

Fundamental Plant and Animal Systems

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V(A). Planned Program (Summary)

1. Name of the Planned Program

Fundamental Plant and Animal Systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms			25%	
206	Basic Plant Biology			15%	
301	Reproductive Performance of Animals			25%	
302	Nutrient Utilization in Animals			15%	
304	Animal Genome			10%	
305	Animal Physiological Processes			10%	
	Total			100%	

V(C). Planned Program (Inputs)

1. Actual amount of professional FTE/SYs expended this Program

Year: 2007	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	4.2	0.0
Actual	0.0	0.0	5.6	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	327517	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	682642	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	488357	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Conduct research; publish / present results

Research involving fundamental systems in animals is to increase our understanding of reproductive, nutritional and general physiological systems and processes. Practical problems addressed include embryonic mortality in sheep and cattle, limiting amino acids in animal rations, health and disease resistance in poultry. In plants, program emphasis varies from determining functions of ubiquitin and other polypeptide tags, to understanding basic mechanisms of flower senescence and cold shock adaptation, to combating the impacts of phytophthora and Chestnut blight, to defining and eliminating negative effects on grazing animals of ergot alkaloids produced by fungi symbiotic with pasture grasses.

Perturbations of fetal growth can lead to a programmed dysfunction of the cardiovascular system resulting in hypertension, heart disease, atherosclerosis, premature stiffening of carotid arteries, etc., and result from intrauterine growth restrictions. Results of one project within this program was able, through modification of early uterine environment, to increase embryo growth and birth weight and to make a marked reduction in thickness of the left ventricular wall of the heart, which suggests dramatic alterations in cardiovascular physiology. A related study is to determine the impact of low progesterone concentrations on pregnancy rates in dairy cattle. Results have shown that hepatocytes cultured in the presence of insulin exhibited reduced progesterone catabolism resulting from lowered hepatic cytochrome P450 activity. The goal is to decrease progesterone catabolism through dietary modifications and thereby increase pregnancy rates.

Fundamental research in poultry is to establish a model of oxidative stress and determine the efficacy of elevated plasma uric acid concentrations as a protectant against oxidative stress. One of the products of oxidative stress in animal tissue is the glycation endproduct, pentosidine. Recent studies have shown a linear correlation between the age of individual birds and the accumulation of pentosidine in skin samples of deceased birds and, in a later study, no significant differences between skin and breast tissue concentrations of pentosidine in living birds.

Basic genetic work in plants is to determine structure and conservation of cold shock domain protein, conduct functional analyses of ubiquitin-specific proteases, to better understand and control flower senescence, and to eliminate ergot alkaloids toxic to grazing animals from symbiotic pasture grass/fungi associations or to humans for fungi like *Aspergillus fumigatus*. Results in the preceding year found (1) all cold shock genes examined to be highly expressed during early stages of embryo development and declining thereafter and normally depressed under conditions typically conducive to floral induction; (2) ubiquitin specific protease (UBP; involved in dismantling polyubiquitin chains and detaching ubiquitin from target proteins), subfamily 3/4 (UBP3/4) which are seemingly important for second mitotic cell division in the male gametophyte, exhibit some ubp3/ubp4 pollen which appears to undergo pollen mitosis II and to germinate; (3) ergot alkaloids are not produced in the vegetative mycelium of the opportunistic human pathogen, *Aspergillus fumigatus*, but rather exclusively on conidia (meaning ergot alkaloids are not likely important to the invasive stage of human or animal infection); and (4) chlorophyll accumulation and number of chloroplasts in carnation flowers decreased throughout development and senescence in epidermal cells in the lower part of petals suggesting a role in flower senescence.

2. Brief description of the target audience

Primarily researchers; professional practitioners, regulators, some producers

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2007	0	0	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year	Target
Plan:	0
2007:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan			
2007	0	4	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

Research presentations

Year	Target	Actual
2007	6	3

Output #2

Output Measure

Refereed scientific manuscripts

Year	Target	Actual
2007	4	11

V(G). State Defined Outcomes

O No.	Outcome Name
1	Reduced embryonic mortality in cattle and sheep %
2	Increased efficiency of amino acid utilization in ruminants %
3	Identify genes coding for cold shock proteins in plants
4	Identify and map genes affecting flower senescence
5	Decrease mortality in poultry production %
6	Develop ergot alkaloid deficient grasses with wild-type vigor
7	Successfully develop and employ hypovirus as a biological control agent for Chestnut blight

Outcome #1

1. Outcome Measures

Not reporting on this Outcome for this Annual Report

2. Associated Institution Types

3a. Outcome Type:

3b. Quantitative Outcome

Year	Quantitative Target	Actual
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3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
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V(H). Planned Program (External Factors)

External factors which affected outcomes

Competing Programmatic Challenges

Other (Failure to measure relevant statistics)

Brief Explanation

Several outcome measures are not routinely measured and will be revised.

V(I). Planned Program (Evaluation Studies and Data Collection)

1. Evaluation Studies Planned

Before-After (before and after program)

Evaluation Results

None beyond measurement of outcomes.

Key Items of Evaluation

The relationship of fetal growth and subsequent cardiovascular disease is potentially quite significant due to human health implications.