

GAO

Fact Sheet for the Chairman,
Subcommittee on Wheat, Soybeans, and
Feed Grains, Committee on Agriculture
House of Representatives

August 1990

FOOD SAFETY AND QUALITY

USDA Initiatives Regarding Aflatoxin Research



142191

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Resources, Community, and
Economic Development Division

B-240304

August 15, 1990

The Honorable Dan Glickman
Chairman, Subcommittee on Wheat,
Soybeans, and Feed Grains
Committee on Agriculture
House of Representatives

Dear Mr. Chairman:

On August 10, 1989, you asked us to provide information on aflatoxin research funded as part of the U.S. Department of Agriculture's (USDA) Agricultural Research Service (ARS) fiscal year 1989 appropriation. In addition, we are including financial data on each of the subject ARS research projects. To provide a more comprehensive overview of USDA's aflatoxin research efforts, we are also including information on (1) fiscal year 1990 research projects undertaken by ARS as part of a program devoted solely to the prevention of aflatoxin formation and (2) aflatoxin research projects that involve USDA's Cooperative State Research Service (CSRS). Some of these research projects are carried out by state institutions, including agricultural experiment stations associated with land-grant colleges and universities, and may be funded, in part, by the federal government.

FISCAL YEAR 1989 ARS AFLATOXIN-RELATED
RESEARCH PROJECTS

The ARS data show a total of 11 research projects in fiscal year 1989 designed to address aflatoxin problems with corn (and other feed grains), cottonseed, peanuts, and domestic animals. Funding for these projects totaled \$5,002,700, of which ARS designated \$3,782,400 as supporting specific aspects of aflatoxin research. (See table 1.) The remaining \$1,220,300 supported other aspects of four of the projects.

Table 1: Agricultural Research Service Funding for Specific Aspects of Aflatoxin Research, Fiscal Year 1989

<u>Research aspect</u>	<u>Amount</u>
Management/cultural practices for prevention	\$1,152,200
Analytical methods	384,100
Plant resistance factors	980,900
Mechanisms of toxin formation	496,400
Control of toxicity in animals	768,800
Total	----- \$3,782,400 ----- -----

Appendix I contains more detailed information on these projects.

FISCAL YEAR 1990 ARS AFLATOXIN PREVENTION RESEARCH PROJECTS

The ARS appropriation for fiscal year 1990 included a total of \$4,248,700 for aflatoxin research. Of this amount, \$750,000 was specifically earmarked to begin a research program devoted solely to aflatoxin prevention. ARS solicited research proposals for this effort from the nation's universities/experiment stations and established an "Aflatoxin Task Force" to review the proposals received. The Task Force was comprised of eight industry representatives, two from each of the corn, peanut, cotton, and tree nut industries, and was chaired by ARS. ARS received 23 research proposals in response to its solicitations. On the basis of Task Force determinations, \$665,500¹ was committed to aflatoxin prevention research--

¹Less than the \$750,000 originally appropriated was subsequently available for this research because of Gramm-Rudman-Hollings budget reductions and associated ARS administrative/overhead costs.

\$332,750 to start eight new research projects and \$332,750 to continue funding for two existing ARS projects.

The National Peanut Council's Director for Industry Services said that the aflatoxin prevention projects are concentrated more on research to eliminate aflatoxin, rather than its detection and control. Also, according to the director the proposed research follows two separate approaches: (1) developing aflatoxin-resistant varieties of major crops and (2) developing biocompetitive controls to the aflatoxin-forming mold.

Once approved, the research projects were coordinated with the Multi-Crop Aflatoxin Working Group. The Working Group membership includes the California Pistachio Commission; Corn Refiners Association, Incorporated; National Corn Growers Association; National Cotton Council; National Cottonseed Products Association; National Peanut Growers Association; National Peanut Council; and the Prune, Raisin, and Walnut Board.

In comments submitted to the Subcommittee on Rural Development, Agriculture, and Related Agencies, House Committee on Appropriations, in March 1990, the Working Group's Chairman said that increased funding is needed for the ARS aflatoxin prevention research program in order to eliminate aflatoxin by the year 2000.

The Working Group Chairman believes that a funding level of \$2.75 million is required for fiscal year 1991.

Appendix II contains more detailed information on the fiscal year 1990 aflatoxin prevention research projects.

CSRS AFLATOXIN-RELATED RESEARCH

As of October 18, 1989, USDA's Current Research Information System (CRIS) listed 126 CSRS and state aflatoxin-related research projects as "active." According to the CRIS Director, estimated completion time frames for research projects can change, and projects are retained in the system as active until an official termination report is received, regardless of the estimated termination dates given. The director said it was therefore possible that some of the state identified projects with termination dates that have already passed may have actually ended but that no

termination report had been received. We were told that more current information on the actual status of some state projects might require direct contact with the individual research investigators involved.

According to a CSRS Budget Office official, CSRS does not allocate research funds on an individual project basis. CSRS research funds are allocated to the states on a formula basis, and the individual research proposals to be funded with these dollars must be reviewed and approved by CSRS before these funds can be spent on them. The states, in turn, determine how the funds will be allocated among their various research institutions and/or approved projects. Also, most of the funds for these research projects usually come from state and/or private versus federal sources. Data regarding the state allocation of federal funds to individual CSRS projects were not available from CSRS or CRIS.

The CRIS Director said that some state projects listed in the CRIS voluntarily participate in and share research information under the CSRS cooperative research program but are not financed with USDA funds. According to the director, regardless of funding source, the expenditures for all participating projects are reported to CRIS each year. However, amounts spent on various aspects of aflatoxin control research are not separately identified. Also, a substantial number of institutions and projects are included, and a time frame of several months or more is involved before all the information is received, compiled, checked for errors, and entered into the CRIS. According to the director, fiscal year 1989 expenditure information would not be available until mid-1990.

Research objectives for the 126 CSRS and state research projects are provided in appendix III.

SCOPE AND METHODOLOGY

Information on ARS and CSRS research projects is maintained in USDA's computerized CRIS. However, ARS preferred to provide its data to us separately, based on its own records. We therefore obtained information on ARS research projects directly from the ARS National Program Leader for Food Safety and Health. We obtained data on CSRS and state research projects from CRIS, based on a search of about 28,000 research resumes in the data base. Information on research to prevent aflatoxin formation being funded under 'ARS' 1990 appropriation was obtained from the ARS National

Program Leader for Food Safety and Health and the National Peanut Council. The Council is a member of the Multi-Crop Aflatoxin Working Group--an informal alliance of producers formed to seek scientific solutions to the aflatoxin problem. ARS met with the Working Group to coordinate and obtain industry views regarding the additional research projects approved for aflatoxin prevention.

Although the information we are providing was obtained from and discussed with agency/industry officials who agreed with the information in the fact sheet, we did not independently verify data accuracy or try to validate the computer/information system(s) that generated it. As requested, however, we did not obtain official agency comments on this fact sheet.

Information regarding ARS and CSRS research efforts can be obtained by contacting the ARS Information Staff, Beltsville, Maryland, 20705, telephone (301) 344-2264, or the CSRS Administrator's Office, Washington, D.C., 20250-2200, telephone (202) 447-4423, respectively.

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As you requested, we are sending copies of this report today to Representative Jim Jontz. As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this fact sheet until 30 days from the date of this letter. At that time, we will provide copies to the Secretary of Agriculture and other interested parties. If you have any questions about the information in this fact sheet, please call me at (202) 275-5138.

Major contributors to this fact sheet are listed in appendix IV.

Sincerely yours,



John W. Harman
Director, Food and
Agriculture Issues

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ABBREVIATIONS

ARS	Agricultural Research Service
CRIS	Current Research Information Service
CSRS	Cooperative State Research Service
GAO	General Accounting Office
USDA	U.S. Department of Agriculture

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

AFLATOXIN RESEARCH PROJECTS

FISCAL YEAR 1989

(As of October 20, 1989)

Project Number: 3620-42000-005-00D

Title: Mycotoxins in Corn and Other Cereal Grains

Objectives: Develop and evaluate methods for detecting and determining mycotoxins produced by Fusarium, Aspergillus, and Penicillium in grains, foods and feeds, and meat and meat products. Isolate and identify mycotoxins affecting farm animals. Study occurrence of specific mycotoxins. Prepare mycotoxins for standards and testing.

