

Identified Research Needs (2018)

What needs have been identified?

Proposed research projects should be designed to provide information that has the potential to resolve real industry problems. The following list is organized by overall subject area. Items within each list are presented in priority order

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 lists but urges the submitter to provide ample background and justification to explain the need for the research

Animal Welfare

1. Investigate methods to improve bird welfare during catching, cage unloading and bird movement through to shackling (Including unloading area design)
2. Evaluate methods of mass depopulation, specifically for broilers, turkeys, layers or breeders
3. Investigate practices to maintain ammonia levels under 25 ppm year-round
4. Investigate methods to determine the causes and methods to prevent wing damage in broilers and turkeys
5. Develop method to determine sex of embryos prior to hatch
6. Investigate alternatives to maceration for cull chicks or embryonated eggs
7. Evaluate the effects of probiotics/feed supplements on gut health
8. Investigate alternatives to electrical stunning
9. Develop objective methods of animal welfare comparisons for various housing systems
10. Validate quantitative method(s) to evaluate bird welfare. Method may be specific to a particular area of production
11. Define the contribution of genetic selection, incubation, nutrition, and management to leg weakness and skeletal problems and devise strategies to ameliorate these problems
12. Devise and test improved conveyances and methods for reducing bird stress, injuries and enhancing product quality and public image in live transport
13. Evaluate carbon monoxide, carbon dioxide, humidity and ammonia sensors to monitor air quality

14. Evaluate the benefits and negative aspects of environmental enrichments for broilers and broiler breeder pullets

Breeder Management (Broiler/Turkey)

1. Prevention management of early male aggressiveness. Optimizing male body weight profiles and mating ratios
2. Develop rapid, non-destructive, and quantitative methods for determining egg microbiological quality for routine quality control practices: hatching eggs
3. Optimal nest requirements for broiler and turkey breeders
4. Determine etiology, epidemiology, prevention, and control measures for mortality of breeder hens and roosters from housing to peak production
5. Develop improved methods for egg management, sanitation and storage to optimize chick quality
6. Determine the pathophysiology, prevention, and control of cyanosis in broiler breeder males
7. Develop nutrition/management strategies to enhance feather quality or prevent feather loss/damage in broiler breeders during lay
8. Establish feeding and lighting schedules for pullets/hens and turkey breeder hens for maximum production/hatchability
9. Alternative feeding/nutrition management for replacement pullets to replace current feed restriction programs

Meat Bird Management

1. Nutrition/Management programs to maximize performance and antibiotic-free production systems
2. Define and describe the microbiological effects of lay-out time, and interventions that can substitute for layout time (e.g., sanitation practices, litter composting, litter amendments, etc.)
3. Determine influence of spectrum, intensity, and photoperiod for different ages on performance and wellbeing
4. Determine causes and prevention of early poult mortality
5. Compare different brooding methods using energy use, mortality, and growth rate as criteria
6. Devise improved strategies for migration control in tunnel ventilated broiler housing

Commercial Egg Production

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 of fly control
3. Devise environmentally acceptable working conditions for employees in alternative housing systems
4. Devise systems to prevent starve-outs and/or injuries

Diseases

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. 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
3. Determine the risk factors, epidemiology, prevention, of reovirus infection in broilers and meat turkeys. Develop a live vaccine which will provide protection against current reovirus strains
4. Determine optimum shuttle and rotation programs for anticoccidials and coccidiosis vaccines to improve and retain efficacy
5. Determine the length of protection generated by killed bacterins, especially autogenous Salmonella bacterins
6. Develop improved vaccine delivery systems for killed and live vaccines that improve accuracy of delivery, and in the case of killed vaccines, improves worker safety, decreases contamination, and reduces injection site infections
7. Devise improved methods for the diagnosis and control of infectious laryngotracheitis.
8. Develop improved methods and pharmaceuticals for prevention and control of helminths and histomonas
9. Determine risk factors, epidemiology, pathogenesis, prevention and control of Campylobacter hepaticus infection in chickens
10. Devise methods for prevention/reduction of pathogenic bacteria colonizing poultry
11. Develop improved adjuvants for killed vaccines and bacterins to increase immune responses, prolong antibody titers, and decrease tissue reaction

12. Investigate the causes, prevention and control of so-called Runting and Stunting Syndrome or cystic enteropathies
13. The pathogenesis, epidemiology, incidence, and effective interventions for femoral head necrosis
14. Determine the genetic diversity of *Ornithobacterium rhinotracheale* and factors important for selection of vaccine candidates
15. Determine the pathogenesis, risk factors, prevention, and control of subcutaneous cellulitis ("IP", infectious or inflammatory process) in broilers
16. Devise improved methods for the diagnosis and control of variant strains of infectious bronchitis
17. Determine the causes, risk factors, epidemiology, prevention, and control of bacterial arthritis and osteomyelitis in breeders, broilers and meat-type turkeys
18. Improve the methods and tools for diagnosis, prevention and control of mycoplasma
19. Develop vaccine that will induce protection against all serotypes of IBV
20. Determine the risk factors, epidemiology, prevention, and control of *Enterococcus cecorum* infections in roosters and broilers

Employee Safety Health

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 hanging workers and develop strategies to minimize these disorders

Environmental Management

1. Devise methods for odor and ammonia control from poultry production houses via diet manipulation, litter additives, etc.
2. Evaluate the effectiveness of BMP's to reduce air and water emissions from poultry farms
3. Evaluate the impact of processing food safety chemical interventions and wastewater treatment systems

