

Extension/UAES - Sustained Livestock Production

Reproductive Performance of Animals

Work to enhance reproductive performance of agriculturally important animals involves factors that control reproduction or provide methodologies to improve reproductive efficiency, including efforts to control puberty, ovarian function and cycles, gamete formation and maturation, fertilization, establishment and maintenance of pregnancy, placental function, fetal development and growth, and parturition.

Areas of work include but are not limited to:

- Reducing the age of first breeding in females
- Improving libido and reducing physical and psychological barriers to mating
- Methods to control estrus and ovulation
- Semen metabolism and preservation, and artificial insemination techniques
- Effects of stress factors on reproductive performance
- Controlling sex of offspring through sperm separation and other means
- Increasing the fertilization and conception rate of available ova
- Increasing the number of potentially fertilizable ova
- Reducing prenatal, natal, and postnatal mortality
- Improving mothering ability
- Methods for early diagnosis of pregnancy
- Fundamental studies to determine molecular, cellular, and metabolic mechanisms regulating reproduction
- Development of reproductive technologies
- Methods to improve spawning efficiency in fish and shellfish
- Methods to enhance larval rearing in fish and shellfish.

Exclude:

- Nonfarm-raised fish and shellfish, game and fur-bearing animals, and other wildlife
- Genetic studies to improve reproductive performance
- Identification of genes that have an effect on reproduction and how they are controlled or regulated

Nutrient Utilization in Animals

Work in this area focuses on efforts to enhance the efficiency of nutrient utilization for improving animal productivity, including molecular and cellular biology of nutrient utilization, digestion, metabolic processes, and feed processing technology.

Areas of work include but are not limited to:

- Digestion and metabolism
- Nutrients required for specific life processes and longevity
- Hormone and nutrient interactions for maintenance, growth, lactation, and other productivity functions
- Composition and biological availability of nutrients of animal feed
- Effects of processing and feeding system on nutritive values of animal feed
- Alternate sources of nutrients, including forages and agricultural byproducts.

Exclude:

- Reduction of waste carcass fat and proportion of low meat yield cuts

Genetic Improvement of Animals

Work in this area focuses on improving production efficiency of agriculturally important animal species through more effective genetic improvement programs utilizing the development and application of expanded genetic information and technology encompassing molecular, quantitative, and statistical genetics.

Areas of work include but are not limited to:

- Estimation of genetic parameters (e.g., heritability, genetic variances and covariances, heterosis, and breeding values)
- Selection studies
- Breed evaluation studies
- Mating systems
- Development of breeding goals and strategies
- Identification of genetic defects
- Incorporation of molecular and genomic information into applied genetic improvement programs
- Acquisition and preservation of genetic resources
- Maintenance of genetic diversity.

Exclude:

- Reduction of waste carcass fat and proportion of low meat yield
- Gene mapping and fundamental molecular genetic and genomic information
- Gene identification, regulation, and control
- Natural resources biodiversity

Animal Physiological Processes

This area includes work on the fundamental physiological processes within the animal at the organismal, organ system, cellular, and molecular level.

Areas of work include but are not limited to:

- Chemical and structural organization of animal cells and their specialized properties and functions, including enzymatic machinery and biochemical conversions
- Organization, structure, and function of organ systems, including endocrine, circulatory/vascular, urinary, nervous, muscular, and skeletal systems, the sense organs, the common integument and its derivatives, and body fluids
- Physiology of vital life processes and mechanisms of function and control
- Neural, hormonal, or other chemical messengers that serve as regulators of physiologic processes and perform integrative functions in the animal
- Prenatal, neonatal, and postnatal development and growth of animals, including genetic control mechanisms and accretion, deposition, and degradation of proteins and fats in animal tissues
- Lactation physiology, including alveolar development and involution, milk synthesis, secretion and ejection, milk composition, and patterns of lactation.

Exclude:

- Physiology of reproduction and reproductive processes

Environmental Stress in Animals

Work in this area involves stresses from the effects of climate, handling, and other environmental factors that decrease productivity, including extremes in temperature, humidity, air movement, and noise that may lead to lower reproduction, reduced feed efficiency, anorexia, reduced disease resistance, and increased mortality.

Areas of work include but are not limited to:

- Environmental factors that reduce productivity
- Facilities and equipment that reduce environmental stress
- Management techniques that enable animals to adapt to stress conditions.

