



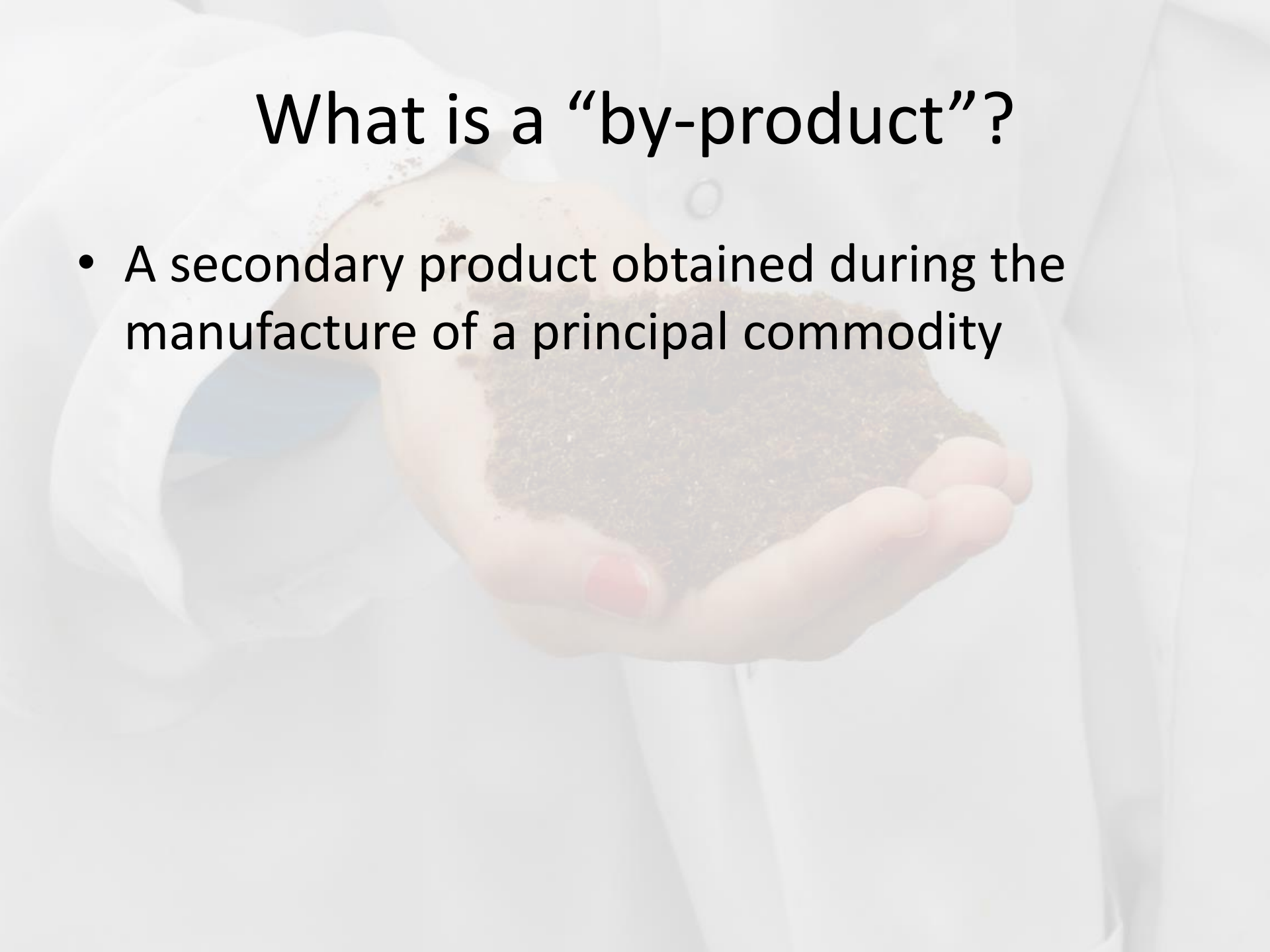
# Overview

- History
- Industry overview
- Materials
- Process
- Products
- Public health
- FSMA
- Industry groups



# What is a “by-product”?

- A secondary product obtained during the manufacture of a principal commodity



# Rendering Plant





# What is Rendering?

Rendering is Cooking and Drying.

Rendering is Recycling.

Rendering is Essential to Public Health.