Total funding: \$733,700

Aflatoxin-related portion:

Analytical Methods \$242,100

Project Number: 3620-42000-009-00D

Title: Integrated Pest Management of Aspergillus Flavus and Aflatoxin in Corn Cultivation

Objectives: Predict and prevent the occurrence of aflatoxin in corn by identifying and studying the interactions of abiotic and biotic environmental factors that determine levels of Aspergillus flavus infection and mycotoxin contamination. Eliminate sources of primary infective inoculum. Identify corn germplasm resistant to fungal infection. Prevent nitidulid beetle vectoring of A. flavus inoculum to corn. Reduce levels of insect damage to corn.

Total funding: \$502,300

Aflatoxin-related portion:

Management/Cultural Practices
for Prevention \$502,300

Project Number: 6202-34000-004-00D

Title: Toxicologic Effects of Mycotoxins in Livestock and Poultry

Objectives: To determine the (1) adverse effects of mycotoxins on livestock and poultry, (2) nature of the interactions between mycotoxins and environmental stressors as well as the interaction between mycotoxins, and (3) role mycotoxins play in idiopathic problems associated with animal production.

Total funding: \$556,000

Aflatoxin-related portion:

Control of Toxicity

in Animals

\$287,800

Project Number: 6202-34000-005-00D

Title: Prevention of Mycotoxicosis in Livestock and Poultry

Objectives: To determine the significance of dietary modification on the expression of mycotoxin toxicity, to what extent therapeutic agents used in animal production may alter the toxicity of mycotoxins, and the efficacy of selected adsorbents to reduce the toxicity of mycotoxins in livestock and poultry.

Total funding: \$481,000

Aflatoxin-related portion:
Control of Toxicity
in Animals \$481,000

Project Number: 6406-22240-001-00D

Title: Disease Resistance for Corn in the South

Objectives: Isolate and/or develop corn germplasm with superior disease resistance and investigate plant responses to various disease-producing fungi and viruses. Improve pathogen inoculation techniques and/or plant evaluation procedures to increase efficiency of selecting resistant genotypes.

Total funding: \$352,500

Aflatoxin-related portion:
Plant Resistance Factors \$352,500

Project Number: 6435-42000-004-00D

Title: Control of Aflatoxin-Producing Fungi by Agroecosystem
Modification

Objectives: Identify environmental, fungal, and plant factors associated with the natural occurrence of aflatoxin in developing crops, particularly cotton as grown in Arizona, as a basis for agronomic manipulations to control toxin-producing fungal populations.

Total funding: \$522,700

Aflatoxin-related portion:
Management/Cultural Practices
for Prevention \$522,700

Project Number: 6435-42000-005-00D

Title: Elucidate Chemical Constituents' Reactions in Corn
Kernels That Reduce Aflatoxin Contamination

Objectives: Identify specific proteins or other substances produced by developing corn kernels that inhibit development of both aflatoxin-producing fungi and toxin production.

Total funding: \$325,300

Aflatoxin-related portion:
Plant Resistance Factors \$325,300

Project Number: 6435-42000-007-00D

Title: Molecular Genetic Basis for Fungal Infection and
Aflatoxin Biosynthesis in Corn and Cottonseed

Objectives: Elucidate molecular mechanisms of gene
regulation governing traits in *Aspergillus*
flavus and *A. parasiticus* critical for infection
and aflatoxin production in developing corn and
cottonseed. Develop genetic engineering
technology to manipulate these traits in the
domestication of the fungi for eventual use as
biocompetitive agents.

Total funding: \$496,400

Aflatoxin-related portion:

Mechanisms of
Toxin Formation \$496,400

Project Number: 6602-22240-001-00D

**Title: Genetic Improvement of Corn, Sorghum, and Other
Forages for Resistance to Insects and Aflatoxin**

Objectives: Identify genetic mechanisms that impart resistance to insects and aflatoxin and transfer resistance genes to agronomically acceptable plant types. Determine mechanisms of inheritance of resistance genes and develop breeding techniques that efficiently transfer these genes. Develop mid/short-season corn inbreds with antibiosis/nonpreference-type resistance to the corn earworm/fall armyworm.

Total funding: \$184,400

Aflatoxin-related portion:

Plant Resistance Factors \$ 73,800

Project Number: 6602-24000-001-00D

Title: Plant Resistance and Germplasm Enhancement for Insect
Pests of Southern Crops

Objectives: Artificially infest and evaluate corn, sorghum,
peanut, and forage grasses for resistance to
insect pests and toxin-producing fungi.
Determine mechanisms of pest resistance.
Determine economic thresholds and economic injury
levels for pests. Develop and release resistant
germplasm.

Total funding: \$530,100

Aflatoxin-related portion:

Management/Cultural Practices for Prevention	\$127,200
Plant Resistance Factors	\$ 53,000

Project Number: 6604-42000-004-00D

Title: Biochemical, Environmental, and Microbiology
Resistance for Preharvest Aflatoxin Resistance

Objectives: Control mycotoxins, aflatoxin in particular, by
(1) developing biocompetitive agents such as non-
aflatoxigenic strains of *Aspergillus flavus* and
A. parasiticus, (2) evaluating the role of peanut
phytoalexins in producing field resistance to
aflatoxin contamination, and (3) developing and
evaluating other appropriate prevention
strategies as these become apparent.

Total funding: \$318,300

Aflatoxin-related portion:

Analytical Methods \$142,000

Plant Resistance Factors \$176,300

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

RESEARCH PROJECTS ON PREVENTION OF AFLATOXIN FORMATION

FISCAL YEAR 1990

(As of April 5, 1990)

Performing Organization: North Carolina State University

Title: Breeding Peanuts for Aflatoxin Resistance

Objectives: Significantly reduce or eliminate aflatoxin contamination in cultivated peanut products by identifying and utilizing plant genotypes with known multiple levels of partial resistance to *Aspergillus* species and to toxin production. Investigate the inheritance and usefulness of preharvest and postharvest resistance for selected hybrids that hold promise for restricting aflatoxin production. Identify sources of *Aspergillus* resistance and restricted aflatoxin production in cultivated wild *Arachis* species. Incorporate newly identified sources of resistances into commercially acceptable peanut cultivars by utilizing sources of resistances identified.

Total funding:

\$13,286

Performing Organization: University of Arizona

Title: Management of Aflatoxin Contamination of Cottonseeds
Using Seed-borne Endophytic Bacteria

Objectives: Develop biological control procedures for the management of cottonseed contamination by aflatoxin. Expand cotton endophyte collection through isolation from seeds, flowers, and bolls of commercially grown Arizona cotton. Screen endophytic isolates for the ability to become systemically established within cotton plants and to colonize boll tissues. Identify endophytic isolates that form large population sizes in wounded boll tissue. Screen endophytic isolates for their ability to eliminate or reduce cottonseed aflatoxin contamination under greenhouse conditions. Field test endophytic isolates that effectively reduce aflatoxin contamination of cottonseeds in the greenhouse.

Total funding: \$32,641

Performing Organization: North Carolina State University

Title: Molecular Approaches to Control Aflatoxin
Contamination of Food Sources

Objectives: To clone and sequence gene coding for enzymes in the aflatoxin pathway. Determine and study the factors that regulate aflatoxin biosynthesis in *Aspergillus flavus*. Develop control strategies for aflatoxin contamination based on information developed.

Total funding: \$58,051

Performing Organization: Iowa State University

Title: Development of a Predictive Model of *Aspergillus*
Flavus Invasion of Preharvest Maize

Objectives: Accumulation of environmental, biological, and physical parameters to serve as a basis for the development of the model system to enhance the field application of biocontrol agents.

Total funding: \$35,000

Performing Organization: University of Illinois

Title: Identification of Molecular Markers Associated With Genes for Preharvest Resistance in Corn to *Aspergillus flavus* and Aflatoxin Production

Objectives: Produce a large group of F1 hybrids by crossing a large, genetically diverse set of corn inbreds onto two inbreds (B73 and Mo17) representing the genetic base of hybrids extensively used in the Corn Belt. Evaluate and improve inoculation methods for screening for resistance to *A. flavus* in corn. Evaluate the resultant F1 hybrids for genetic resistance to *A. flavus* in the field. Evaluate the top 10 percent most resistant hybrids for aflatoxin production in the laboratory. Identify germplasm that expresses a dominant form of resistance to *A. flavus* and aflatoxin production. Develop different F2 populations from different F1 hybrids that exhibit resistance to *A. flavus* and aflatoxin production. Plant F2 seed, sample individual plant tissue, and inoculate and evaluate F3 seed on F2 plants for resistance to *A. flavus* and aflatoxin production. Identify F2 generation demonstrating the best differential for resistance/susceptibility to *A. flavus* and isolate deoxyribonucleic acid (DNA) from plant tissue samples corresponding to the highest 10 percent and lowest 10 percent of plants for resistance to *A. flavus* and aflatoxin production within this generation. Perform molecular marker analyses on the DNA samples to identify

chromosome regions associated with resistance to
A. flavus and aflatoxin production.

