

# The Rendering Code of Practice

**David L. Meeker, Ph.D., MBA**

Senior Vice President, Scientific Services

National Renderers Association

Director of Research

Fats and Proteins Research Foundation



# What is Rendering?

Rendering is Cooking and Drying.

Rendering is Recycling and the Basis for Sustainability.

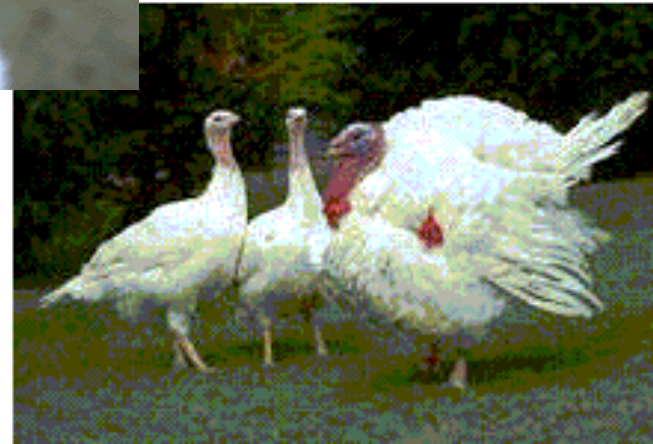
Rendering is Essential to Public Health.



# U.S. Animal Agriculture Annual Production

## The Meat Industry

- 35 million cattle (49% of live wt. not used for human food)
- 100 million hogs (44% not used for human food)
- 8 billion chickens (37% not used for human food)
- 280 million turkeys (36% not used for human food)



# Raw Materials

- Offal
- Bones and fat
- Blood
- Animals dead on arrival, in transit or on farms
- Restaurant grease
- Feathers
- Recalled meat
- Outdated meat
- Butcher shop scraps



# Rendering Services The Food Industry

- 2.7 billion pounds of meat and seafood lost in retail (spoiled, outdated)
  - *2 billion pounds recycled by renderers*
- 4.7 billion pounds of used restaurant grease
  - *2 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



# Rendering is Cooking and Drying

- Continuous flow or batch
- Steam cookers
- 115° to 145° C. for 40 to 90 minutes (245° to 290° F.)
- Inactivation of bacteria, viruses, protozoa, and parasitic organisms.



# Rendering is Recycling

Today's industry produces approximately 9 MMT (20 billion pounds) annually of finished rendered products, continues to grow, and is integrated into the dynamic and productive agricultural system.



# Rendering Plants



# Rendering Plant



# Rendering Plant



# Rendering Plant—Up Close



# Rendering Plant—Up Close



# Rendering Plant—Up Close



# Rendering Plant—Up Close



# Rendering Plant—Up Close Grinder



# Rendering Plant—Up Close Centrifuge



The modern rendering industry invests heavily in odor control and air pollution equipment.





The modern rendering industry invests heavily in modern equipment to control water pollution.

The industry converts more than 25 MMT (56 billion lb.) of animal by-products into usable commodities annually.

- Highly valued protein ingredients for livestock, poultry, pets
- Tallow and other animal fats for the manufacture of fatty acids and as a source of energy in feed rations and biofuels.
- 125 AAFCO-defined animal by-products



# Protein Meals – 9 billion pounds\*

(U.S. Production)

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

\*4 Million Metric tons



# Rendered Fats – 9.5 billion pounds

(U.S. Production)

<b>Product</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<i>Inedible Tallow</i>	1,486.6*	1,453.2	1,442.2
<i>Edible Tallow</i>	886.7	812.0	805.8
<i>White Grease</i>	580.7	594.0	590.7
<i>Choice White Grease</i>	518.4	530.3	527.4
<i>Lard</i>	62.2	63.7	63.3
<i>Yellow Grease</i>	906.4	884.4	900.8
<i>Poultry Fat</i>	475.2	474.8	481.5
<i>Total</i>	4,335.7	4,218.3	4,221.0

\*Thousands of metric tons (metric ton = 2240 lb.)

