Late in 2013, the Fats and Proteins Research Foundation (FPRF) surveyed the rendering industry to gather information to precisely articulate rendering industry research needs. Each year, FPRF re-examines its requests for proposals intended for researchers in order to attract and fund the most productive and highest value projects. Responses from renderers strongly support the current portfolio of research projects, but also suggest a few areas that need additional research. Of course, FPRF’s ability to expand its research portfolio will depend on financial contributions from current and new members.

FPRF invests research funds in two ways. First, any research institution can compete for research funding by submitting “at-large” proposals during two selection periods each year as has been done since the foundation’s beginning in 1962. FPRF also has a continuing relationship with Clemson University for support of the Animal Co-Products Research and Education Center (ACREC).

At-large research is aimed at potential researchers who are encouraged to design projects that solve a significant problem in the rendering industry, improve product safety/quality, invent chemical or biological modifications to increase value, or conduct nutrition studies to improve the utilization of rendered products in animal diets. In recent years, FPRF has focused work on aquaculture, swine, and poultry nutrition to fill gaps in the current knowledge necessary for diet formulators, including critical work on nutritional characteristics of rendered products. The use of rendered products in pet diets has been identified as a new research emphasis to augment the extensive work in feeding rendered products to livestock.

The highest priority at ACREC over its first 10 years has been to provide data that will support validation of cooker operations and thermal death times of *Salmonella*, *Clostridium*, and other feed/food safety hazards. FPRF has also invested funds with ACREC researchers to improve plant operations such as wastewater cleanup and odor remediation. The significant investments over the years at ACREC have resulted in a critical mass of scientists and experience on rendering issues that encourages unique multidisciplinary experimental design.

Surveys tend to focus on current problems. For example, many responses to the latest survey related to the Food Safety Modernization Act (FSMA) and how it may impact the rendering industry. Sometimes, a researcher may have an idea for a project that was not articulated as a high priority by the rendering industry. FPRF will consider such “out of the box” proposals, but a compelling case needs to be made for FPRF to shift intended priorities.

Following is a summary of the answers received to the survey questions.

**What are the biggest issues facing your company where FPRF research would be helpful?**

1. Industry image: Counter the public perception that rendering is a smelly, polluting industry that is unwelcome even in industrial sites. Communicate the positive environmental, sustainability, and public health aspects of rendering.
2. Regulatory pressures related to food safety, environment, worker safety, and health.
3. FSMA compliance techniques and resources, such as:
   a. data to support hazard analysis for things such as mycotoxins and drug residues;
   b. data to further validate the conditions of rendering as a preventive control of biological hazards in rendered products as well as related products (i.e., feather meal, blood meal, and used cooking oils);
   c. quick tests for regulated *Salmonella* serotypes to accommodate a “hold and test” practice;
   d. quick methods for identifying/measuring pesticide/hazard chemicals in raw materials and finished fat; and
   e. recall implementation strategies.
4. Improving quality and product safety in the face of more stringent regulations and customer demands.
5. Increasingly stringent Environmental Protection Agency discharge standards leading to additional wastewater treatment technologies.
6. Handling dissolved air flotation solids (also called secondary protein nutrients).
7. Maintaining current volumes and identifying new raw material streams.
8. Effects of slaughterhouse microbial intervention chemicals on rendered product stability.
9. The need for more effective stabilizers in rendered meals and fats.
10. More effective processing methods for liquid materials such as blood, stick water, and sludge.
11. On-site odor control.
12. Process improvements to enhance productivity, reduce cost, or increase values.
13. Contamination from plastics, animal identification tags, rumen boluses, animal implants, etc.
14. Theft of recyclable used cooking oils.
What kinds of things need to be done to improve rendered product safety and/or quality that would benefit your company’s business?

1. Treatments or processes that would eliminate microbes (including Salmonella) in finished products and through storage and transportation.
2. Better understanding of oxidation of rendered products and impacts on animal health, prevention strategies, and analytical methods.
3. Expanded information on product safety and quality under various different rendering systems.
4. Quick methods for identifying pesticides and other hazardous chemicals.
5. Consistent physical properties, such as color, smell, etc.
6. Timely, low-cost, simple, and easy methods to measure nutrient levels in rendered products.
7. Models for predicting digestibility of amino acids in each rendered animal protein meal (by species).

What kinds of chemical or biological modifications to rendered products would increase the value of rendered products manufactured by your company?

