Accelerating Advances in Animal Welfare

The Accelerating Advances in Animal Welfare initiative is a new program at the Foundation for Food and Agriculture Research (FFAR) intended to support farm-animal welfare research. Animal welfare research plays a critical role in the development and continuing improvement of sustainable livestock production, with potential to improve animal lives, food quality, farm-laborer work environments and the relationship between our society and the food we eat.

The Accelerating Advances in Animal Welfare program will bring together major stakeholders from the public and private sectors to effect positive changes in farm-animal welfare by:

- Identifying High Impact Target Areas for Research
- Partnering to Fund Transformative Research Projects
- Publicizing Applied Outcomes
- Outreach and Education

1. Background

Animal health and welfare are key to sustainable food security. Today there are approximately 19 billion chickens, 1.4 billion cattle and 1 billion sheep and pigs in farm production worldwide[3]. Globally, per capita meat and dairy consumption are expected to increase ~73% and ~58% by 2050[3], respectively, as incomes rise in the developing world. These insights present both a challenge and an opportunity for improving animal lives in a rapidly growing world.

The intensification of livestock production in developed countries has improved efficiency and access to meat and dairy products, yet the treatment of farm-animals in these settings remains controversial. Challenges in intensive livestock production include the need to accommodate natural animal behaviors such as flight and rooting while reducing injuries and maladaptive behaviors. Surgical procedures may cause stress or pain depending on how they are performed. Innovative research is critical to developing new approaches in animal-welfare and ensuring their successful adoption. We are seeking partners to promote transformative animal welfare research with the potential to positively impact millions of animals as well as livestock-rearing best practices.

2. Objective

The objective of this RFA is to stimulate and support innovative research in farm-animal welfare. Research is critical to progress in this field, as changes to animal production practices may impact animal physiology, may require large-scale alterations in animal housing and may have environmental and economic impacts that extend beyond the farm

or production facility. FFAR expects the Animal Welfare program to support cross-disciplinary research in animal genetics, behavior, husbandry, physiology, biotechnology, nutrition and other scientific areas.

3. Research Areas

1. Cage-Free Poultry Welfare

The global demand for eggs and egg products is expected to increase significantly in the next several decades[1]. In the United States, the move toward cage-free housing for egg-laying hens is progressing rapidly with the commitment by over 200 major restaurant and grocery chains, food manufacturers and producers, and hospitality and travel service industry groups to source eggs from cage-free poultry by 2025 or sooner. The USDA estimates that to meet these cage-free commitments, the egg industry will need to convert most current production systems to cage-free by 2025, at which time > 215 million layer hens will be housed in cage-free systems[4]. However, there are biological and operational challenges associated with cage-free egg production. One common challenge is minimizing bone fractures, which can affect 50-75% of cage-free hens by the end of the laying lifespan[5-7]. Bone fractures cause pain, decreased egg production, reduced growth efficiency and reduced carcass value. Given the wide variety of evolving aviary designs and hen genetics, and the number of additional factors that can affect this issue problem, it is vital that researchers in the United States address this issue to support farmers as they transition to cage-free systems.

The overarching goal of this RFA is to **reduce the incidence of bone fractures in aviary housing systems.**

FFAR is committed to supporting science-based approaches to this issue, including:

a. Identification of quantitative trait loci and single nucleotide polymorphisms (SNP's) that may assist primary breeders in selection for pro-welfare traits (e.g. bone strength) while maintaining egg quality

b. Development of dietary formulations/additives for improved bone strength

c. Research on microbiome/gut health and bone density

d. Improved housing design (perch design, materials and placement, tier height, ramp angle, etc.)

e. Improved rearing conditions (pullet housing design and management)

Impact and Feasibility:

Keel fractures among poultry housed in aviary systems are considered a major welfare concern and negatively affect egg production. Bone strength in poultry is moderately to strongly heritable (40 %)[8,9], suggesting that selective breeding for bone strength could reduce the incidence of fractures. Research in this area may also impact osteoporosis, a closely related issue that affects > 80% of hens by the end of egg production and which contributes to bone breakage and 20-35% of mortalities during the egg-production cycle of caged hens[10,11]. There are only few major breeding companies that offer commercial poultry lines, which are typically selected for productivity, life expectancy and egg quality. Adoption of research findings by any of the major hatcheries would have significant impact on layer hen welfare.

Dietary formulations or additives may reduce fractures by enhancing bone strength during egg production[12]. Housing design and pullet rearing conditions may also significantly reduce keel fractures[13].