Source: Render Magazine April 2014 (Kent Swisher). [www.rendermagazine.com](http://www.rendermagazine.com)

Turning This:



# Into This:



# Examples of a Few Finished Products

**Stabilized Poultry  
Fat**

**Hydrolyzed Poultry  
Feather Meal**

**Stabilized Pet Food  
Poultry Fat**

**Stabilized  
Poultry  
Protein Meal**



**Low Ash Pet Food  
Poultry Protein Meal**

**Pet Food Poultry  
Protein Meal**

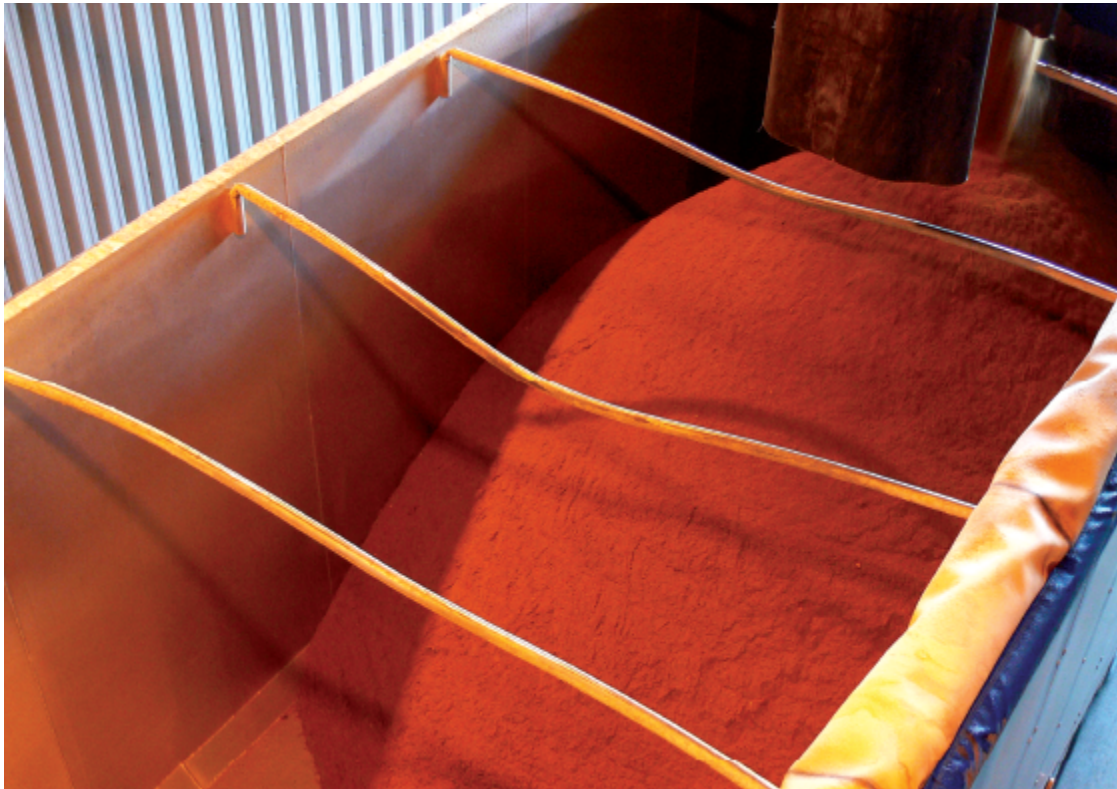
# Meat and Bone Meal is Competitive

Meat and bone meal:

- 50.5% protein
- 8% calcium
- 4% phosphorus
- 10% fat

De-hulled soybean meal:

- 48.5% protein
- few other critical nutrients



# Meat and Bone Meal is Competitive

MBM is higher in protein, phosphorus, energy, iron, and zinc than soybean meal.