4. Determine the impacts of food safety chemicals on wastewater treatment systems and methods to treat/mitigate effects
5. Define diets and withdrawal strategies to control contamination in processing
6. Devise methods for water reuse, conservation and recycling
7. Development of carbon footprint for various poultry industry sectors (feed mill, rendering, grow out, hatcheries, and processing plants) - or development of model to calculate carbon footprint for various sectors
8. Impact of the use of poultry litter as a fertilizer both on soil quality and water quality.
9. Investigate economical and reliable methods and/or systems for reducing pollutants in storm water runoff, particularly fecal coliforms

Feed Mill Operations

1. Estimate Salmonella and Campylobacter prevalence in poultry feeds and feed ingredients, and significance/role of same in relation to Salmonella and Campylobacter prevalence in finished products
2. Devise cost-effective ways to improve pellet quality

Food Safety

1. Determine safe and effective antimicrobial applications to reduce Salmonella and Campylobacter 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
2. Develop rapid methods for detecting foodborne pathogens
3. Devise methods for prevention/reduction of pathogenic bacteria of food safety concern colonizing poultry
4. Develop safe and cost-efficient methods for reducing Salmonella contamination in poultry feeds
5. Develop post-chill handling methods to reduce microbial contamination
6. Evaluate effectiveness of carcass dips/sprays in reducing microbial contamination
7. Develop methods for cleaning deep skin Salmonella contamination in poultry carcasses or parts
8. Validations for interventions: Identifying the critical monitoring parameters for Salmonella
9. Estimate Salmonella and Campylobacter prevalence in poultry feeds, and significance/role of same in relation to Salmonella and Campylobacter prevalence in finished products

10. Determine the portion of human Salmonella and Campylobacter infections that is scientifically linked to consumption of poultry products
11. Develop methods for prevention and cross contamination and prevention of ingesta contamination leading to elimination of contamination on final product
12. Define the impact of cleaning catching/hauling equipment on bacterial load on carcasses, especially Salmonella and Campylobacter

Further Processing

1. Devise improved and rapid methods for the detection of metal fragments, bone, and other foreign materials in meat

Genetics

1. Devise ways to improve the immune response of poultry through genetics, including resistance to colonization by salmonella and campylobacter
2. Define the contribution of genetic selection to leg weakness and skeletal problems and devise selection strategies to ameliorate these problems
3. Develop Marek's resistance in chickens through genetics

Hatchery Management

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. Evaluate the value of in-hatchery feeding of chicks
4. Optimize incubation methods and operational parameters for maximum hatch and chick/poult quality
5. Develop improved chick delivery methods to lessen chick and employee stress
6. Devise and validate measures to reduce stress and injuries in automated bird handling systems

Human Nutrition

1. Compare the nutritional and microbiologic quality of poultry raised using organic and conventional methodologies, as well as consumer perceptions related to both
2. Compare the nutritional and microbiologic quality of organic and conventional eggs, as well as consumer perceptions related to both

Live Haul

1. Define the impact of cleaning catching/hauling equipment on bacterial load on carcasses, especially Salmonella and Campylobacter
2. Devise and test improved conveyances and methods for reducing bird stress, injuries and enhancing product quality and public image in live transport

Nutrition

1. Determine the cost effectiveness of enzyme combinations that maximize energy and/or amino acid utilization from commonly fed feed ingredients
2. Define the optimal intestinal microflora for maximizing genetic potential of current broiler and turkey strains
3. Devise nutrition management programs to support extended lay in laying hens
4. Determine how to feed meat birds to maximize leg strength
5. Determine the influence of breeder nutrition on chick and poult performance
6. Determine the impact that various ingredient combinations have on the microbial status of the bird
7. Define diets and withdrawal strategies to control contamination in processing
8. Determine the effects of feed texture on bird performance, feed production/handling, gut microflora status and bird health
9. Determine the energy content of the various corn hybrids currently being fed. Has the TME changed over time?
10. Formulating diets for reducing problems associated with broiler breeder obesity causing leg deformity, brittle bone and breakage in cage layers, thus enhancing animal welfare
11. Determine the optimal energy and protein needs of broiler breeders at various stages of production

12. Define the nutritional factors that limit the use of DDGS in monogastric diets (fiber, available energy, available amino acids, fat stability, mycotoxin concentration impact, gut microflora impact) and devise viable, cost-effective options

Poultry Housing

1. Optimize integrated pest management programs in live production
2. Evaluate oxygen and ammonia sensors to monitor air quality

Breeder Replacement Management

1. Determine optimal feeding techniques for weight and uniformity management and welfare (potential alternatives to skip a day feeding programs)
2. Develop new vaccination techniques to improve protection and lessen stress on the bird
3. Determine optimum photoperiods, light intensity, and associated management factors (e.g., beak trimming) in relation to weight, uniformity, bird welfare and maturity
4. Determine optimal male weights throughout life for best hatch

Processing

1. Define the cause of “white striping” and “woody breast” and other myopathies in chicken breast meat and determine procedures to reduce its incidence
2. Define the effect of gas stunning on delay in defeathering, chilling, and meat quality in broilers and turkeys
3. Develop methods for prevention of cross contamination and prevention of ingesta contamination leading to elimination of contamination on final product
4. Determine effects of preslaughter stress on feather release, moisture gain/retention, and muscle tissue quality
5. Determine the actual feasibility of irradiation of poultry meat