# History of the Rendering Industry

- Traditionally, more of the animal was utilized
- Fertilizer
- Candles and soap
- Increased animal production
  - Grocery stores
  - Fallen animals
  - Boxed beef
- “The Invisible Industry”



# U.S. Animal Agriculture Annual Production

- 35 million cattle (49% of live wt. not used for human food)
- 110 million hogs (44% not used for human food)
- 2 million sheep and lambs (46% not used for human food)
- 8.6 billion chickens (37% not used for human food)
- 280 million turkeys (36% not used for human food)
- 24 million ducks (30% not used for human food)

This amounts to approximately 50 billion lb. produced in the U.S.

Plus approximately 6 billion lb. produced in the Canada

# Rendering Services The Food Industry

- 2.7 billion pounds of meat and seafood lost in retail (spoiled, dated)
  - 1.9 billion pounds recycled by renderers
- 4.7 billion pounds of used restaurant grease
  - 2.4 billion pounds recycled by renderers





# The Rendering Industry (U.S. and Canada)

- 273 facilities in the U.S. and 29 in Canada
- \$10 billion annual revenue
- 25 MMT (56 billion lb) raw material each year
- 70 million kg raw material each day





# Alternatives



# Rendering is Essential

- To protect the environment
- To protect human health
- To protect animal health
- It is sustainable and contributes to sustainability of animal agriculture

# Our Green Impact

## Rendering Annually Recycles (million lb) :

Nutrient	U.S. Total
Carbon	10,511
Nitrogen	1,072
Phosphorus	384

### Rendering protects the environment:

- If not recycled, the large amounts of carbon, nitrogen, and phosphorus present in inedible animal by-products may contribute to global warming, soil loading and water contamination.
- U.S. rendering facilities utilize world-class processing equipment, treatment processes and control equipment to minimize the impact on the local environments' air and water.





## Rendering's Carbon Footprint

- Recycling fat and protein **significantly reduces** the amount of greenhouse gases, such as CO<sub>2</sub>, released into the environment.

Item	U.S.
CO <sub>2</sub> equivalents recycled, metric tons/year	66,958,000

- According to the US-EPA, the CO<sub>2</sub> renderers recycle each year is equivalent to the following actions taken to reduce greenhouse gases:

Greenhouse gas reduction strategy	U.S.
Number of cars taken off the road per year	12,263,370
Seedling trees planted per year	1,716,871,791
Tons of garbage diverted from landfills per year	23,088,966

# Raw Materials

- Offal
- Bones, fat, trimmings
- Blood
- Animals dead on arrival, in transit or on farms
- Restaurant grease
- Feathers
- Grocery store material
- Recalled product



# Restaurant grease



## “Fallen” Animals

1.71 million adult cattle/yr.

2.37 million calves/yr.

18 million swine/yr.

350 million lb. poultry/yr.

Total = 4.4 billion lb./yr.

Approx. 2.2 billion lb./yr. (50%) is rendered.

Approx. 4.5% of rendered products come from fallen animals.