# “Vegetarian” Diets for Broilers (Penz, Brazil, 2004) No Animal By-Products (To meet EU Requirements)

- \$10/ton increased cost.
- Poorer feed conversion.
- Pellet quality compromised.
- Increased harmful oligosaccharides and antigens.
- Increased feet and leg problems.
- Increased water intake and wet litter.
- Lower metabolizable energy.
- SBM variability of protein, digestibility not accounted for in research.

These Problems are Avoided by Using MBM in Rations

# The Rendering Industry Commitment

- Make Clean Product
  - Keep it Clean



# Rendering Code of Practice

- HACCP based program
- Establish process controls
- 3<sup>rd</sup> –party audits
- Accreditation to verify the controls are in place
- Participation is voluntary, but marketplace demands
- More than 117 rendering plants certified (approx. 95%)

# Hazard Analysis and Critical Control Point

## HACCP Principles

1. Conduct a **Hazard Analysis**
2. Identify **Critical Control Points** (CCPs)
3. Establish **Critical Limits**
4. Establish **Monitoring Requirements** for CCPs
5. Establish **Corrective Actions**
6. Establish **Record-Keeping** Procedures
7. Establish **Verification** Procedures

# Rendering Code of Practice

## Basic elements of sanitation and hygiene

- Good manufacturing practices (GMPs)
- Process Controls



# Rendering GMPs

Good Manufacturing Practices (GMPs) describe the conditions and practices that are necessary for the manufacturing, processing, transportation or storage of feed or ingredients to ensure its safety and wholesomeness.

# Rendering GMPs

- Raw material inspection
- Product flow and traffic control to prevent cross-contamination
- Preventive maintenance, calibration schedules and documentation
- Procedures and schedule for cleaning and sanitation of equipment
- Employee training personal safety, and their role in the safe feed
- Employee training on cleaning and sanitation procedures
- Procedures proper storage and use of chemicals in the plant
- Receiving, storage, loading, and shipping
- Traceability and recall plans
- Pest control

# Minimum Product Safety Standards

## Chemical hazards

- Do process controls to ensure finished products are in compliance with established pesticide tolerances for chemicals, pesticides and toxic substances, including PCBs
- Who monitors for changes in federal tolerances?
- What sources monitored for new tolerances?
- Are appropriate process controls identified for each product?

# Minimum Product Safety Standards

- Physical hazards
  - Are materials such as wood, glass, metal, plastic, etc. significant hazards?
  - How will the hazard be addressed?
    - Removal
    - Processing to remove the hazard
  - Who is responsible?
  - Are appropriate process controls in place?

# Process Controls in Rendering

Process Controls are very formal ways to closely monitor, control, and record manufacturing processes that are defined as Critical Control Points (CCPs).