Total funding: \$27,748

Performing Organization: University of Georgia Research Foundation

Title: Biological Control of *Aspergillus flavus* and
Aspergillus parasiticus by *Paecilomyces lilacinus*

Objectives: Determine potential of *Paecilomyces lilacinus* to
be a biological control agent by colonizing *A.*
flavus and *A. parasiticus*. Determine, in field
and laboratory environment, conditions allowing
mycoparasitism of *A. flavus* and *A. parasiticus*
sclerotia and mycelia by *P. lilacinus*. Determine
if *P. lilacinus* is a true mycoparasite by
evaluating the colonizing ability of strains
recently isolated from naturally colonized
sclerotia buried in Georgia and Illinois.

Total funding: \$40,000

Performing Organization: University of California, Berkeley
University of California, Davis

Title: Genetic Variation in the Resistance of Various Cultivars of Pistachio, Almond, and Walnut to *Aspergillus flavus/parasiticus* and Determination of Environmental and Ecological Factors Necessary for Stable and Efficient Preharvest Aflatoxin Suppression Facilitated by the Use of Atoxigenic Strains of *A. flavus/parasiticus*.

Objectives: Determine genetic variation in the resistance of 10 to 14 cultivars each of pistachios, almonds, and walnuts to *Aspergillus flavus/parasiticus*. Search for atoxigenic strains of *A. flavus* or other microorganisms native to tree nut orchards in California and use them to suppress (or exclude) *A. flavus/parasiticus* in preharvest pistachios, almonds, and walnuts. Determine the effects of altering cultural practices (irrigation and cover crops) in tree nut orchards that affect environmental conditions and the changes in the mycoflora of pistachio, almond, and walnut fruits, especially for *Aspergillus flavus/parasiticus*. Determine the involvement of hemipterans in contaminating pistachio (and/or almond and walnut) with *A. flavus* and the effects on aflatoxin accumulation.

Total funding:

\$83,024

Performing Organization: ARS, Georgia Coastal Plain Experiment
Station, Tifton, Georgia

Title: Identification of Peanut Germplasm With Resistance to
Aflatoxin

Objectives: Identify peanut germplasm with resistance to preharvest aflatoxin contamination. Year 1: Develop an effective and efficient mass screening method for detecting aflatoxin resistant germplasm. Select a core collection of 700 cultivated peanut genotypes to represent the entire U.S. cultivated species collection and increase the seed supply. Year 2: Screen the core collection of the cultivated species developed in year 1 with the best mass screening method identified in year 1. Select a core collection of 200 wild species peanut genotypes to represent the entire U.S. wild species collection and increase the seed supply.

Total funding: \$43,000

Performing Organization: National Peanut Research Lab, Dawson,
Georgia

Title: Elucidate the exact mechanisms (timing, route, etc.)
by which peanuts are infected with aflatoxigenic
fungi.

Objectives: Select/screen for parasitic organisms (viruses,
bacteria, fungi, insects, etc.) against A.
flavus/A. parasiticus. Study the effect of
Chitosan on preharvest aflatoxin contamination
in collaboration with the Southern Regional
Research Center, New Orleans group.

Total funding:

\$166,250

Performing Organization: Southern Regional Research Center,
Mycotoxin Research, New Orleans,
Louisiana

Title: Biocontrol of *A. Flavus* Using Biocompetitive Agents,
and Enhancement of Host Plant Resistance

Objectives: Test effectiveness of crab or shrimp-derived chitin or chitosan products as (1) soil amendments to inhibit growth of *A. flavus* and/or to enhance bacterial and/or other microbial populations that are suppressive to fungal growth; (2) seed treatments, amended with natural biocompetitive flora, to compete and suppress *A. flavus* in the soil; and (3) treatments to induce defense chemicals (phytoalexins) and associated resistance against infection by *A. flavus*. Biochemically characterize crops with measurable levels of resistance against *A. flavus* (i.e., corn) and compare with biochemical profiles of highly susceptible varieties of the crop. Replace aflatoxin producing strains of *A. flavus* with nonproducing *A. flavus* strains in field environments.

Total funding: \$166,500

UNITED STATES DEPARTMENT OF AGRICULTURE
COOPERATIVE STATE RESEARCH SERVICE

AFLATOXIN RESEARCH PROJECTS

(As of October 18, 1989)

Project Number: ALA00563

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: To reduce mycotoxin contamination by developing evaluation procedures, improving host plant genotypes, agronomic practices, decontamination methods, and storage procedures. To study the epidemiology, biochemistry, and physiology of mycotoxigenic fungi and the role of arthropods in dissemination. To analyze and assess grains for aflatoxins, other mycotoxins, and toxigenic fungi and to improve sampling and analytical methods.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: ALA00583

Title: Cellular and Molecular Genetics for Crop Improvement

Objectives: Identification and characterization of agriculturally important genetic systems.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: ALA00609

Title: Disease Resistance and Immunity in Poultry

Objectives: Determine the effects of subclinical levels of aflatoxin on the growth, performance, and immune response of young broiler chickens and turkey poults. Evaluate infectious bursal disease vaccination programs for broiler and broiler breeder chickens. Evaluate Newcastle disease vaccination programs for broiler and broiler breeder chickens. Determine the influence of heredity on acquired resistance conferred by coccidiosis vaccination. Potentiate the immune response of young broiler chickens to coccidiosis vaccination.

Start date: 10/01/83

Termination date: 09/30/88

Project Number: ALA00612

Title: Mycotoxicology of *Aspergillus Flavus* and Other Fungi

Objectives: Identify mycotoxins of fungi associated with agricultural commodities, feeds, and foods. Determine the effect of nutritional and environmental factors on mycotoxin production by *A. flavus* and other fungi. Determine the influence of extrachromosomal genetic elements on the production of aflatoxin and other mycotoxins.

Start date: 10/01/83

Termination date: 09/30/88

Project Number: ALA00645

Title: Growth of and Toxin Production by Fungi Contaminating Foods, Feeds, and Forages

Objectives: Isolate and identify fungi from grain sorghum, and other foods, feeds, and forages associated with possible mycotoxicoses. Screen fungi for toxigenicity in bioassays with experimental animals. Determine the effect of environment and other factors on growth and toxin production of toxigenic fungi on natural and synthetic substrates.

Start date: 11/01/84

Termination date: 09/30/89

Project Number: ALA00707

Title: Nutrition and Feeding of Cultured Warmwater Fishes

Objectives: Requirements for selected amino acids and vitamins, and energy for channel catfish, tilapia, and grass carp will be determined under controlled environment conditions using purified diets.

Start date: 02/01/87

Termination date: 09/30/91

Project Number: ALA00771

Title: Effect of Antimetabolites and Degradative Enzymes on Aflatoxin Production by *Aspergillus Flavus*

Objectives: Determine the effect of emetine and related methoxy compounds on the biosynthesis of aflatoxins. Identify enzymes that degrade aflatoxin.

Start date: 10/01/88

Termination date: 09/30/93

Project Number: ALA00793

**Title: Epidemiology and Ecology of Aflatoxin-Producing Fungi
and Rhizosphere-Inhabiting Organisms in Peanuts**

**Objectives: Determine the effects of environmental factors
and ecological interactions with other
rhizosphere-inhabiting organisms on aflatoxin
production by Aspergillus spp. in peanuts.
Simulate rhizosphere-organismal development and
effects, using peanut/Aspergillus spp.
interaction as a model. Examine effects of
applications of chemicals or biocontrol organisms
on organisms in the rhizosphere of peanuts.**

Start date: 10/01/89

Termination date: 09/30/94

Project Number: ALAX-2-279-14-3160

Title: An Interdisciplinary Approach to Optimum Food Utility of Peanuts in SAT Africa

Objectives: Design and implement a research program to determine the food utility of the peanut for semi-arid tropics (SAT) of Africa via:
Description and understanding of variations in environment, socioeconomics, and food technologies as they constrain the preservation and utilization of peanut supplies; analysis of the current and potential dietary role of existing peanut products; research on improvement of existing peanut products with suitable energy density, nutrient concentrations, and preferred tastes at acceptable cost; insurance of safety of products with particular reference to mycotoxins in raw and finished products; exchange of peanut germplasm for breeding varieties resistant to aflatoxin.

Start date: 09/01/84

Termination date: 08/31/87

Project Number: ARK00934

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: To determine the effects of mycotoxins, the effects of their interactions on domestic animals, and their presence in edible tissue. To analyze and assess grains for toxigenic fungi, aflatoxin, and other mycotoxins, and to improve sampling and analytical methods.