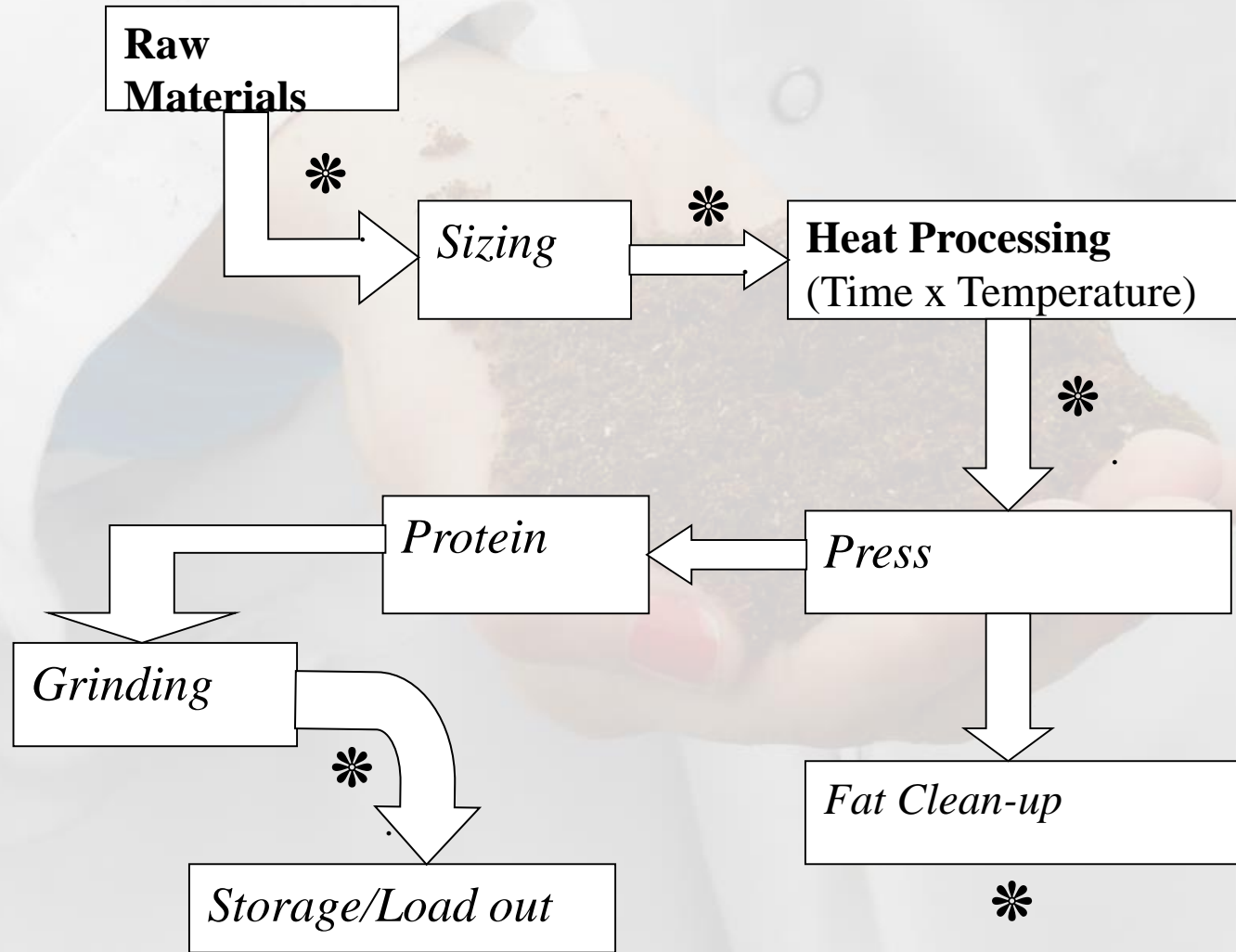


# Rendering process

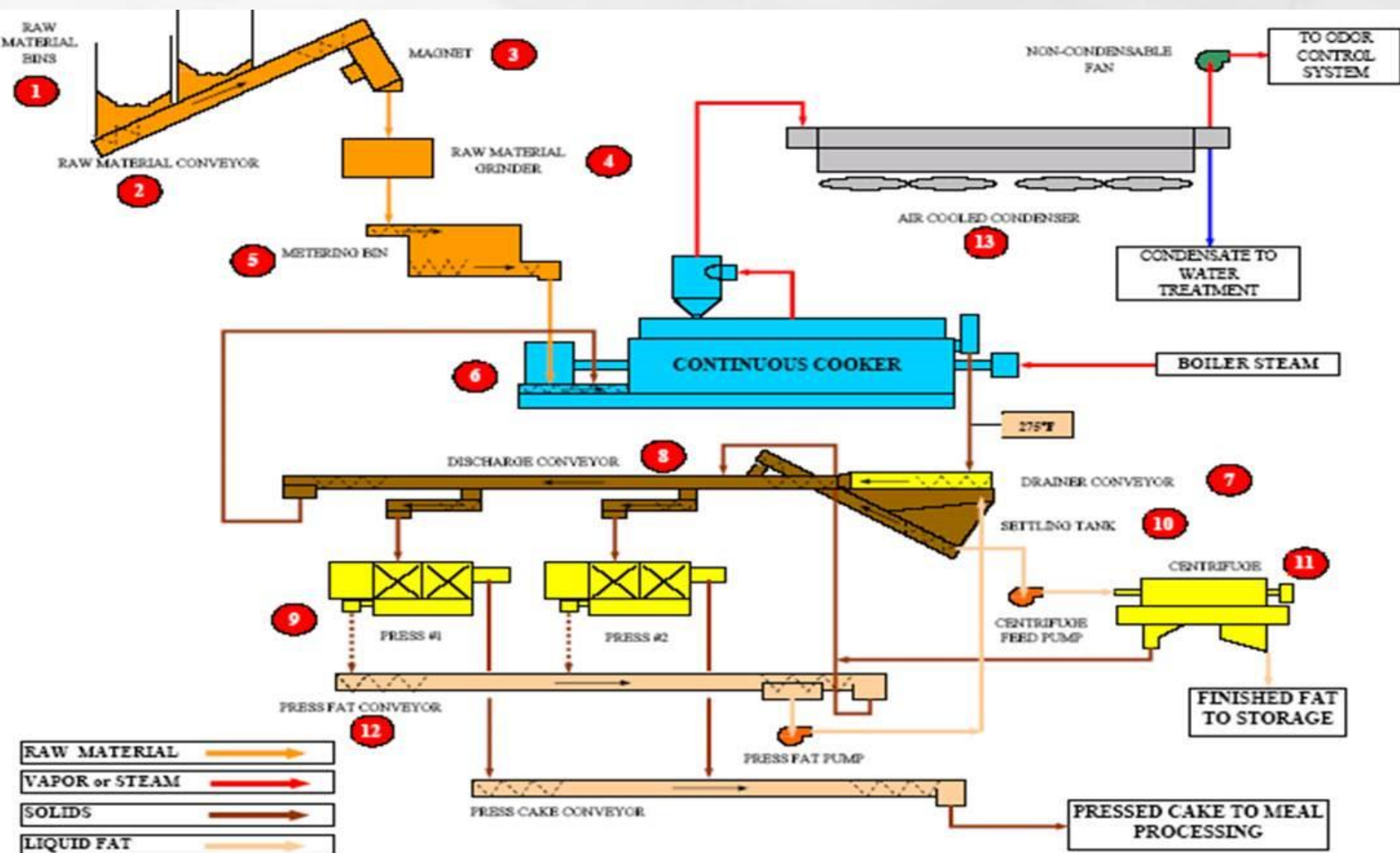
- Continuous flow or batch
- Steam cookers
- 245° to 290° F. for 40 to 90 minutes
- Inactivation of bacteria, viruses, protozoa, and parasitic organisms