Exclude:

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- Stress factors that affect reproductive performance
- Nonfarm-raised fish, shellfish, game and fur-bearing animals, and other wildlife
- Genetic factors of animal response or adaptability to environmental stress
- Physiological responses to environmental stress
- Behavioral responses to environmental stress

Animal Management Systems

Work in this area focuses on the development and application of management systems, including computer technology/models and analytic methods, to improve management decisions and enhance animal production systems.

Areas of work include but are not limited to:

- Animal-based studies that compare production systems or segments of production systems, including systems with emphasis on organic farming or small farms
- Animal-based studies that emphasize sustainable agriculture
- Computer simulation models of animal production systems that allow comparisons of various alternative management components and decisions.

Exclude:

- Nonfarm-raised fish, shellfish, game and fur-bearing animals, and other wildlife

Animal Diseases

This area includes work on animal diseases that represent a threat to the production of an adequate and wholesome supply of animal products from livestock, poultry, and fish.

Areas of work include but are not limited to:

- Disease management for biosecurity purposes
- The nature of causative agents involved in animal diseases
- Mechanisms of disease resistance and immunity
- Interrelationships among environment, genetics, and infectious agents in the etiology of diseases
- Methods of diagnosis, prevention, treatment, control, and eradication of diseases, including development of equipment
- Methods for risk assessment, surveillance, and prevention of foreign animal disease threats
- Evaluation of alternative control methods
- Understanding mechanisms involved in transmission of diseases to animals, including the role of vectors such as insects, ticks, and mites
- Integrated control systems for animal diseases.

Exclude:

- Disorders due to improper nutrition
- Disorders resulting from pollution
- Bloat and disorders due to ingestion of toxic plants, etc.
- Disorders due to environmental stress
- Nonfarm-raised fish, shellfish, game and fur bearing animals, and other wildlife

Toxic Chemicals, Poisonous Plants and Other Hazards

This area focuses on reduction of losses in productivity in livestock, poultry, and fish operations due to toxic chemicals, pesticides, poisonous plants, predators, ingestion of metal and other foreign bodies, and other hazards.

Areas of work include but are not limited to:

- Determining the specific sites and mechanisms of poisoning, bloat, and other disorders to learn the bases of these phenomena
- Toxicology and safe levels of residues of pesticides and other chemicals, natural or synthetic, used directly on or ingested by livestock and poultry
- Methods of reducing ingestion of pesticides or other chemicals in or on animal feeds
- Reasons for inter-species differences in detoxification mechanisms and sensitivity to poisoning by pesticides and other chemicals
- Developing animal management practices that minimize use of pesticides and other chemicals that leave toxic residues or that reduce the level of residues
- Prevention or alleviation of "hardware disease," and effects of plants that cause bloat, poisoning, or deformities of livestock
- Developing methods for combating nuclear radiation hazards to livestock
- Methods for reducing animal losses from predators.

Exclude:

- Breeding and selection of feed crops for reduced content of toxic components
- Pesticides and other toxic substances applied to or ingested by livestock and poultry when the emphasis is clearly on reduction of the toxic content of foods consumed by humans
- Disorders resulting from pollution
- Nonfarm-raised fish, shellfish, game and fur-bearing animals, and other wildlife

Engineering Systems and Equipment

This work includes mechanization to increase efficiency and decrease labor requirements in agricultural and forestry production such as: grain, fruit and vegetable crops, timber, livestock, poultry, fish, and other animals. This includes machinery and power units for the pre- and post-harvest of various animal and plant products.

Areas of work include but are not limited to:

- Tillage, planting, chemical application, and harvesting systems for agricultural and range systems
- Harvesting systems for forestry, including roads, transportation, and access for in-woods processing
- Systems for establishment and regeneration of crop, forest, and range systems
- Handling methods for animals and animal products
- Design and evaluation of equipment used in production of agricultural, forest, and range systems
- Application of sensors and robotics
- Application of pesticides and crop nutrients
- Energy conservation relative to systems and equipment.

Exclude:

- Structures and facilities
- Irrigation and drainage systems
- Safety of humans
- Equipment that reduces environmental stress in animals
- Food bioengineering and food process engineering

Zoonotic Diseases and Parasites Affecting Humans

Work in this area concerns animal diseases and parasites such as anthrax, encephalitis, leptospirosis, and rabies that pose potential threats to human health. Included are studies on epidemiology, risk assessment, biosecurity, and evaluation of efficacy of control programs for disease vectors.