Start date: 10/01/82

Termination date: 09/30/87

Project Number: ARK00985

Title: Biological Effects of Mycotoxins

Objectives: Characterize symptoms produced by mycotoxins and determine pathology and pathogenesis of symptoms.

Start date: 12/01/82

Termination date: 09/30/87

Project Number: ARK01227

Title: Environmental Influences on Physiological and
Metabolic Responses in Poultry

Objectives: To determine the physiological basis of environmentally induced hemodynamic and metabolic alterations in gastrointestinal, splanchnic, renal, and reproductive vasculatures. To investigate the role of acid-base balance in maintenance of body homeostasis. To interrelate hemodynamic, metabolic, or acid-base alterations with productivity.

Start date: 10/01/85

Termination date: 09/30/90

Project Number: ARZT-136181-H-23-007

Title: Determination of Toxic/Mutagenic Potentials of Fungal, Algal, and Plant Toxins in Foods and Feeds

Objectives: Mycotoxins: To evaluate on-site use of immunochemical methods for monitoring aflatoxin contamination in cottonseed and corn and the safety of ammonia/aflatoxin decontamination reaction products in foods. Seafood toxins: To isolate and identify toxins associated with ciguatera poisoning by culturing and exposing fish to ciguatoxic dinoflagellates. Plant toxins: To determine the toxicological profiles of intrinsic components of herbal tea preparations and herbal plants native to Arizona.

Start date: 07/21/88

Termination date: 09/30/91

Project Number: ARZT-137074-R-23-089

Title: Improve Food Safety Through Discovery and Control of
Natural and Induced Toxicants

Objectives: Determine effects of agricultural practices,
biotechnological manipulation, and processing on
natural toxicants in foods; develop methods to
minimize their occurrence.

Start date: 10/01/87

Termination date: 09/30/92

Project Number: ARZT-171744-R-05-89

Title: Improve Food Safety by Control of Natural Toxicants

Objectives: Understand conditions contributing to the occur-
rence of natural toxicants. Develop strategies
for controlling natural toxicants in food.

Start date: 10/01/82

Termination date: 09/30/87

Project Number: CA-D*-ETX-2813-RR

Title: Improve Food Safety Through Discovery and Control of
Natural and Induced Toxicants

Objectives: Detect and identify presently unknown natural toxicants in raw and processed foods. Develop rapid and sensitive analytical and bioassay methods for screening known toxicants in foods. Determine effects and mode of action of natural toxicants in animals and assess human health risk. Elucidate the mechanisms of formation and transmission of toxicants in the food chain.

Start date: 10/01/87

Termination date: 09/30/92

Project Number: CA-D*-ETX-3739-AH

Title: Nature, Occurrence, and Effects of Toxic Chemicals in
Animals

Objectives: Toxic chemicals from various sources may produce acute or long-term deleterious effects on economic animals or lead to injurious residues for potential consumers. This project will investigate the nature, occurrence, and biological effects of chemicals to which economic species are exposed.

Start date: 05/10/82

Termination date: 09/30/88

Project Number: CA-D*-POM-3158-H

Title: Postharvest Technology in Fruit Marketing

Objectives: Conduct research to reduce pathological, physiological, and physical losses after harvest. Studies will include the following: Improved temperature management practices; further use of controlled (CA) or modified (MA) atmospheres; potential/suitability of species and cultivars for long distance shipping; physical injury resistance and/or ability to heal wounds; disease resistance.

Start date: 10/01/86

Termination date: 09/30/91

Project Number: CA-D*-POM-3604-RR

Title: Improve Food Safety by Control of Natural Toxicants

Objectives: Develop strategies for controlling natural toxicants in food. Develop rapid analytical methods for detection and surveillance of natural toxicants.

Start date: 10/01/82

Termination date: 09/30/87

Project Number: CONS00606

Title: Occurrence of Mycotoxins in Feeds and Foods and Their Effects on Animal and Human Health

Objectives: Detect, identify, and quantitate mycotoxins and their metabolites in feeds and foods.

Start date: 04/01/87

Termination date: 09/30/90

Project Number: FLA-ANS-02265

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: Determine the effects of mycotoxins and the effects of their interactions on domestic animals and their presence in edible tissues.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: FLA-FOS-02265

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: To determine the effect of mycotoxins and the effect of their interactions and their presence in edible tissues.

Start date: 10/01/82

Termination date: 08/01/85

Project Number: FLA-FOS-02710

Title: Reduction of Aflatoxin Content in Peanut Seeds by Microwave Roasting

Objectives: Determine if medium intensity microwave energy (MIME) is an effective method for reducing aflatoxin amounts in peanut seeds. Evaluate the effects of MIME on the sensory and nutritional qualities of peanut seeds. Evaluate the toxicological effects of aflatoxin reaction products in microwave roasted peanut seeds.

Start date: 10/01/88

Termination date: 09/30/93

Project Number: FLA-VME-02265

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: Determine the effects of mycotoxins and the effects of their interactions on domestic animals and their presence in edible tissues.

Start date: 10/01/82

Termination date: 12/31/85

Project Number: FLAX85001

Title: Effect of Genetic, Agronomical, and Environmental Factors on Peanut Seed Quality

Objectives: Evaluate the foliage from annual and perennial peanuts for use as a fodder. Determine the effect of cultural and curing practices on peanut seed composition. Develop a maturity index and correlate with harvesting. Determine biochemical bases for pest resistance and *Aspergillus* spp. Identify nutritionally rich protein fractions in peanut seed.

Start date: 10/01/85

Termination date: 09/30/90

Project Number: GEO-RF-330-099

Title: Groundnut Pest Management in Burkina Faso

Objectives: Identify the major economic pests of groundnut in Burkina Faso. Relate relative pest abundance to groundnut seasonal and developmental phenology. Develop economic injury levels for the major economic pests by quantifying the relationship between pest density and yield loss. Develop control strategies for insect pest management that fit into the cultural, socioeconomic conditions of the farmer.

Start date: 05/01/83

Termination date: 06/30/90

Project Number: GEO-02-0229

Title: Breeding Peanuts for Resistance to Aflatoxin-Producing Strains of Aspergillus Species

Objectives: Develop high quality peanuts with resistance to toxin-producing molds.

Start date: 03/01/87

Termination date: 02/28/92

Project Number: GEO00343

Title: Nutrition and Management of Swine in Confinement

Objectives: Study the influence of electrolyte balance on performance and on skeletal abnormalities in growing-finishing swine. Quantify the interrelationships between vitamin and mineral nutrition in growing swine. Determine the effects of low levels of aflatoxin in the diet on reproductive performance of sows.

Start date: 07/01/81

Termination date: 06/30/86

Project Number: GEO00358

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: Determine effects of mycotoxins and the effects of their interactions on domestic animals and presence in edible tissues. Study epidemiology, biochemistry of mycotoxigenic fungi, and role of arthropods in dissemination. Analyze and assess grain for aflatoxin, other mycotoxins, and toxigenic fungi and improve sampling and analytical methods.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: GEO00365

Title: Identification and Analysis of Mycotoxins

Objectives: To develop mycotoxin methods suitable for use at peanut buying points and in finished products. To define the role of irrigation, calcium, and other nutrients in field aflatoxin contamination. To isolate and identify new toxic fungal metabolites.

Start date: 01/01/83

Termination date: 01/01/88

Project Number: GEO00434

Title: Aflatoxins in Peanuts

Objectives: To develop and evaluate methods suitable for use at the buying point to help identify aflatoxin-contaminated lots. To characterize and identify genetic differences in peanuts that affect aflatoxin accumulation in order to have a reasonable chance of identifying sources of resistance to the A. flavus group. To evaluate the influence of current harvesting and drying practices on aflatoxin contamination of farmers' stock peanuts.

Start date: 07/01/88

Termination date: 06/30/93

Project Number: GEO00435

Title: Improved Methods for the Determination of Mycotoxins

Objectives: To apply state-of-the-art chromatographic techniques to the determination of mycotoxins in human and animal feedstuffs in order to improve the selectivity, sensitivity, efficiency, speed, and reliability of the chromatographic techniques.

Start date: 07/01/88

Termination date: 06/30/93

Project Number: GEO00837

Title: Mycotoxin Distribution and Control in Foods and Food Processing Facilities

Objectives: To survey apple and grape products produced in Georgia for the presence of mycotoxins to (1) investigate why some agricultural commodities are more susceptible to mycotoxin contamination than others, (2) determine the possible presence of airborne mycotoxins in processing facilities, and (3) evaluate the potential benefit of naturally occurring anticarcinogens.