# The Basic Production Process of Rendering



Process Control Points



### CONTINUOUS SYSTEM

# The Basic Process of Rendering

**Trucks:** plant cleanliness and product quality begin with prompt collection.

**Grinder:** each type of raw material is processed separately, starting with crushing.

**Cooker:** releases natural proteins and oils of the animal by-products; feathers are hydrolyzed.

**Air purifier:** ensures the highest standard of air quality.

**Press:** all materials are pressed to separate solids from liquids.

**Centrifuge:** fats and oils are centrifuged to remove any remaining solids; blood is collected through coagulation and centrifuging.

**Polisher:** fats and oils are further refined, filtered and processed.

**Dryer:** fish solids and feathers are dried separately.

**Mill:** protein meals are milled separately.

**Storage:** all meals, fats and oils are stored in tanks until shipped.

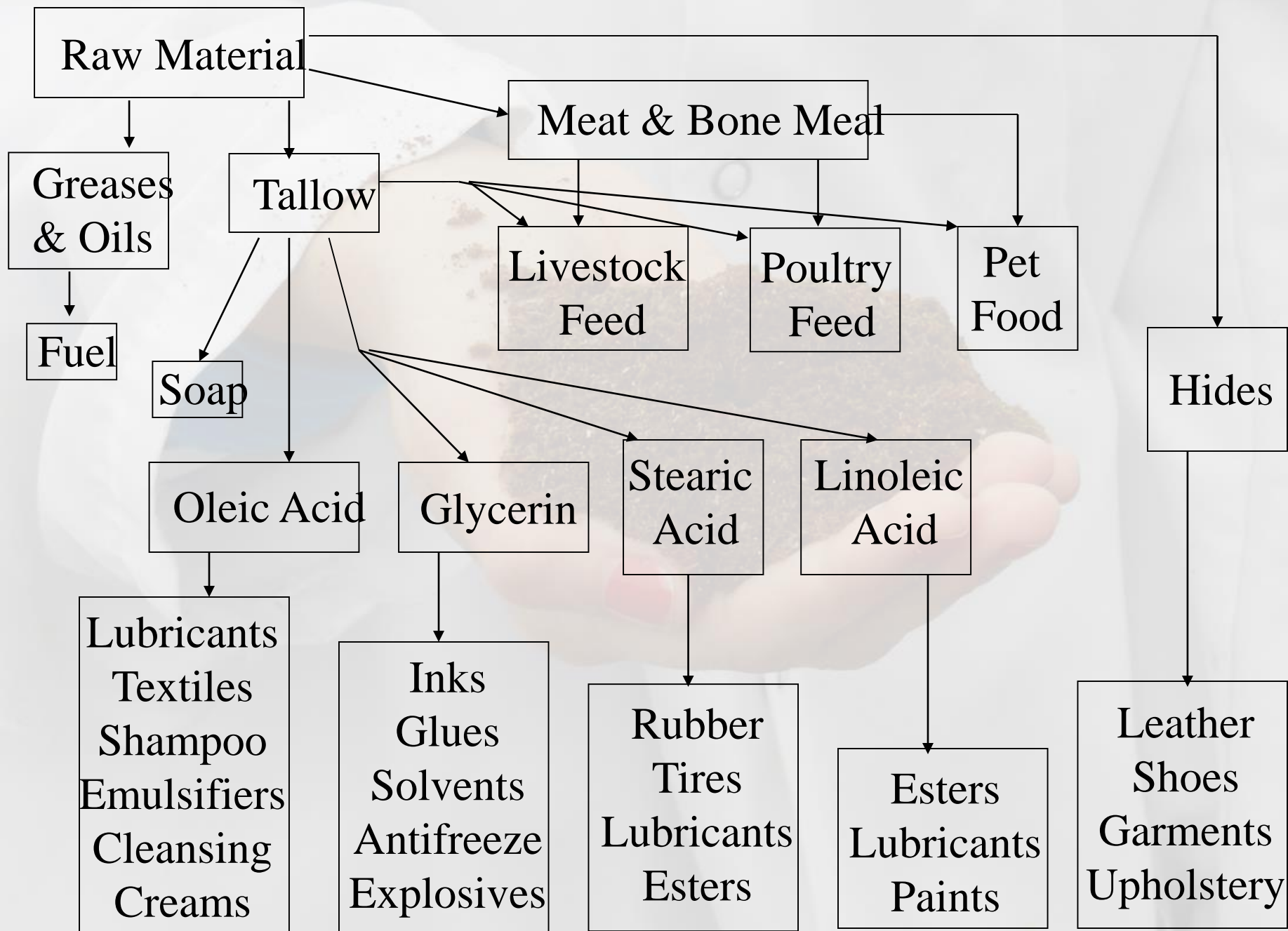
**Transport:** meals, fats and oils are delivered worldwide via truck, rail, container or ship.



# Products

- Fats
- Proteins





# Tallows and Greases

• Edible Tallow	1.6 billion lb/yr
• Inedible Tallow	3.9
• Lard and Grease	1.3
• Yellow Grease	2.6
• <u>Poultry Fat</u>	<u>2.2</u>
• Total	11.6 billion lb/yr



# Protein Meals – 9.2 billion lb/yr

## 125 AAFCO-defined animal by-products

- Meat Meal
- Meat and Bone Meal (can be species specific)
- Blood Meal (Flash/Spray/Ring/Batch Dried)
  - Can be whole or only hemoglobin
- Poultry By-Product Meal
- Poultry Meal
- Hydrolyzed Poultry Feather Meal

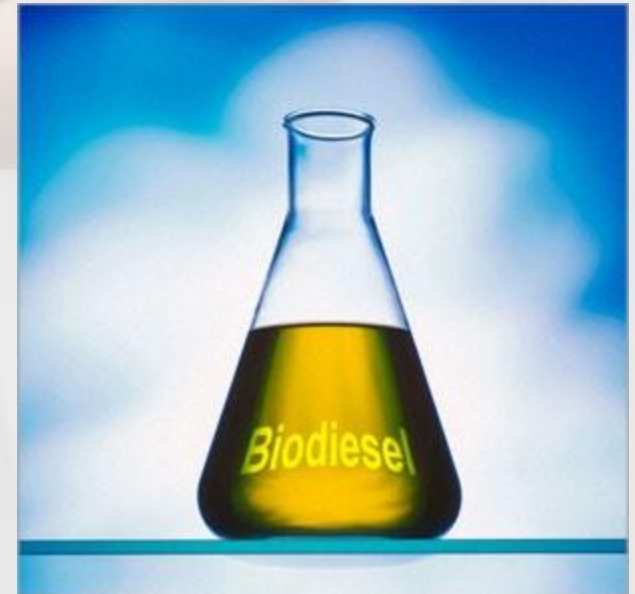




From this:



To this:





# Types of renderers

- Packer-Renderers
- Independents





# Public health





# Rendering Protects Human & Animal Health

- Rendering Industries in the U.S. and Canada safely and responsibly sanitizes and recycles more than 56 billion pounds of inedible materials generated each year by the animal production and meat industries
- Rendering offers a sanitary and eco-friendly way to dispose of the massive amount of meat and food by-products produced every year.
- Such materials spoil easily and make an excellent media for pathogens to grow and multiply
- Temperatures ( $> 245^{\circ}\text{F}$ ) used during processing are more than adequate to kill conventional disease-causing organisms, such as bacteria and viruses



AH966A [RM] © www.visualphotos.com



## Rendering Destroys Bacteria of Food Safety Concern

<b>Bacteria</b>	<b>Raw Tissue</b>	<b>Post-Press</b>
<i>Clostridium perfringens</i>	71.4%	0%
<i>Listeria species</i>	76.2%	0%
<i>L. Monocytogenes</i>	8.3%	0%
<i>Campylobacter species</i>	29.8%	0%
<i>C. Jejuni</i>	20.0%	0%
<i>Salmonella species</i>	84.5%	0%

## Public health

- Foot-and-Mouth Disease (FMD)
- Pseudorabies Virus (PRV)
- Bacillus Anthracis (Anthrax)
- Avian Influenza
- Almost all Others



*Bacillus Anthracis cells with spores*

# Rendering dead stock

- Preferred disposal method
  - environmentally responsible
  - timely removal and reduction/separation
  - reduces risk to public health
  - control of rodents, insects and scavengers

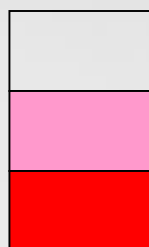


## Rendering for Dead Stock Disposal

- Rendering abides by State laws regarding dead stock disposal
  - Usually 24 or 48 hrs. after death to avoid the nuisances of odors and potential transmission of disease
- Dead stock picked up by designated, specially equipped trucks to preclude contamination of the roadways
- Trucks cleaned and disinfected after routes
- Trucks subject to inspection, authorized by law
- Facilities are licensed and approved

# Rough Scoring of Disposal Options Against Hazards

Potential Public Health Hazards	Disposal Options				
	Rendering	Incineration	Landfill	Pyre	Burial
<i>Cryptosporidium</i>					
BSE*					
Sulphur Dioxide					
Particulates					
<i>E. coli</i> , <i>Campylobacter</i>					
<b>Rank by Lowest Risk</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>



Risk is non-existent or negligible

Risk is intermediate

Risk is greatest for human exposure

\* For cattle over 30 months only, the “blank” cell for rendering is dependent on solids going for incineration

# FDA Food Safety Modernization Act (FSMA)

- Passed by Congress on December 21, 2010
- Signed into law by President Obama on January 4th, 2011.
- Aims to shift the focus of federal regulators from response to prevention of contamination.



# Key Principles of Human Food PC Rule

- Confirms industry's primary role on food safety
- Prevention of hazards
  - Risk-Based
  - Science-based – Minimally necessary controls to protect public health
  - Flexibility – where specific preventive controls are mandated, alternatives are accepted if validated



# Summary of Requirements

- Hazard Analysis and Risk-Based Preventive Controls
  - Each facility would be required to implement a written food safety plan that focuses on preventing hazards in foods
- Updated Good Manufacturing Practices

- Renderers are more prepared for this change than a lot of other feed producers because of the Enhanced Feed Ban



# Conclusion

- Infrastructure for:
  - Recycling waste products
  - Product traceability
  - Safe finished products
  - Compliance with Federal/State regulations
  - Disease prevention, containment and eradication efforts



A close-up photograph of a person's hand holding a large mound of dark brown, granular soil. The hand is positioned palm-up, and the soil is piled high. The person is wearing a white lab coat, with the sleeve and cuff visible. The background is a soft, out-of-focus white. The text "ABOUT THE ASSOCIATIONS" is overlaid in bold black letters at the bottom of the image.