# Process Controls in Rendering

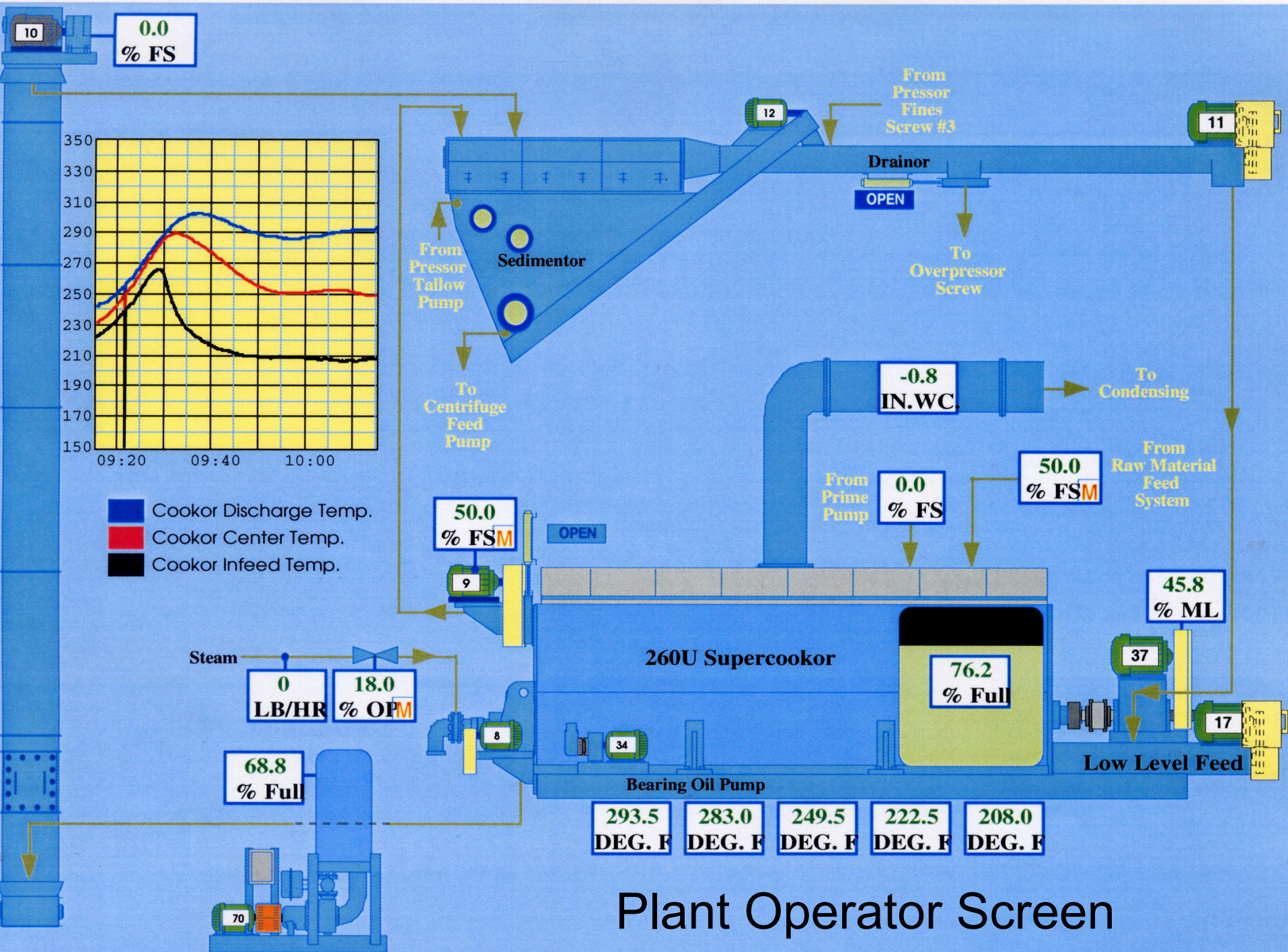
It is critical that sufficient temperatures are attained, so cooking would be a CCP in any rendering HACCP plan (Biological hazards).

**Cooking temperatures** should be closely monitored, controlled, and recorded.



Process Control

# #1



## 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%

U. Of Illinois, 2001. 17 rendering facilities sampled summer and winter.  
Percentage of samples having pathogens present.

# Adequate heat kills conventional pathogens

- ACREC research at Clemson
  - For every 10C° (18F°) increase in temp, you double the lethality (“rule of thumb”).
  - Conducting experiments on lethality of different temps in rendering on various bacterial strains.
  - We can prove lethality based on the temp after crax leaves the cooker.
- 240F° for 2 minutes is highly lethal for most bacteria.