Start date: 07/01/84

Termination date: 06/30/90

Project Number: GEO00864

Title: Genetics of Aspergillus Flavus

Objectives: To sample natural populations of A. flavus. To conduct heterokaryon compatibility tests and identify h-c groups. To synthesize heterokaryons and heterozygous diploids for parasexual genetic analyses. To identify and map genes controlling heterokaryon incompatibility.

Start date: 07/01/85

Termination date: 09/30/86

Project Number: GEO01416

Title: Process for Development and Utilization of Peanut Products

Objectives: To optimize the process for making paste from peanuts for use as an imitation cheese spread and as a food ingredient; to optimize processes for preparing peanut tofu spreads flavored with chocolate and fruit; develop extraction and pasteurization processes for producing a palatable peanut beverage; develop fermented products from aqueous extracts of peanuts; and evaluate nondestructive methods for removing aflatoxins from peanuts.

Start date: 04/01/88

Termination date: 03/31/92

Project Number: GEO01422

Title: Physical Properties of Peanut for Processing
Alternatives

Objectives: To develop improved and alternate separation technologies for peanut processing by measuring selected physical and rheological properties to evaluate fluidized bed medium (FBM) separation concepts and to improve shelling characteristics, and apply Nuclear Magnetic Resonance (NMR) principles for sensing and evaluating moisture/aflatoxin content in peanuts.

Start date: 09/01/88

Termination date: 08/31/92

Project Number: ILLU-70-0358

Title: Occurrence of Mycotoxins in Feeds and Foods and Their Effects on Animal and Human Health

Objectives: Detect, identify, and quantitate mycotoxins and their metabolites in feeds and foods. Investigate effects of mycotoxins on animal health and productivity. Improve diagnostic criteria, techniques, and treatment for mycotoxicoses. Improve methods for controlling formation of and for detoxifying mycotoxins in feeds and foods. Develop recommendations for utilization or disposal of contaminated feeds. Study the biosynthesis and disposition of mycotoxins and their metabolites in microbial, plant, or animal systems. Support analytical reference centers for mycotoxins and fungus cultures. Develop and evaluate an interdisciplinary computerized information system for mycotoxins and mycotoxicoses.

Start date: 10/01/85

Termination date: 09/30/90

Project Number: ILLV-CVM-070-359

Title: Fuel Alcohol as an Alternative Use For Aflatoxin-
Contaminated Corn

Objectives: To produce fuel alcohol from corn contaminated
with aflatoxin, treat the mash to destroy the
aflatoxin, and conduct feeding studies with
stillage in livestock and poultry.

Start date: 10/01/81

Termination date: 09/30/86

Project Number: 8400115

Title: Source and Dispersal of Aspergillus Flavus Primary
Infective Inoculum

Objectives: Quantification of Aspergillus flavus sclerotial
contribution to primary contamination of field
corn in Tifton, Georgia.

Start date: 06/01/84

Termination date: 12/31/86

Project Number: IOW02365

Title: Bacterial and Fungal Spores in Food and Feed

Objectives: To investigate physical and chemical means of controlling bacterial and fungal spoilage in foods and feeds. Evaluate such factors as water activity, temperature, ph, chemicals, and irradiation for the control of germination and outgrowth of bacterial and fungal spores of importance in causing spoilage or producing toxic substances in foods and feeds. To study the survival and destruction of spores in the presence of germicides and the influence of the environment on the efficiency of these germicides when used for sanitizing surfaces.

Start date: 07/01/87

Termination date: 09/30/92

Project Number: IOW02406

Title: Occurrence of Mycotoxins in Feeds and Foods and Their Effects on Animal and Human Health

Objectives: Characterize toxigenic fungi, substrates, and environmental conditions associated with mycotoxin production. Detect, identify, and quantitate mycotoxins and their metabolites in feeds and foods. Investigate effects of mycotoxins on animal health and productivity. Improve diagnostic criteria, techniques, and treatment for mycotoxicoses. Improve methods for controlling formation of, and for detoxifying, mycotoxins in feeds and foods. Develop recommendations for utilization or disposal of contaminated feeds. Study the biosynthesis and disposition of mycotoxins and their metabolites in microbial, plant, or animal systems.

Start date: 10/01/85

Termination date: 09/30/90

Project Number: IOWV-410-23-46

Title: Computer Imaging of Livestock Behavior and Disease

Objectives: Develop a microcomputer pattern recognition system for monitoring the behavioral activity of swine. Evaluate the system in two studies: The first study will examine swine feeding behavior following the presentation of unpalatable feed. The second study will assess behavioral changes occurring during the onset of disease induced by a clinically toxic dose of aflatoxin. Experimental results to be used to evaluate the potential of such a system as a tool for improving management practices and in the early detection of disease.

Start date: 02/01/87

Termination date: 09/30/90

Project Number: IOWV-416-23-18

Title: Relationship of Mycotoxins to Swine Reproductive Failure

Objectives: To provide a prospective study of the relationship between reproductive disease in swine and mycotoxins in the feed supply. To evaluate the usefulness of producer sampling of feeds to verify prior harmful exposure to mycotoxins. To provide evidence for the occurrence of common mycotoxins in feed supplies provided to midwestern swine.

Start date: 07/15/84

Termination date: 12/31/87

Project Number: KAN00124

Title: Occurrence of Mycotoxins in Feeds and Foods and Their Effects on Animal and Human Health

Objectives: Characterize toxigenic fungi, substrates, and environmental conditions associated with mycotoxin production. Improve methods for controlling formation of, and for detoxifying, mycotoxins in feedstuffs and foods, and develop recommendations for utilization or disposal of contaminated feeds.

Start date: 10/01/85

Termination date: 09/30/90

Project Number: KANV00052

Title: Biochemical Examination of Avian Blood to Determine the Presence of Hepatic Disease

Objectives: To determine whether common mammalian plasma biochemical indicators of liver disease are applicable to various avian species. To evaluate plasma biliverdin concentration as an indicator of avian hepatic disease. To study the effects of aflatoxicosis in the pigeon model for seed-eating birds.

Start date: 10/01/85

Termination date: 09/30/86

Project Number: KY00490

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: Study the epidemiology, biochemistry, and physiology of mycotoxigenic fungi and the role of arthropods in dissemination.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: LAB02496

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: To determine the effects of mycotoxins and the effects of their interactions on domestic animals and their presence in edible tissues.

Start date: 01/01/86

Termination date: 09/30/86

Project Number: MD-JM-118

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: To determine the effects of mycotoxins and the effects of their interactions on domestic animals and their presence in edible tissues. To study the epidemiology, biochemistry, and physiology of mycotoxigenic fungi and the role of arthropods in dissemination.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: MD-M-230

**Title: Mycotoxicoses in Commercial Poultry: Descriptive
Toxicology and Preventive Measures**

Objectives: To determine and measure physiological parameters in poultry affected by aflatoxin and ochratoxin. To determine and measure physiological parameters in poultry affected by ochratoxin and citrinin with special attention to modes of action for each. To characterize interactions between T-2 toxin and other mycotoxin, such as aflatoxin and ochratoxin. To develop an avian model system for the evaluation of the existence and extent of mycotoxin/stressor synergism and to describe such interactions when they occur. To provide a practical estimate of the type and extent of mycotoxicoses affecting poultry production in Maryland. To assess efficacy of mold inhibitors and determine an integrated approach to prevention and control of mycotoxin contamination of feeds.

Start date: 10/01/85

Termination date: 09/30/88

Project Number: MD-M-231

Title: Response of the Avian Reproductive System to Dietary Mycotoxin

Objectives: To investigate the effects of aflatoxin, ochratoxin, and citrinin on avian endocrine function and reproductive performance. To examine the relationship of the duration and age at toxin exposure to the severity on mycotoxicoses in poultry. To provide further basis for improvement in poultry performance and production in Maryland.

Start date: 10/01/85

Termination date: 09/30/88

Project Number: ME08755

Title: In Vitro and In Vivo Studies of Fish and Shellfish
Neoplasia

Objectives: This project is designed to further our knowledge of the characteristics and etiology of neoplasms of finfish and shellfish. Specifically, studies will be initiated to induce neoplastic transformation in cells of bivalve and teleost origin and to study the characteristics of those cells as compared with cells from naturally occurring neoplasms. The characteristics that will be studied include alterations of morphological, biochemical, and immunological properties of the transformed cells. Biochemical analyses will include fibronectin, polar and neutral lipids, fatty acid, and glycosphingolipid composition of transformed cells.