2. Swine Welfare

Currently, the US produces 120-150 million swine per year and global demand for pork is projected to increase by 50% by 2050[13,14]. One of the most prominent welfare issues of pigs raised for commercial production is surgical castration of piglets, which is performed to prevent the development of malodor/taste known as boar taint in intact males. Males are castrated at an early age but analgesia is rarely used. Castrated piglets show an acute physiological stress response to castration including increased ACTH and cortisol levels, increased heart rate and behavioral indicators of pain that can last for four days following the procedure[15,16]. Alternatives such as immuno-castration are not routinely used in the US due to logistical aspects of administration, cost and potential risks to humans. Developing alternatives to castration have the potential to greatly improve the welfare of 60-75 million piglets per year[17].

The overarching goal of this RFA is to **assist the development of alternatives to castration that provide for the piglet's well-being and maintain pork quality.**

FFAR is committed to supporting science-based approaches to this issue, including:

a. Selective breeding, or gene-editing, for production of animals with low physiological levels of androstenone and skatole

b. Chemical interference with the production of androstenone and skatole hormones that cause boar taint

c. Mechanical or genetic sex-selection of sperm (selection for female-only offspring).

Impact and Feasibility:

Castration without pain management is considered one of the major welfare problems in commercial swine production. Current alternatives, such as immuno-castration, are not widely used for a number of reasons including the danger to those administering the immunogen, cost and logistics. Selection of animals with low boar taint may be possible due to the high heritability (25-87%) of this trait[18-20], and some research has already been completed in this area. Interference with production of androstenone and skatole could be achieved by several methods. Unlike the dairy industry, sex selection of sperm in swine has been challenging and is not commonly performed.

4. Criteria for Evaluation

Applications will be judged by the following criteria:

A. **Scientific innovation and impact (approximately 45%).** Applications should describe innovative research with the potential to impact a large number of poultry or livestock. Applicants will be requested to provide an estimate of the number of animals that could be affected by the study results and describe the degree of positive change in animal welfare. Multi-disciplinary collaborations will be reviewed favorably.

B. **Feasibility (approximately 15%).** Applicants will describe the potential for successful completion of the research project, potential pitfalls and the expertise of the groups/individuals involved in the study. Previous successes in the proposed area of research, including grants, publications, patents or other accomplishments, will be viewed favorably. The research environment (facilities, equipment and institutional/corporate support) should be appropriate to conduct the research.

C. **Dissemination and implementation of results (approximately 25%).** Applications should include a description of how results will be disseminated to and used by producers, livestock genetics companies, drug companies, or equipment manufacturers, and/or incorporated into existing farms and production systems. Preference will be given to academic – industry collaborations and documented partnerships that strengthen the capacity to carry out the goals or implementation of the project.

D. **Timeline (approximately 10%).** Expected milestones and outputs should be described. Projects up to 3 years duration will receive preference under this FOA. If the project comprises a single phase or portion of a larger study, then a description of the larger study or previously completed sections should be included.

Research topics not covered by this initiative

Proposals that address animal health or biology, or production efficiency, without a strong welfare component will not be considered.

5. Transparency

Awardees will be expected to:

A. Agree to publish a pre-analysis plan which includes the abstract, hypothesis, project personnel (PI and key personnel), project duration, expected outcomes and award amount in a publicly accessible location.

B. During the study, notify FFAR of significant deviations from the pre-analysis plan.

C. Make the full data-set, the code used to analyze it, and any other necessary materials publicly available within six months of publishing the study.

D. Post a pre-print or working paper version within 8-12 weeks of submitting the study for publication, if journal allows pre-prints to be posted online.

6. Award Information

Anticipated Funding: Up to $500,000 per project.

Duration: Projects of up to 60 months in duration will be considered, although shorter projects of up to are preferred.

Indirect Expenses: A maximum of 10% of the total award may be used for indirect costs.

For more information regarding project budget, please contact grants@foundationfar.org

6. *Who is Eligible to Apply?*

- Public and private institutions of higher education
- Nonprofit organizations
- For-profit organizations

7. Key Dates

May 1, 2017: Funding Opportunity Announcement
August 1, 2017. 11:59 PM (ET): Application Deadline
November-December, 2017: Applicants Notified and Awards Made

PREPARE TO APPLY: *DOWNLOAD PROPOSAL TEMPLATE*
Please note: All pre-proposals MUST be submitted through Proposal Central.

HOW TO APPLY:

Log on to Proposal Central (https://proposalcentral.altum.com/). Under "Grant Opportunities," select "Filter by Grant Maker," select "Foundation for Food and Agriculture Research" and click "Apply Now" next to "Animal Welfare." For questions regarding the preproposal, see the appropriate contact list below.

FFAR Contact Information

Please direct all scientific inquiries to Timothy Kurt, Scientific Program Director: tkurt@foundationfar.org
Please direct all other inquiries to: grants@foundationfar.org

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