

Extension/UAES – Plant, Animal and Microbial Genomics

Plant Genome, Genetics, and Genetic Mechanisms

This area focuses on development and dissemination of fundamental information in plant genetics and plant breeding technology with the purpose of making plant breeding more efficient and productive, and includes related technologies such as genomic database management.

Areas of work include but are not limited to:

- Genome sequencing and mapping
- Genetic structure, organization, and function
- Comparative and translational genomics
- Gene identification and manipulation
- Genetic markers and marker assisted selection for breeding
- Quantitative Trait Loci (QTL) analysis
- Genetic structures and mechanisms
- Inheritance of traits
- Bioinformatics and databases.

Exclude:

- Breeding for specific traits with direct purpose of releasing a crop variety or breeding line, even when using molecular tools such as molecular markers, expressed sequence tags, and QTL
- Use of genomic technology to characterize or evaluate germplasm
- Population genetics associated with germplasm preservation
- Forest and range plants

Plant Biological Efficiency and Abiotic Stresses

This area focuses on understanding and improving plant productivity and quality affected by reduced inputs or abiotic stresses such as water, temperature, or nutrients.

Areas of work include but are not limited to:

- Biological mechanisms that affect actual or potential yields
- Biological mechanisms related to water use and survival of water stresses (e.g., drought, flooding)
- Biological mechanisms related to the use of nutrients and survival of nutrient stress
- Biological mechanisms related to survival of temperature stress (including freezing, chilling, and heat)
- Breeding (including genetic engineering) for biological efficiency or stress tolerance
- Cultural practices to improve biological efficiency or stress tolerance.

Exclude:

- Basic plant biology
- Integration into production management systems
- Breeding (including genetic engineering) for quality improvement
- Breeding (including genetic engineering) for host plant resistance
- Breeding (including genetic engineering) for crop-weed management
- Evaluation of germplasm for variation in biological efficiency or stress tolerance
- Effects of abiotic factors on pests
- Effects of pollution stress on plants
- Forest and range plants

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

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 cuts
- Gene mapping and fundamental molecular genetic and genomic information

- Gene identification, regulation, and control
- Natural resources biodiversity

Animal Genome

Work in this area involves the application of new developments in molecular biology to map and understand the genome of agriculturally important animal species.

Areas of work include but are not limited to:

- Gene mapping, including linkage and physical mapping
- Gene identification, function repetition, and control
- Genetic engineering and gene manipulation
- DNA cloning and sequencing
- Quantitative Trait Loci (QTL) identification and development of marker assisted selection procedures.

Exclude:

- Application of marker assisted selection in applied breeding

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

New and Improved Food Processing Technologies

Work in this area focuses on development or improvement of methods, techniques, or processes to maintain or improve quality or functionality, stabilize or preserve foods, or prepare foods for further processing.

Areas of work include but are not limited to:

- Food physical processes (i.e., thermal and non-thermal pasteurization/preservation, size reduction, separation, concentration)
- Food bioprocesses (i.e., enzyme and microbial applications, fermentation, genetic engineering of foods and food ingredients)
- Food chemical processes (i.e., salt, sugar, acid, preservatives, colorants, antioxidants, chemical modification)

- Food processing efficiencies (i.e., management of energy, water, wastes)
- Improved or new food packaging technologies
- Food process modeling, automation, and sensors
- Processing technologies for new food uses of agricultural products

Primary Program Emphasis Areas – Areas of Work Defined

2007 Addendum

No new areas added