Start date: 10/01/87

Termination date: 09/30/92

Project Number: MICL00584

Title: Chemical Changes as Related to Quality Factors in Meat

Objectives: Relate chemical changes occurring in meat from time of slaughter through consumption to quality of meat and meat products. Determine and relate chemical changes in muscle tissue to physical, organoleptic, and nutritive value of meat. Ascertain the effects of processing on the chemical constituents of meat and relate them to the desirable and undesirable attributes.

Start date: 10/01/57

Termination date: 01/08/85

Project Number: MICL06838

Title: Animal Mycotoxicoses: Prevention and Therapy

Objectives: To determine the feasibility of using active and passive immunization for prevention against and therapy for mycotoxicoses in laboratory animals. Protection against mycotoxicoses will be initially tested in laboratory mice. The long-term objectives will be to test similar immunization procedures for other mycotoxins and utilize the most successful of these immunization procedures in food-producing animals, such as swine and poultry.

Start date: 01/14/85

Termination date: 12/31/87

Project Number: MIS-1413

Title: Plant Resistance to Diseases and Insects in Corn and Hybrid Testing

Objectives: Continue to search for and develop sources of resistance to maize dwarf mosaic, maize chlorotic dwarf, southern corn rust, Fusarium moniliforme, Aspergillus flavus, southwestern corn borers, and fall armyworms. Determine effectiveness and inheritance of resistance. Determine adaptability and performance of commercial hybrids.

Start date: 07/01/80

Termination date: 06/30/85

Project Number: MIS-1415

Title: Disease, Insect, and Nematode Resistance of Corn for
the South

Objectives: Continue to search for and develop sources of
resistance to maize dwarf mosaic, maize
chlorotic dwarf, southern corn rust, Fusarium
moniliforme, Aspergillus flavus, southwestern
corn borers, and fall armyworms. Initiate a
program on nematode resistance in corn.
Determine effectiveness and inheritance of pest
resistance in corn.

Start date: 07/01/85

Termination date: 06/30/90

Project Number: MO-00296-3

Title: Occurrence of Mycotoxins in Feeds and Foods and Their Effects on Animal and Human Health

Objectives: Detect, identify, and quantitate mycotoxins and their metabolites in feeds and foods. Improve methods for controlling formation of, and for detoxifying, mycotoxins in feeds and foods, and develop recommendations for utilization or disposal of contaminated feeds. Study the biosynthesis and disposition of mycotoxins and their metabolites in microbial, plant, or animal systems. Support analytical reference centers for mycotoxins and fungus cultures, and develop and evaluate an interdisciplinary computerized information system for mycotoxins and mycotoxicoses.

Start date: 10/01/85

Termination date: 09/30/90

Project Number: MO-00298

Title: Resistance of Maize and Fescue to Fungal Pathogens and Mycotoxin-Producing Fungi

Objectives: To rapidly identify sources of genetic and/or cytoplasmic incompatibility in maize to *Aspergillus flavus* and in fescue to *Epichloe typhina*. To investigate virulence among fungal isolates in natural and model environments. To test the gene-for-gene hypothesis in host-parasite associations of corn and fescue with the anamorphs of these fungi.

Start date: 07/01/85

Termination date: 09/30/89

Project Number: MO-00304

Title: Corn Improvement Through Resistance to Corn Pathogens

Objectives: To identify sources of resistance in exotic, U.S. Corn Belt genotypes and the wild relatives of corn, *Zea diploperennis*, the diploid perennial teosinte and the annual teosinte, *Z. mexicana*, and transfer these to usable background genotypes. Use recurrent selection in the field to increase frequencies of favorable genotypes.

Start date: 07/01/83

Termination date: 09/30/86

Project Number: MO-00305

Title: The Role of Plant Defense Systems in Limiting
Aflatoxin B(1) (AFB) Accumulation

Objectives: Demonstrate that corn kernels produce induced secondary metabolites which alter the rate of aflatoxin (AFB) synthesis by *Aspergillus flavus*. Identify the elicitors produced by *A. flavus* and characterize the corn metabolites. Determine whether variability for synthesis of the corn metabolite exists among corn lines or within populations.

Start date: 09/01/85

Termination date: 08/31/90

Project Number: MO-00377

Title: Maize Improvement Through Breeding and Genetics

Objectives: Identify factors that limit maize production in Missouri. Develop breeding populations from adapted and exotic germplasm sources that would alleviate those factors. Develop breeding methods and new techniques for maize improvement in respect to stalk and root quality; host-plant resistance, including insect and plant diseases; grain quality; rapid field dry down capabilities; superior white inbred lines; strains with cobs suitable for manufacture of cob pipes; and stress endurance.

Start date: 07/01/70

Termination date: 09/30/86

Project Number: MO-00830

Title: Critical Evaluation of New Chromatography Techniques
for Diagnostic Mycotoxicology

Objectives: Develop rapid diagnostic methods of analysis for naturally occurring mycotoxins and their metabolites in a variety of feedstuffs, animal tissues, and body fluids. Critically appraise the overall importance of suspected mycotoxicoses to diagnostic veterinary medicine in Missouri.

Start date: 10/01/84

Termination date: 09/30/88

Project Number: NC01175

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: To reduce mycotoxin contamination by developing evaluation procedures, improving host plant genotypes, agronomic practices, decontamination methods, and storage conditions. Determine the effects of mycotoxins, the effects of their interactions on domestic animals, and their presence in edible tissues. Study the epidemiology, biochemistry, and physiology of mycotoxigenic fungi and the role of arthropods in dissemination. Analyze and assess grains for aflatoxin, other mycotoxins, and toxigenic fungi. Improve sampling and analytical methods.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: NC03452

Title: Peanut Breeding and Genetics

Objectives: Develop peanut breeding lines and cultivars with higher yields, greater insect resistance, early maturity, and improved quality characteristics. Generate information and breeding procedures to efficiently utilize available diverse germplasm.

Start date: 10/01/84

Termination date: 09/30/90

Project Number: NC03508

Title: Peanut Diseases and Their Control

Objectives: Epidemiology and control of peanut diseases. Ecology of soilborne pathogens.

Start date: 07/01/75

Termination date: 09/30/87

Project Number: NC03820

Title: Management of Stored Grain

Objectives: Evaluate grain protectants for insect management. Determine the value of sanitation in insect management. Cooperate in determining the association of stored grain insects with aflatoxin. Survey of stored grain insects.

Start date: 10/01/83

Termination date: 09/30/88

Project Number: NC03853

Title: Beef Cattle Finishing Systems for Eastern North Carolina

Objectives: To compare different environmental systems. To investigate the feeding of aflatoxin-contaminated corn.

Start date: 04/01/84

Termination date: 09/30/88

Project Number: NC03910

Title: Epidemiology and Host Parasite Interaction of Corn Diseases in North Carolina

Objectives: Determine influence of environment on epidemiology of *Aspergillus flavus* and *Cercospora zae-maydis*; the factors regulating aflatoxin production in culture; the mechanism of resistance in *C. zae-maydis* to cercosporin; the nature of resistance in plants to maize dwarf mosaic virus (MDMV); and the distribution, ecology, and seed transmission of MDMV strains.

Start date: 11/01/84

Termination date: 09/30/89

Project Number: NC05151

Title: Variety Evaluation of Corn, Corn Silage, Small Grain,
Grain Sorghum, and Soybeans

Objectives: Evaluate corn, corn silage, grain sorghum, small grains, and soybean cultivars, hybrids, and experimental lines now in production or under consideration for release, with respect to adaptation, yield, plant characteristics, chemical properties, pathological data, and quality factors. Seek methods of improving the precision and efficiency of conducting official variety tests. Examine genotype and environment interactions and the stability of hybrids and cultivars as they perform in North Carolina with respect to yield.

Start date: 10/01/84

Termination date: 09/30/89

Project Number: NC06105

Title: Expression and Regulation of Genes for Aflatoxin Biosynthesis

Objectives: To isolate the genes required for aflatoxin biosynthesis in *Aspergillus flavus* by complementation of aflatoxin-negative mutants with a cloned gene library. Determine and analyze the nucleotide sequence of these genes. Determine when these genes are actively transcribed and what conditions affect transcription.

Start date: 10/01/89

Termination date: 09/30/94

Project Number: NC07033

Title: Effects of Nutritional Factors and Multiple Mycotoxin Contamination on the Performance of Swine

Objectives: To determine whether interactive effects exist between mycotoxins. Establish the ability of swine to tolerate single or multiple mycotoxin contamination in the diet. Determine if nutrient content of diets can be modified to enhance resistance to dietary mycotoxins.