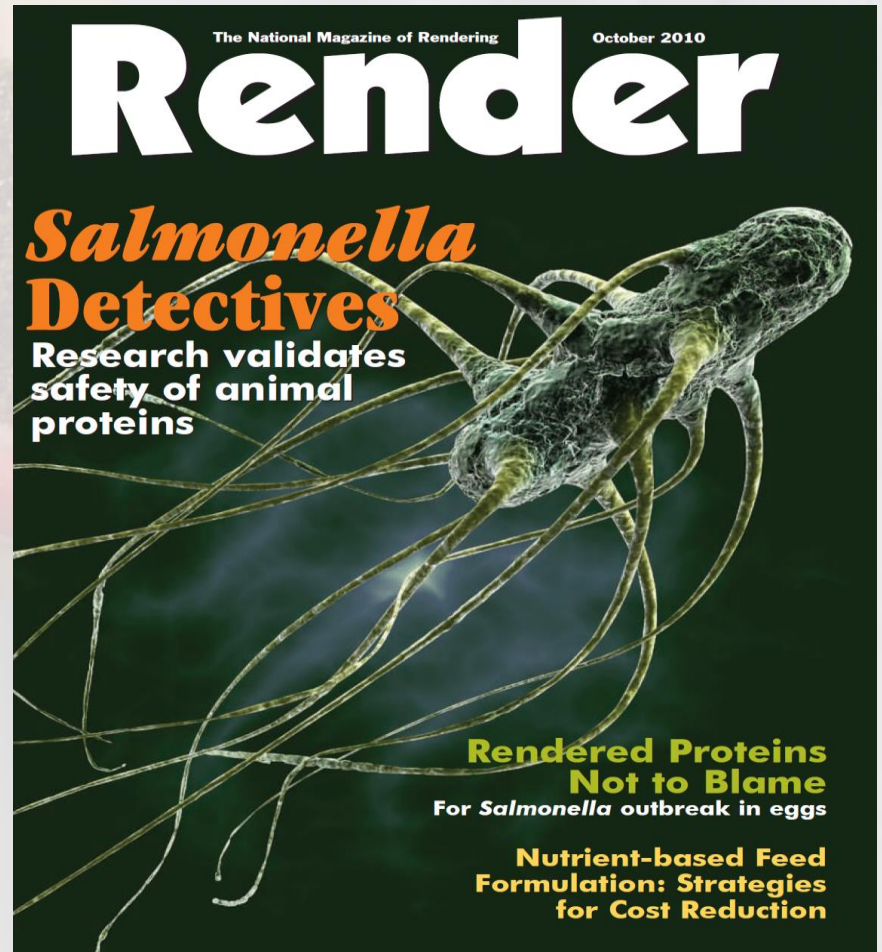
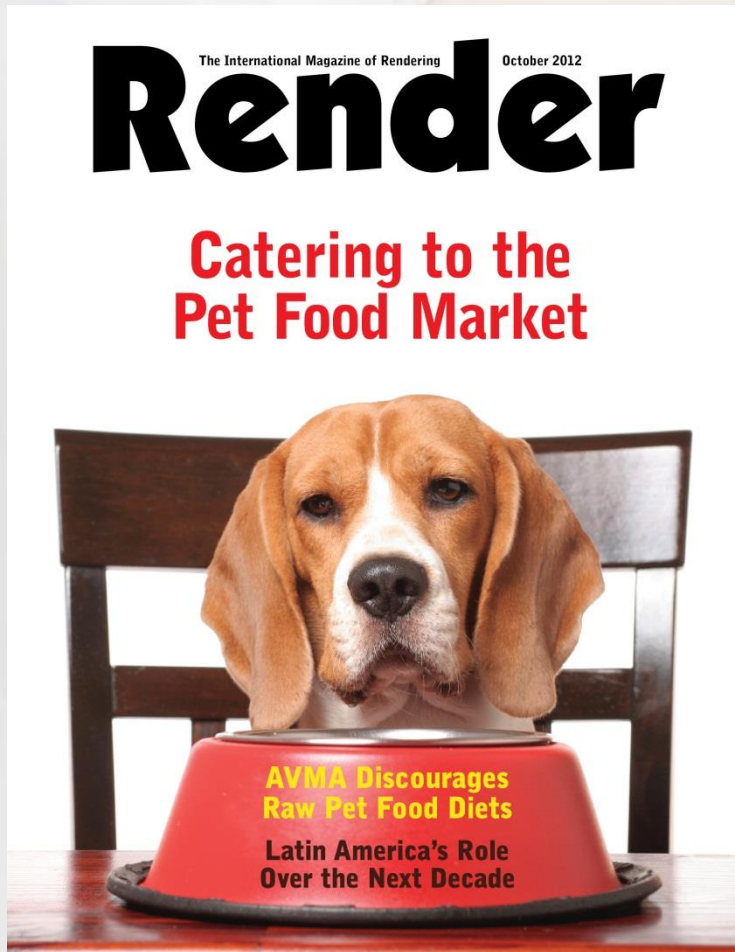
# **ABOUT THE ASSOCIATIONS**



