



## 2022-2024 USPOULTRY

### Research Priorities

The U.S. Poultry & Egg Association (USPOULTRY) is dedicated to the growth, progress, and welfare of the poultry industry and all of its individual and corporate interests. The promotion of problem-related research and the training of graduate students are priorities for the association.

Proposed research projects should be designed to provide information that has the potential to resolve real industry problems. USPOULTRY realizes that new issues are always emerging and that scientists may see the importance of a potential problem that has not been recognized or cited as an industry research need. USPOULTRY invites proposals that address problems outside the industry list but urges the proposer to provide ample background and justification to explain the need for the research.

The ranked research priorities presented herein represent the identified research needs for the poultry industry.



## Top Overall Research Priorities

Category	Research Needs Statement
Animal Welfare	Develop methods to determine the sex of embryos prior to hatch.
Breeder Management	Develop alternative feeding and nutrition management programs for replacement pullets aimed at eliminating current feed restriction programs.
Meat Bird Management	Define and describe the microbiological effects of layout time and interventions that can substitute for layout time (i.e., sanitation practices, litter composting, litter amendments, etc.).
Commercial Egg Production	Develop rapid, non-destructive, and quantitative methods for determining egg microbiological quality for routine quality control practices in commercial eggs.
Diseases	Determine risk factors, epidemiology, pathogenesis, prevention, and control of the various clostridial diseases of poultry (gangrenous dermatitis, clostridial dermatitis, necrotic enteritis, focal duodenal necrosis, cholangiohepatitis, etc.).
Environmental Management	Develop best practices for peracetic acid use in poultry processing to optimize/balance use, pH, PAA dosage levels, food safety intervention, and wastewater impacts.
Food Safety	Devise methods for the prevention/reduction of pathogenic bacteria of food safety concern colonizing poultry.
Hatchery Management	Devise and validate enhanced hatching egg management and operational sanitation methods to improve the microbiological quality of hatching eggs and chicks/poults while protecting worker safety.
Nutrition	Define diets and withdrawal strategies to control contamination in processing.
Processing	Develop methods to prevent cross contamination and ingesta contamination leading to the elimination of adulterated final product.
Employee Safety Health	Industrial hygiene monitoring and sampling protocols -- identify potential exposures and develop a protocol for determining permissible exposure levels and for determining required frequency and methodology for routine sampling – including ammonia, chlorine, nuisance dusts, formaldehyde, carbon dioxide and a variety of airborne infectious diseases such as aspergillosis and histoplasmosis.



## Animal Welfare

Rank	Research Needs Statement
1	Develop methods to determine the sex of embryos prior to hatch.
2	Investigate approaches to improve bird welfare during catching, cage unloading and bird movement through to shackling (including unloading area design).
3	Evaluate new methods of mass depopulation, specifically for broilers, turkeys, layers and breeders.
4	Devise and test qualitative and quantitative methods to objectively evaluate key bird welfare outcomes (i.e., distribution, gait, activity and enrichment use, etc.). Methods may be specific to an area of production or poultry species.
5	Establish what enrichments and lighting programs (type, intensity) are best for welfare outcomes for indoor-raised, commercial broilers (standard breeds).
6	Devise and test improved conveyances (vehicles, transport containers, loading/unloading devices) that result in reduced bird stress, injuries and losses and enhance product quality and public image in live transport and unloading. Methods may be specific to an area of production or poultry species.
7	Evaluate the ability of probiotics/feed supplements to improve gut health leading to decreased litter moisture and improved welfare outcomes (i.e., foot condition, hock condition, etc.) for poultry while in the house.
8	Define the contribution of genetic selection to leg weakness and skeletal problems and devise selection strategies to ameliorate these issues.



## Breeder Management

Rank	Research Needs Statement
1	Develop alternative feeding and nutrition management programs for replacement pullets aimed at eliminating current feed restriction programs.
2	Improve the understanding of the transmission of all critical public health <i>Salmonella</i> serovars from breeders to progeny.
3	Develop rapid, non-destructive, and quantitative methods for determining egg microbiological quality for routine quality control practices (hatching eggs).
4	Develop improved methods for egg management, sanitation, and storage to optimize chick quality.
5	Establish feeding and lighting schedules for pullets/hens and turkey breeder hens for maximum production/hatchability.
6	Determine etiology, epidemiology, prevention, and control measures for mortality of breeder hens and roosters from housing to peak production.
7	Investigate the epidemiology and pathogenesis of <i>Cochlosoma</i> , <i>Trichomonas</i> and non-specific protozoal enteritis to improve understanding of vectors and routes of infection. Develop effective prevention strategies for these diseases.