Start date: 01/01/85

Termination date: 09/30/89

Project Number: NC07034

Title: Analysis of Mycotoxin Residues in Food Animals to
Diagnose Exposure

Objectives: Diagnose exposure of animals to aflatoxin,
trichothecenes, or zearalenone. Apply mass
spectral techniques to confirm the identities of
mycotoxin residues in animals. Expand the
computerized mass spectral library of mycotoxins.

Start date: 01/01/86

Termination date: 09/30/90

Project Number: NC07041

Title: Involvement of the Reticuloendothelial System in
Response to Aflatoxicosis in Turkey Poults

Objectives: Determine the short- and long-term effects of
aflatoxin B(1) following pre/post natal exposure
on turkey monocytes and macrophage function.
Determine the genotoxic effects of AF-B(1) on
turkey macrophages in vitro. Investigate the
relationship between the genotoxic and
immunotoxic effects following treatment of turkey
macrophages with AF-B(1) in vitro.

Start date: 04/01/88

Termination date: 09/30/89

Project Number: NC05537

Title: Peanut Varietal Improvement for Thailand and the Philippines

Objectives: Develop peanut varieties and breeding lines with high yields, early maturity; tolerance to environmental stress; resistance to rust, cercospora leafspots, Aspergillus flavus, and Sclerotium wilt. Develop agronomic systems of production suitable for exploitation of new varieties in cropping systems of Thailand and the Philippines.

Start date: 01/01/83

Termination date: 06/30/90

Project Number: NC05547

Title: Compositional Uniqueness of North Carolina Feedstuffs and Effect on Utilization by Dairy Cattle

Objectives: Evaluate usage and value of feed analyses. Investigate Near Infrared Reflectance Spectroscopy for determination of feed composition. Compile data on nutritional composition and evaluate consequences of utilizing feeds with unique compositions.

Start date: 07/01/83

Termination date: 09/30/87

Project Number: NC05549

Title: Fungal Activity and Mycotoxins in Poultry Feeds

Objectives: Determine specific practices within feed mills that encourage fungal activity and mycotoxin production. Determine the extent to which feed ingredients other than corn are contaminated with mycotoxins. Determine specific management factors that can reduce the chances of fungal activity and subsequent mycotoxin formation at the farm level.

Start date: 10/01/83

Termination date: 09/03/87

Project Number: NC05634

Title: Measurement and Preservation of Peanut Quality During Marketing, Handling, and Storage

Objectives: Develop improved procedures and equipment to determine the quality of peanuts and to preserve peanut quality during handling and storage.

Start date: 10/01/86

Termination date: 09/30/90

Project Number: NC09354

Title: Identification of Genes for Aflatoxin Biosynthesis

Objectives: Isolate genes required for aflatoxin biosynthesis by complementation of aflatoxin-negative mutants with a cloned gene library. Determine the nucleotide sequence of these genes and analyze these sequences for information about their translation products. Determine the time and cultural conditions when these genes are actively transcribed and how transcription is correlated with aflatoxin biosynthesis.

Start date: 07/01/88

Termination date: 06/30/90

Project Number: NEB-14-024

Title: Mycotoxicoses of Swine in Nebraska

Objectives: Diagnostic capabilities for analyses of mycotoxins in animal and plant material matrices. Survey occurrence of mycotoxicoses in Nebraska swine over 5-year period. Investigate effects of selected mycotoxicoses in swine and possible therapeutic and prophylactic regimens.

Start date: 07/28/80

Termination date: 09/30/85

Project Number: NEB-14-040

Title: Occurrence of Mycotoxins in Feed and Foods and Their Effects on Animal and Human Health

Objectives: Improve methods for controlling formation of, and for detoxifying, mycotoxins in feed and foods, and develop recommendations for utilization or disposal of contaminated feeds. Investigate effectiveness of chemical detoxicants on deoxynivalenol, zearalenone and ergot-contaminated grains. Determine statistically significant effectiveness for detoxicants with greater than 50 percent mycotoxin reduction efficacy. Investigate effectiveness of chemical detoxicants in combinations of two on mycotoxin-contaminated grains. Establish statistically significant effectiveness for detoxicant combinations that reduce decontamination times.

Start date: 10/01/85

Termination date: 09/30/90

Project Number: NEB-16-033

Title: Marketing and Delivery of Quality Cereals and Oilseeds
in Domestic and Foreign Markets

Objectives: Identify quality factors and determine their economic significance to producers, marketers, and end-users of grains. To relate quality factors to urgent problems of safety and health, such as dust explosions, microorganisms, mycotoxins, and chemical (pesticide) contamination. Develop equipment, techniques, and grain varieties to improve quality throughout the production and marketing system and determine their economic feasibility.

Start date: 10/01/83

Termination date: 09/30/88

Project Number: NEB-48-004

Title: Occurrence of Mycotoxins in Feeds and Foods and Their Effects on Animal and Human Health

Objectives: Characterize toxigenic fungi, substrates, and environmental conditions associated with mycotoxin production. Improve methods for controlling formation of, and for detoxifying, mycotoxins in feeds and foods, and develop recommendations for utilization or disposal of contaminated feeds. Participate in development and evaluation of an interdisciplinary computerized information system for mycotoxins and mycotoxicoses with other NC-129 members.

Start date: 10/01/85

Termination date: 09/30/90

Project Number: NJ10201

Title: Improving the Assurance of Quality and Safety of
Consumer's Food

Objectives: Determine the mechanisms by which certain specific food components (natural, process-induced, intentionally and unintentionally added) influence potential dietary-induced carcinogenesis. Develop procedures to rapidly identify the presence of specific toxic materials in the food supply. Elucidate the mechanisms that regulate microbial growth and/or synthesis of microbial toxins by food pathogens and potential pathogens.

Start date: 10/01/83

Termination date: 09/30/89

Project Number: NJ10540

Title: Feasibility Study on the Use of Sodium Bicarbonate to
Reduce Aflatoxin Contamination of Grains

Objectives: To confirm and more clearly elaborate the antimicrobial activity of sodium bicarbonate against a variety of organisms of spoilage and pathogenic significance.

Start date: 03/01/87

Termination date: 09/30/90

Project Number: NYC-399428

Title: Protein-Induced Alteration of Hepatocarcinogenesis

Objectives: The relationship between dietary protein intake and selected biochemical events involved in the post-initiation development of liver preneoplasia will be evaluated.

Start date: 05/15/84

Termination date: 12/31/87

Project Number: NYCV-480-320

Title: Dietary Modulation of Chemical and Viral Hepatocarcinogenesis

Objectives: To discover which dietary factors are related to increased or decreased risk of liver cancer, and to use dietary modulation to enhance understanding of the mechanisms of hepatocarcinogenesis.

Start date: 12/01/83

Termination date: 11/31/86

Project Number: ORE00062

Title: Metabolism and Carcinogenicity of Aflatoxins and Other Food-Borne Carcinogens

Objectives: Aflatoxin B1 is a potent food-borne toxin and one of only 30 compounds described as human carcinogens. The long-term objective is to understand mechanisms of carcinogenicity of this and related compounds so that rational approaches can be made toward elimination of their health effects, if not their exposure, in humans and animals. The rainbow trout has proven a useful and highly sensitive comparative species for cancer research. Studies in this project will improve methods for cancer testing of rare chemicals, and improve our understanding of basic molecular biology of cancer by aflatoxins and other food-borne carcinogens.

Start date: 04/01/87

Termination date: 03/31/92

Project Number: ORE00108

Title: Improve Food Safety Through Discovery and Control of
Natural and Induced Toxicants

Objectives: Develop rapid and sensitive analytical and
bioassay methods of screening known toxicants in
foods. Determine effects and mode of action of
natural toxicants in animals and assess human
health risk. Identify and investigate modes of
action of food-borne factors that may reduce the
impact of dietary carcinogens.

Start date: 10/01/87

Termination date: 09/30/92

Project Number: ORE00911

Title: Temperature Effects on Xenobiotic Elimination by
Fishes

Objectives: The general objective of this project is
increased understanding of how modulation of
hepatic detoxication systems alter toxicity of
xenobiotics in rainbow trout.

Start date: 07/01/86

Termination date: 06/30/91

Project Number: PENV-5-22734

Title: Molecular Mechanisms of Chemical Carcinogenesis

Objectives: To determine the role of mitochondrial, genetic, and metabolic injury in cytotoxicity and in the multistep carcinogenesis induced by structurally diverse compounds like aflatoxin B1, benzo pyrene, dimethyl benzanthracene, dimethylazobenzene, and nitrosamines.

