HANDOUT 4

Research Summary for University of Arkansas System Board of Trustees

Billy Hargis
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DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Program Overview

Poultry disease issues and associated control efforts exceed 10% of the cost of production, and are often associated with significant animal welfare issues. Antibiotic utilization for both therapeutic and growth promotion uses is declining due to social and regulatory pressures. In collaboration with several scientists within the UA Division of agriculture, our laboratory has focused on alternatives to drugs for sustainable improvements in poultry health, livability, feed efficiency, and animal welfare.

Key Projects and Collaborations:

Development of effective probiotics for improved feed efficiency, Salmonella exclusion, and enteritis reduction

- Development of 8 licensed and 5 commercialized products
- Created a successful startup company, acquired by a multinational company. Manufacture and distribution is based in Johnson, Arkansas.
- Projects have supported 11 MS, 14 PhD students and five postdoctoral associates to date.

Development of a novel recombinant vaccine platform for broad protection against multiple diseases

- Collaborations with scientists within the UA Division of Agriculture as well as other US and foreign Universities.
- The UA system has coordinated IP protection
- Twelve issued patent families
- One startup company based on UA-licensed technologies formed
- Projects have supported four completed PhD projects, two Honors Students advised, and two research scientists (4 years).

Development and production assistance for autogenous vaccines for orphan diseases of poultry

- Active collaborations with three turkey producers, and four broiler integrators
- Turkey vaccines for hemorrhagic enteritis, turkey dermal necrosis and myositis, bordetellosis, salmonellosis, and histomoniasis
- Developed inactivated vaccine for newly emerged variants of avian adenoviral inclusion body hepatitis, live vaccine for broilers under development
- Direct support role for our laboratory as a stop-gap measure for diseases against which there are no licensed vaccines available

Research Summary

Casey M. Owens, Ph.D.
Novus International Professor of Poultry Science and
Professor of Poultry Processing and Products

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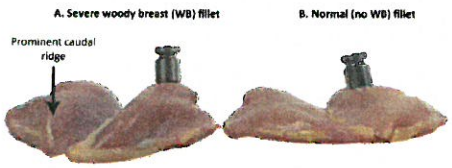
Program Overview

Dr. Owens conducts research to evaluate the effects of preslaughter environmental conditions and processing techniques on muscle metabolism and meat quality of poultry. Recent focus has been on breast muscle myopathies and related meat quality.

In the U.S., the average live weight of birds in this segment is now over 6 lbs., but can range from 6 to 10+ lb. Furthermore, approximately 70% of the broiler meat produced in the U.S. comes from large birds. Along with increases in yield and efficiencies, some negative attributes have emerged in the form of myopathies in the poultry breast. Woody breast is one of the emerging myopathies. It is hard to the touch and is histologically characterized by muscle fiber degeneration and increased connective tissue within the muscle. Compositionally, woody breast has lower protein and higher fat content compared to normal fillets. It is estimated that up to 40% of flocks in big bird programs can have moderate or severe woody breast issues. *These cases can result in unnecessary condemnations, decreased meat quality and yield, changed nutritional content, and continued reduced customer/consumer acceptance (resulting in lost customer accounts), all resulting in high economic losses.*



Key Projects and Collaborations:

Using Image Analysis, Compression Force, and Shear Properties to Predict Woody Breast in Broiler Carcasses, Raw Fillets, or Cooked Meat

- Digital images of the carcasses have been used for measuring various dimensions to determine relationships to woody breast scores. Data provides a strong proof of concept that carcass conformation/shape features can be used to predict woody breast in deboned fillets. This is non-destructive and non-contact, and it has the potential to easily be incorporated into existing commercially available vision grading systems, making it cost-effective for implementation in processing plants.
- Ongoing studies are being conducted to determine effectiveness of using instrumental compression force and shear properties (e.g., peak counts) to accurately identify woody breast in the raw or cooked state.

Determine Biological and Physiological Factors which Cause Breast Myopathies in Commercial Broilers

- Several experiments will 1) determine profile of myofibrillar, sarcoplasmic, and collagen protein synthesis and degradation through nine weeks of age in high breast yielding broilers, 2) assess expression of genes and proteomic profile, microbiome, and muscle histology of myopathic and normal birds in early and late stages of the condition, 3) identify predictive biomarkers for breast myopathies, and 4) assess impact of nutrition and production practices on myopathies. Collaboration with Dr. Coon/POSC faculty.
- This will aid in identifying key points throughout the growth period which relate to development of severe myopathies and identify early time points at which myopathies can be predicted.
- Understanding the biological mechanisms in the development of the breast myopathies is critical in significantly reducing or eliminating the detrimental changes in the meat which results in negative changes in terms of meat quality and potentially animal welfare.