National Renderers Association



Fats and Proteins Research Foundation

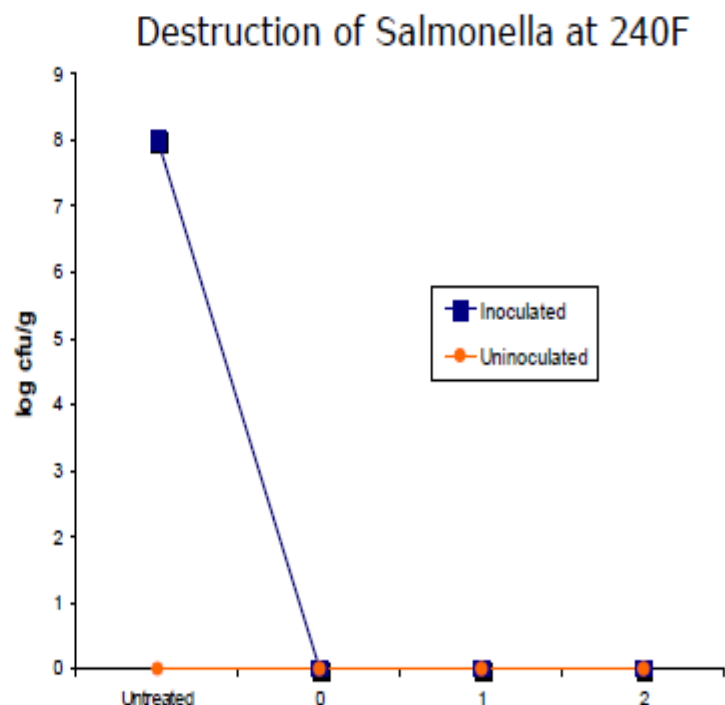
## Validation of Thermal Destruction of Pathogenic Bacteria in Rendered Animal Products

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)

# Rendering Destroys Viruses of Feed Safety Concern

## **Thermal Processing: Rendering**

Research conducted at Clemson University indicates that at 230°F (110°C) or above, for 15 sec or longer, Type A influenza viral RNA is destroyed within rendered poultry products as determined by PCR.

Reference: Leaphart, A.B., T.R. Scott, S.D. Chambers, W.C. Bridges, Jr. and A.K. Greene. 2012. Validation of rendering for destroying avian influenza in poultry co-products. J. Appl. Poult. Res. 21 :719–725. <http://dx.doi.org/10.3382/japr.2011-00345>

Research also has shown rendering effective in killing:

- Classical swine fever virus
- Foot and mouth (FMD) virus
- Pseudorabies virus (PRV)

# Biological Safety Hazards

- Adequate heat kills conventional pathogens
- Select indicator organism for validation
  - Salmonella may not be a good choice due to lack of specificity and potential for recontamination
  - Control recontamination with GMPs/SSOPs
- Assess the extent of heat treatment needed for each product

# Bio-secure Load-out



# Bio-secure Load-out



# The Rendering Industry Commitment

- Is committed to producing quality products that are safe for use as animal feeds and feed ingredients.
- The Rendering Code of Practice is a feed safety program based on Good Manufacturing Practices and process controls that are consistent with HACCP-based principles.
- The Rendering Code of Practice is the rendering equivalent of the AFIA Safe Feed/Safe Food program.
- Feed manufacturers should source ingredients from certified renderers.
- The current list is here:

<http://nationalrenderers.org/biosecurity-appi/code/certified-plants/>



## Rendered Products Are Safe.

**As an essential link in the food chain,** the rendering industry is conscious of its role in the prevention and control of bacteria and virus, to provide safe feed ingredients for livestock, poultry, aquaculture, and pets. Every effort is made to ensure that cooking destroys microbes, and that recontamination does not occur after the rendering process.

Since 1985, the Animal Protein Producers Industry (APPI) has coordinated a program of education and laboratory testing for renderers to control *Salmonella*. Now, APPI offers a sophisticated training and process testing to offer the most appropriate controls and practices to best assure safe products. Our advanced feed safety programs include strategies to control biological, chemical, and physical hazards that can occur in animal production and processing systems. A concerted effort is made to foresee any hazard likely to occur and to build prevention of risk into manufacturing. Process controls in rendering verify that cooking temperatures control microbial and viral contamination. These programs also concentrate on recontamination prevention with rodent control, plant and transport sanitation, and other biosecurity measures.