1. Increased digestibility of rendered proteins.
2. Decreased oxidation in rendered proteins and fats to decrease free fatty acids and rancidity.
3. Microbiological (Salmonella) prevention and control agents.
4. Enzymatically hydrolyzing raw material or finished meal to increase digestibility of products.
5. Reduced fat and ash content in protein meals.
6. Custom blended ingredients to include trace minerals, etc.
7. Discoloration process that does not damage quality of final protein.
8. Elimination of polyethylene from fats.
10. Extracting useful components from raw materials such as natural antioxidants.
11. Processing methods or modifications of fats and proteins to enhance value for non-feed uses.
12. The cleanup of fats, including the removal or useful determination of free fatty acids, removal of gums and metals, and improved purity, so they can be more easily processed into petrochemical alternative.
13. Methods to keep raw materials fresh prior to processing.

What information would help your sales force sell rendered products for use in animal diets?

1. Educating consumers that rendered products are high quality, safe for the food chain, and sustainable.
2. Animal feeding trials in a variety of poultry, livestock, aquaculture, and pet species to
   a. confirm nutritional benefits of rendered proteins and fats (including tallow and yellow grease) over vegetable ingredients;
   b. support data for new feed ingredient definitions using rendered products;
   c. provide data regarding the benefits of using rendered products, including high-value specialty ingredients such as chicken meal, porcine blood meals (dried red blood cells), etc.
   d. document the safety of rendered products for animal feeds.
3. Database of accurate digestibility and nutritional values of various products to improve diet formulation.
4. Use of animal proteins to replace antibiotic growth promoters in livestock and/or to improve animal health.
5. Models for predicting digestibility of amino acids in each rendered animal protein meal.
6. Increased understanding of fatty acid nutrition and whether certain profiles optimize value in diets.
7. Improved shelf life.
8. Traceability and chain of custody tracking to protect raw materials from contamination.

What are the most threatening feed safety challenges faced by your company?

1. Microbiological (Salmonella) prevention and control expectations by regulators and customers.
   a. Validating rendering temperatures to regulators, foreign governments, and customers.
   b. Use of indicator organisms to indicate control of pathogens.
   c. Log reduction targets for microbes. How much is acceptable and how high would require pre-treating raw material?
   d. Controlling microbial contamination after the cooking process.
   e. Emerging diseases: validation that rendering conditions control the latest animal disease receiving media attention.
   f. Prevention, detection, and measurement of pesticide contamination and antibiotic residues.

What are the most challenging rendering operations issues encountered by your company?

1. High costs (mainly energy) of processing; alternatives that are safe and preserve quality are needed.
2. Foreign material (i.e., gloves, metals, etc.) contamination from meat processors.
3. Controlling air emissions and odors.
4. Sanitation (dry clean only) in grinding and storage areas.
5. Effective employee training and availability of skilled labor.
7. Quickly identifying and quantifying pesticide/chemical residues in raw materials and finished products.
9. Methods to control rendered product composition (i.e., levels of protein, fat, ash, phosphorus, calcium, free fatty acids, etc.) for more precise and specialized uses.

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10. Wastewater volumes, treatment, filtering, and acceptable discharge levels.
11. Reducing or using waste heat generated in processing.

In recent years, the rendering industry has decreased emphasis on alternative non-feed uses for rendered proteins. Do you think work in this area would benefit your company in the future?

1. Yes, non-feed market options for animal proteins could be important in the future. Some streams of raw material (such as animal mortalities) may be diverted away from feed by regulation or customer preferences. Examples include proteins used as polymer feedstocks; hydrogenated products substituted for paraffin in paraffin-coated paper; replacing non-renewable chemicals with rendered fats; sustainable substitutes for petroleum lubricants, coatings, etc.; organic fertilizers; and bio-energy.

Top 10 Research Topics
Among a long list of possible research topics, these 10 scored the highest.

1. Kill temperatures for pathogens in raw materials
2. Treatments to prevent growth of pathogens in rendered products
3. Antimicrobial and antioxidant properties of rendered products
4. How to clean up/disinfect a plant after a disease outbreak or positive sample
5. The distance pathogens can travel in a rendering plant from a point source such as raw material receiving
6. Prevention of odors in rendering operations
7. Increasing efficiency and effectiveness of wastewater treatment
8. The use of rendered products in aquaculture diets
9. Prevention of oxidation in rendered fats and proteins
10. Increasing shelf life of rendered products

FPRF has made necessary adjustments in intent, direction, and management and significant progress has been made with research providing practical information to renderers. Without adequate investment, though, continued effective research may be compromised. Every renderer should consider adding strength to the effort by investing funds and being involved to keep FPRF strong and headed in the right direction to serve the industry.

For more information on the Fats and Proteins Research Foundation and the many benefits it provides the global rendering industry, visit their website at www.fprf.org.