Areas include but are not limited to:

- Understanding mechanisms involved in transmission of diseases to humans, including the role of insects, ticks, and mites
- Developing control programs to reduce animal reservoirs of zoonotic agents
- Developing means of preventing transmission of zoonotic diseases and parasites from animals to humans.

Exclude:

- Animal diseases and parasites where the concern is the protection of the animal itself
- Transmission of parasites and pathogenic microorganisms in animal food products consumed by humans

Primary Program Emphasis Areas – Areas of Work Defined

2007 Addendum

Sustained Livestock Production

Improved Animal Products (Before Harvest)

This area includes work to improve the composition and quality of animal products to reflect consumer preferences.

Areas of work include but are not limited to:

- Physiology and biochemistry of fats, proteins, and flavor components of animal products
- Factors responsible for development of flavor and other components of product quality
- Reduction in undesired fat in animal products
- Improving wool, hides, and other non-food animal products
- Determination of consumer preferences and factors influencing product acceptability.

Exclude:

- Bees and honey

Processing techniques for improvement or development of food and non-food products from animals

- Nutrient composition of animal products

External Parasites and Pests of Animals

This area includes work on pests and external parasites, including insects, ticks, mites, and other parasitic organisms that reduce animal productivity. This area also includes work on more cost effective methods of control.

Areas of work include but are not limited to:

- Biology and life history of pests
- Biosystematics/taxonomy
- Use and development of irradiation, chemosterilants, attractants, repellents, and

other non-insecticidal approaches to insect control

- Absorption, metabolism, and excretion of insecticides by insects feeding on or in animals
- Biological control of insects
- The nature of insect resistance to chemical controls
- Evaluation of alternative control methods
- Development of methods and equipment for applying or using control materials
- Integrated control systems for external parasites.

Exclude:

- The role of insects, mites, and other arthropods in disease transmission
- Nonfarm-raised fish, shellfish, game and fur-bearing animals, and other wildlife

Internal Parasites in Animals

This area includes work on internal parasites such as various kinds of worms, flukes, and protozoa. Emphasis is on reducing losses, including those due to mortality, reduced yield and condemnation of meat, feed wastage, and cost of drugs.

Areas of work include but are not limited to:

- Biotic relationships in parasitism
- Biosystematics/taxonomy
- Biocontrol and management practices that minimize reliance on chemicals
- Safe chemical means including systemics for combating parasites
- Effective means of diagnosing parasitic infestation
- Evaluation and development of control methods and equipment
- Study of heritable traits, breeding, and selection to improve resistance to parasites
- Integrated control systems for internal parasites.

Exclude:

- Nonfarm-raised fish, shellfish, game and fur-bearing animals, and other wildlife
- Insects, ticks, leeches, and mites

Animal Welfare/Well-Being and Protection

Work in this area focuses on developing effective animal care and use programs, and information related to and contributing to the welfare, well-being, and proper stewardship of food animals.

Areas of work include but are not limited to:

- Fundamental studies related to the assessment of animal well-being, including measures of adaptation and adaptiveness, measures of social behavior and spacing, physiological measures, and measures of cognition and motivation
- Management/confinement production systems related to animal welfare/wellbeing
- Controlled environments and environmental factors, including temperature, relative humidity, ventilation, lighting, and sound related to animal welfare/wellbeing
- Housing and equipment design; pen/cage design and densities; feeding, watering, and bedding practices related to animal welfare/well-being
- Handling, restraint, transport, and husbandry practices, such as castration, tail docking, debeaking, and others related to animal welfare/well-being
- Humane slaughter, euthanasia, and analgesia related to animal welfare/wellbeing
- Behavior patterns related to animal welfare/well-being
- Disease prevention techniques and practices, including management practices, disease detection and surveillance, assessing disease risks, vaccine

development, parasite control, and others specifically related to animal welfare/well-being.

Exclude:

- Etiology of disease, disease agents, internal and external parasites, and toxic hazards
- Genetics of disease resistance
- Production management systems as related to production efficiency and economic viability
- Nonfarm-raised fish, shellfish, game and fur-bearing animals, and other wildlife