More than 90% of rendered product in the U.S. and Canada are produced under principles in the Rendering Code of Practice or equivalent programs such as HACCP. If you are a customer—ask for these credentials and rest assured. If you are a renderer, make sure you take advantage of these excellent programs.

---

For information, contact Dara John at 660-277-3469 or [appi@cvalley.net](mailto:appi@cvalley.net), or visit us on the web at <http://www.nationalrenderers.org/biosecurity-appi/>.



## **NATIONAL RENDERERS ASSOCIATION**

- Trade association organized in 1933 representing rendering on national and international levels
- 36 active member companies from Canada and U.S.
- Education programs
  - Regulatory compliance
  - Food safety



## Fats & Proteins Research Foundation, Inc.

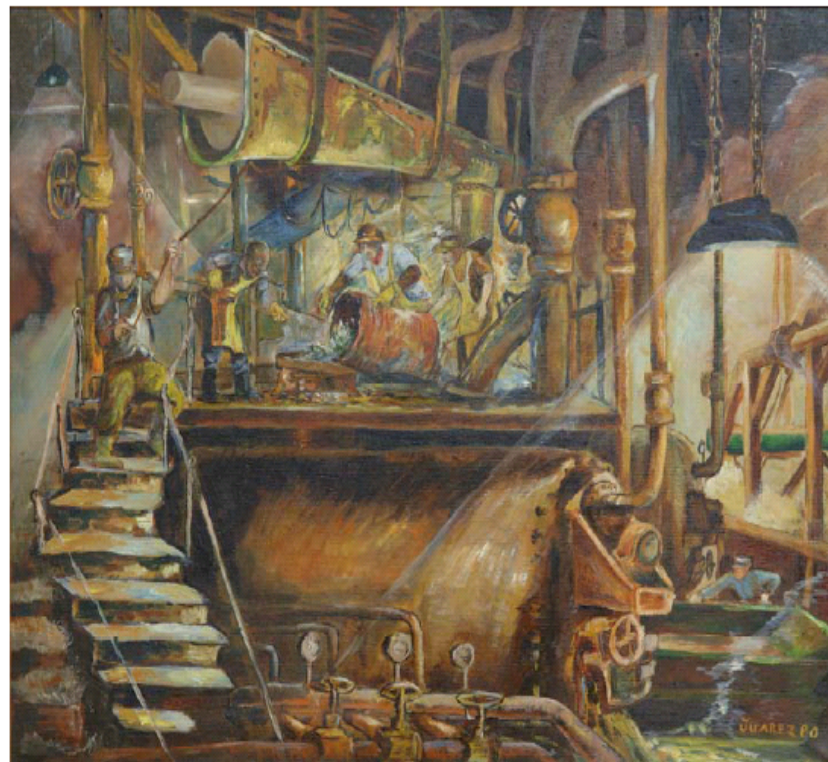
- Organized in 1962 to serve rendering and associated industries
- To direct and manage research to:
  - Enhance current usage
  - Develop new uses for rendered animal products
  - Provide value to all animal production.
- Funded approximately 600 research projects.

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



Edited by  
David L. Meeker

<http://nationalrenderers.org/>

# National Renderers Association



[About](#) [Environmental Impact](#) [Economic Impact](#) [Research](#) [Nutrition](#) [Biosecurity-APPI](#) [Events](#) [Publications](#)



leading excellence in recycling and sustainability

Welcome to the National Renderers Association.

## Related Links

 **NEW: NRA Statement on Porcine Epidemic Diarrhea Virus (PEDv)**

 **Rendered Products Are Safe**

 View the Spanish language version of our video, "Rendering: The Sustainable Solution."

 **NEW:** View & Download 2014 IPPE International Rendering Symposium Presentations Here

 Get Details About NRA's 2013 Annual Convention

 View & Download Annual Convention Presentations Here

## Rendering: The Sustainable Solution

YouTube 