# National Renderers Association

- Founded in 1933
- NRA addresses current industry issues, promotes domestic and international marketing, supports research and provides education and information for the industry
- Foreign Market Development Program of USDA-FAS
- Alexandria headquarters, offices in Mexico and Hong Kong and market consultants in Brussels, China, Thailand, Vietnam, and Chile

# Render magazine



# Animal Protein Producers Industry

- Founded in 1984
- Biosecurity wing
- Weekly process control verification testing
- Microbiological testing
- Code of Practice
  - Based on HACCP principles
  - Plants get verified by 3<sup>rd</sup> party auditors
  - Continuing education

# Rendering Code of Practice

- To promote the safety of animal proteins and rendered fats
- Establish process controls
- Accreditation to verify the controls are in place
- Participation is voluntary
- Realities of the marketplace





# Recent Rendering Industry Research

A total of 8,783 samples have been analyzed from Jan. 1 to Dec. 31, 2010 by N P Analytical Laboratories. *Salmonella* was positive in 731 (8.3%) of total analyzed samples.



# Recent Rendering Industry Research

Further serotyping on 100 randomly selected positive samples showed no foodborne *Salmonella* serotypes such as *Enteritidis* or *Typhimurium*, and none of *Salmonella* serotypes identified in the recent FDA draft Compliance Policy Guide on *Salmonella* in feed and pet food as pathogenic to animals were found.



# Fats and Proteins Research Foundation

- Founded in 1962
- Direct and manage a research process that results in an enhanced current usage and the development of new uses for rendered animal products
  - Nutrition, biosecurity, food safety, non-feed uses, biofuel
- Completed over 575 projects



# FPRF Research Funding

- Robust research program
- Two funding streams
  - At-large
  - ACREC





# At Large

- Currently funding over \$300,000 worth of research
- Currently focused on animal nutrition
- RFPs due twice a year, in April and October
- Current projects include projects on fat addition to DDGS, replacing fish oil in aquaculture feed, pet food research, and phosphorus and amino acid digestibility in swine

# ACREC

- First 9 projects started in 2004
- Inter-disciplinary
- Large range of projects from many departments including animal science, microbiology, engineering, chemistry



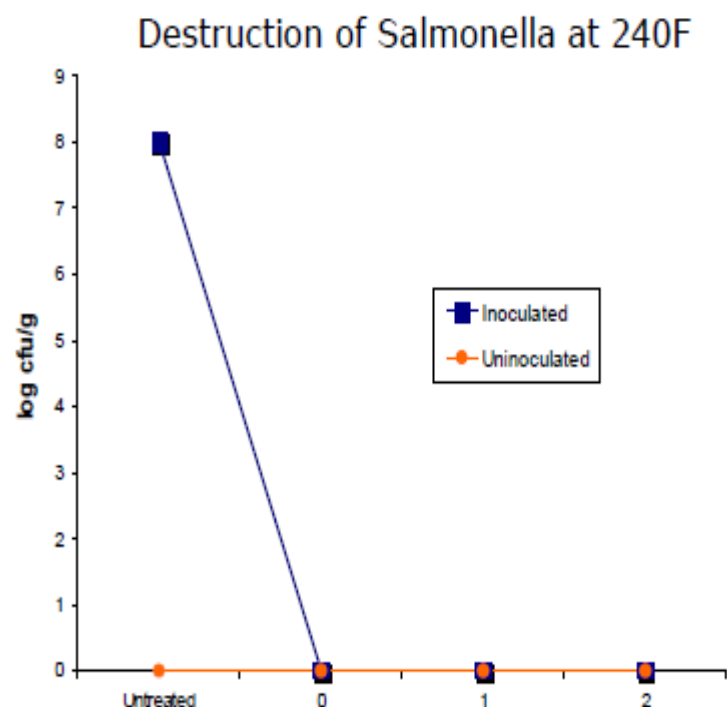
## Validation of Thermal Destruction of Pathogenic Bacteria in Rendered Animal Products

Dr. Annel K. Greene

Dr. Xiuping Jiang

Dr. William C. Bridges, Jr.

M. Melissa Hayes



240°F for 0 min (come-up time approximately 8 minutes)

Additional information in a  
book available from the  
National Renderers  
Association

Free download:  
[nationalrenderers.org](http://nationalrenderers.org)  
under "Publications"

# ESSENTIAL RENDERING

All About The Animal By-Products Industry



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# Questions?

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