## Meat Bird Management

Rank	Research Needs Statement
1	Define and describe the microbiological effects of layout time and interventions that can substitute for layout time (i.e., sanitation practices, litter composting, litter amendments, etc.).
2	Develop nutrition/management programs to maximize performance in antibiotic-free production systems.
3	Develop/evaluate strategies and tools for effective and economical house cleaning and disinfection during the life of the flock and between flocks.
4	Devise methods to effectively reduce viral shedding from houses affected with Highly Pathogenic Avian Influenza (HPAI) prior to depopulation.
5	Compare different brooding methods using energy consumption, mortality, and growth rate as criteria.
6	Develop and evaluate a feeding program and management practices (lights, feed pan management, water pressure, temperature, etc.) to slow the growth of normal growing commercial broilers and turkeys in the field that can be immediately implemented during an emergency.
7	Determine the influence of spectrum, intensity, and photoperiod for different ages on performance and wellbeing.



## Commercial Egg Production

Rank	Research Needs Statement
1	Develop rapid, non-destructive, and quantitative methods for determining egg microbiological quality for routine quality control practices in commercial eggs.
2	Devise environmentally acceptable and residue-free systems for fly control.
3	Identify an appropriate type of sample to take in the hatchery which will assist in understanding <i>Salmonella</i> transmission from hatch to the grower house. Determine if the sample type is adequate for a <i>Salmonella</i> surveillance program.
4	Develop effective, practical and economical strategies to eradicate Mycoplasma from multi-age housing systems.
5	Devise environmentally acceptable working conditions for employees in alternative housing systems.
6	Devise systems to prevent starve-outs and/or injuries.
7	Devise means of control marketing eggs in a multi-aged layer complex when one house is infected with Low Pathogenic Avian Influenza (LPAI).



## Diseases

Rank	Research Needs Statement
1	Determine risk factors, epidemiology, pathogenesis, prevention, and control of the various clostridial diseases of poultry (gangrenous dermatitis, clostridial dermatitis, necrotic enteritis, focal duodenal necrosis, cholangiohepatitis, etc.).
2	Develop a live <i>Salmonella</i> vaccine that is equally effective across multiple serogroups.
3	Enhanced Gut Health - understanding and improving micro biome, including the mechanism and impact of prebiotics and probiotics; understanding host/pathogen interaction; understanding the role of viruses; develop strategies to manage gut health; improve diagnostics.
4	Determine the risk factors, epidemiology, and prevention of reovirus infection in broilers and meat turkeys.
5	Determine the length of protection generated by killed bacterins, especially autogenous <i>Salmonella</i> bacterins.
6	Develop a live vaccine which will provide protection against current reovirus strains.
7	Determine risk factors, epidemiology, pathogenesis, prevention and control of <i>Enterococcus</i> infection in chickens.
8	Develop a safe and effective mass-applied live vaccine for Infectious Coryza ( <i>Avibacterium paragallinarum</i> ) prevention and outbreak control.
9	Devise improved methods for the diagnosis and control of variant strains of infectious bronchitis.
10	Develop improved Histomoniasis treatment and prevention options.
11	Define and improve the epizootiology and diagnostic manifestations of the Egg Drop Syndrome Virus (EDSV) in poultry.
12	Devise methods for prevention/reduction of pathogenic bacteria colonizing poultry.
13	Determine risk factors, epidemiology, pathogenesis, prevention and control of <i>Campylobacter hepaticus</i> infection in chickens.
14	Devise improved methods for the diagnosis and control of variant strains of infectious laryngotracheitis.
15	Devise ways to improve the immune response of poultry through genetics, including resistance to colonization by <i>Salmonella</i> and <i>Campylobacter</i> .
16	Develop Marek's resistance in chickens through genetics.



## Environmental Management

Rank	Research Needs Statement
1	Develop best practices for peracetic acid use in poultry processing to optimize/balance use, pH, PAA dosage levels, food safety intervention, and wastewater impacts.
2	Devise methods for odor and ammonia control from poultry production houses via diet manipulation, litter additives, etc.
3	Devise methods for water reuse, conservation and recycling.
4	Development of a feed decontaminant/antimicrobial similar in cost and effectiveness as formaldehyde but with less concern regarding worker safety.
5	Evaluate the impact of processing food safety chemical interventions and wastewater treatment system.
6	Identify alternatives for DAF skimmings management and recovery of beneficial materials.



## Food Safety

Rank	Research Needs Statement
1	Devise methods for the prevention/reduction of pathogenic bacteria of food safety concern colonizing poultry.
2	Develop methods for cleaning deep skin <i>Salmonella</i> contamination in poultry carcasses or parts.
3	Determine whether effective <i>Campylobacter</i> vaccines can be developed for breeders and broilers.
4	Evaluate effectiveness of carcass dips/sprays in reducing microbial contamination.
5	Determine pre-harvest <i>Salmonella</i> indicators that correlate to finished product (parts or grind).
6	Determine the portion of human <i>Salmonella</i> and <i>Campylobacter</i> infections that is scientifically linked to consumption of poultry products.
7	Development of a <i>Salmonella</i> vaccine that is effective for group C <i>Salmonella</i> .
8	Develop post-chill handling methods to reduce microbial contamination.
9	Develop novel methods for detecting foodborne pathogens.
10	Evaluate the critical contamination points between turkey live hang and post-chill, utilizing qualitative and quantitative data, and identify key locations for more targeted interventions.
11	Determine safe and effective antimicrobial applications to reduce <i>Salmonella</i> and <i>Campylobacter</i> levels and/or prevalence associated with mechanically deboned poultry, poultry parts, and heat treated (Not-Ready-To-Eat) poultry products, as well as the raw materials used to produce them.
12	Understanding best practices for grinding - how temperature, pressure, etc. affects <i>Salmonella</i> populations.
13	Define the impact of cleaning catching/hauling equipment on bacterial load on carcasses, especially <i>Salmonella</i> and <i>Campylobacter</i> .
14	Estimate <i>Salmonella</i> and <i>Campylobacter</i> prevalence in poultry feeds and feed ingredients, and the significance/role in relation to <i>Salmonella</i> and <i>Campylobacter</i> prevalence in finished products.



## Hatchery Management

Rank	Research Needs Statement
1	Devise and validate enhanced hatching egg management and operational sanitation methods to improve microbiological quality of hatching eggs and chicks/poults while protecting worker safety.
2	Develop alternative methods to enhance chick quality without the use of antibiotics.
3	Devise and validate measures to reduce stress and injuries in automated bird handling systems.
4	Evaluate the value of in-hatchery feeding of chicks.
5	Evaluate the effects of prolonged time lapse between poult hatching and placement in the field. Determine what the optimal time range is to place poult after hatching to achieve maximal well-being.



## Nutrition

Rank	Research Needs Statement
1	Define diets and withdrawal strategies to control contamination in processing.
2	Determine the influence of breeder nutrition on chick and poult performance.
3	Devise nutrition management programs to support extended lay in laying hens.
4	Determine the impact that various ingredient combinations have on the microbial status of the bird.
5	Compare the nutritional and microbiologic quality of organic and conventional eggs, as well as consumer perceptions related to both.
6	Determine the cost effectiveness of enzyme combinations that maximize energy and/or amino acid utilization from commonly fed feed ingredients.
7	Define the optimal intestinal microflora for maximizing the genetic potential of current broiler and turkey strains.
9	Determine the optimal energy and protein needs of broiler breeders at various stages of production.
10	Define optimal protein (amino acid) and energy needs of broilers grown to various weights and marketing programs (deboning/whole birds) with modern genetics as well as slow growth broilers.
11	Define poultry feed formulations that reflect sustainable production parameters.
12	Compare the nutritional and microbiologic quality of poultry raised using organic and conventional methodologies, as well as consumer perceptions related to both.
13	Devise cost-effective ways to improve pellet quality.



## Processing

Rank	Research Needs Statement
1	Develop methods to prevent cross contamination and ingesta contamination leading to the elimination of adulterated final product.
2	Determine additional automation capabilities in processing facilities from arrival of live birds through to packaging and dispatch.
3	Define the cause of "white striping" and "woody breast" and other myopathies in chicken breast meat and determine procedures to reduce its incidence.
4	Devise improved and rapid methods for the detection of metal fragments, bone, and other foreign materials in meat.
5	Define the effect of gas stunning on delay in defeathering, chilling, and meat quality in broilers and turkeys.
6	Devise technological methods that would allow plants to run a wider range of bird weights within the same processing facility during a crisis where there is a need to process birds at greater sizes/weights.
7	Determine the actual feasibility of irradiation of poultry meat.
8	Determine effects of preslaughter stress on feather release, moisture gain/retention, and muscle tissue quality.



## Employee Safety Health

Rank	Research Needs Statement
1	Industrial Hygiene monitoring and sampling protocols -- identify potential exposures and develop a protocol for determining permissible exposure levels and for determining required frequency and methodology for routine sampling -- including ammonia, chlorine, nuisance dusts, formaldehyde, carbon dioxide and a variety of airborne infectious diseases such as aspergillosis and histoplasmosis.
2	Determine the incidence of repetitive motion disorders in catchers and live hang workers and develop strategies to minimize these conditions.
3	Identify existing and novel practices to prevent dissipation and spread of any public health virus aerosols from workers near one another in processing plants. Provide safety guidelines and design criteria for common areas such as break rooms, bathrooms, etc.