Start date: 02/01/78

Termination date: 03/31/90

Project Number: SC00526

Title: Metabolism, Toxicokinetics, and Physiological Effects of Aflatoxin B(1) in the Bovine

Objectives: Characterization of metabolic and toxicokinetic profiles of aflatoxin B(1) in the bovine and effects of potential dietary MFO inducers on these pathways. Examine estrogenic effects of major bovine liver metabolites of AFB(1) by an invitro estrogen receptor assay. Investigate effects of AFB(1) and metabolites on various aspects of the bovine immune system in vivo and in vitro. Attempt to devise a rapid, sensitive enzyme immunoassay system for AFM(1) in milk.

Start date: 10/01/81

Termination date: 06/30/87

Project Number: SC01023

Title: Mycotoxins of Corns and Other Feed Grains

Objectives: To reduce mycotoxin contamination by developing evaluating procedures, improving host plant genotypes, agronomic practices, decontamination methods, and storage conditions. To study the epidemiology, biochemistry, and physiology of mycotoxigenic fungi and the role of arthropods in dissemination. To analyze and assess grains for aflatoxin, other mycotoxins, and toxigenic fungia, and improve sampling and analytical methods.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: SC01060

Title: Dietary Factors Affecting Cholecalciferol Metabolism
in Poultry

Objectives: To determine the effect of contaminants in feed on the absorption and metabolism of cholecalciferol.

Start date: 07/18/83

Termination date: 06/30/87

Project Number: SC01090

Title: Suppression of Aflatoxin and Nematodes in Corn Through Cultural Practices

Objectives: Aflatoxin formation in preharvest corn will be evaluated in prolific and nonprolific hybrids. Minimum and conventional tillage systems will be examined for their effects on preharvest aflatoxin formation. Nematode populations will be evaluated in corn grown conventionally and under a minimum tillage cropping system. The role of organic residue on nematode population dynamics will be studied.

Start date: 07/01/84

Termination date: 06/30/89

Project Number: SC01124

Title: Dietary Factors Affecting the Toxic or Immune Responses of Ruminants to Mycotoxins

Objectives: Assess ability of certain dietary constituents for inducing lymphocyte MFO activity toward production of mutagenic metabolites of AFB(1), and subsequent binding to lymphocyte DNA. Evaluate effects of high levels of clovers in endophyte-contaminated pastures for reducing or augmenting stocker steer response to fescue toxicity.

Start date: 05/01/85

Termination date: 09/30/89

Project Number: SC01241

Title: Effects of Aflatoxin B(1) on Bovine and Avian T-Cell Function in Vitro

Objectives: Examine the effect of AFB(1) and aflatoxicol on bovine and avian macrophage and T-lymphocyte function in vitro.

Start date: 08/01/87

Termination date: 07/31/90

Project Number: SD00440

Title: Analysis of Mycotoxins and Selected Pesticides

Objectives: Establishment of a mycotoxin screening program and the determination of the extent of regional mycotoxin occurrence. Methodology will be developed for targeted pesticides (strychnine, fluoroacetate).

Start date: 10/01/80

Termination date: 09/30/84

Project Number: TEN00678

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: To reduce mycotoxin contamination by developing evaluation procedures, improving host plant genotypes, agronomic practices, decontamination methods, and storage conditions. Determine the effects of mycotoxins and the effects of their interactions on domestic animals and their presence in edible tissues. Study the epidemiology, biochemistry, and physiology of mycotoxigenic fungi and the role of arthropods in dissemination. Analyze and assess grain for aflatoxin, other mycotoxins, and toxigenic fungi. Improve sampling and analytical methods.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: TEN00768

Title: Analysis Assay and Control of Mycotoxins in
Agricultural Products

Objectives: Evaluate chemical and biological methods for
analysis of mycotoxins. Study the immunological,
mutagenic and carcinogenic effects of mycotoxins.
Determine the incidence of selected mycotoxins in
foods and evaluate methods to control their
occurrence.

Start date: 03/01/85

Termination date: 09/30/89

Project Number: TEN00786

Title: Drying Grain Sorghum and Minor Crops in Tennessee

Objectives: Evaluate drying parameters for grain sorghum and
minor crops using laboratory-scale systems.
Identify alternative drying methods for these
crops.

Start date: 10/01/85

Termination date: 09/30/89

Project Number: TEX-02-2434 (6785)

Title: Mechanistic Studies of Ochratoxin A and Citrinin-
Induced Nephropathy in Swine

Objectives: Develop efficacious analytical protocols for detection and structural confirmation of the mycotoxins ochratoxin A and citrinin in swine tissues. Elucidate the molecular mechanisms and structure/activity relationships involved in the nephrotoxic action/interaction of ochratoxin A, citrinin, corresponding metabolites, and poly-substituted congeners.

Start date: 09/01/84

Termination date: 03/31/88

Project Number: TEX01882

Title: Genetic Improvement of Peanut to Alleviate Production Constraints and Enhance Product Quality

Objectives: Develop peanut varieties for Texas with improved agronomic traits, tolerance to environmental stresses, resistance to important diseases, and with high market quality. Devise improved screening techniques and evaluate new germplasm for useful genetic traits. Evaluate new promising varieties in important peanut-growing areas of the state.

Start date: 04/01/87

Termination date: 03/31/92

Project Number: TEX03751

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: Determine the effect of mycotoxins, the effects of their interactions on domestic animals, and their presence in edible tissues. Analyze and assess grains for aflatoxin, other mycotoxins, and toxigenic fungi. Improve sampling and analytical methods.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: TEX06215

Title: Developmental Toxicity of Mycotoxins: Mechanisms of Action/Interaction and Detoxification

Objectives: Determine the mechanisms of developmental toxicity of environmentally important mycotoxins and naturally occurring mycotoxin mixtures from animal feed sources and develop practical detoxification measures to antagonize these effects.

Start date: 10/01/86

Termination date: 09/30/91

Project Number: TEX06332

Title: Isolation and Identification of Mycotoxin and Other Fungi Associated With Peanut Plants and Soil

Objectives: Isolate and identify mycotoxic fungi associated with peanuts in Texas. Correlate occurrence of fungal species in Texas with occurrence in other farming areas in order to integrate information to improve yields and quality of peanuts. Conduct cooperative work with toxicologists to pinpoint potential problems associated with toxic fungi.

Start date: 11/02/84

Termination date: 10/30/89

Project Number: TEX06682

Title: Mycotoxin Management in Peanuts by Prevention of Contamination and Monitoring

Objectives: Determine when peanuts are invaded by mycotoxin-producing fungi. Develop rapid, accurate analytical procedures for detection of mycotoxins in peanuts, peanut products, and tissues and biological fluids from animals. Discover production, harvest, and curing practices that can help minimize mycotoxin contamination. Develop inspection procedures for rapid detection and diversion of mycotoxin-contaminated peanuts into processing for cleanup and/or detoxification.

Start date: 07/01/83

Termination date: 06/30/90

Project Number: TEX06719

Title: Mycoflora and Mycotoxin Damage of Peanuts: Host-Parasite Management Strategies

Objectives: Isolate and identify pathogenic, antagonistic, and hypoparasitic microorganisms associated with peanut soils and plant parts. Determine the ecological significance of microorganisms in healthy plant parts. Screen breeding lines for resistance to pathogenic fungi and characterize the resistant barriers. Devise an improved sorting system for removal of mold-damaged kernels in the shelling plant.

Start date: 07/31/84

Termination date: 07/30/89

Project Number: TEX06735

Title: Predictive Tests for Mycotoxicity

Objectives: Develop short-term, in-vitro assay systems that can predict the relative prenatal toxicity (e.g., abortion, stillbirth) of food- and feed-borne mycotoxins. Elucidate the underlying genetic mechanisms that mediate the maternal and fetal toxicity of food- and feed-borne toxicants.

Start date: 09/04/84

Termination date: 09/30/89

Project Number: TEX06825

Title: Diagnostic Assays for Mycotoxin-Induced Reactivation
of Integrated IBR Virus

Objectives: Design diagnostic assay systems for mycotoxin-
induced latent IBR viral reactivation and
induction using the aflatoxins as model mycotoxin
species.

Start date: 02/14/86

Termination date: 09/30/88

Project Number: TEX06830

Title: Experimental Assessments of the Developmental Toxicity
of Feedborne Mycotoxins

Objectives: Characterize the developmental toxicity of
commonly occurring mycotoxin combinations, in
vivo and in vitro. Determine the distribution
and excretion of selected mycotoxin combinations
in vivo and accumulation and metabolism in the
fetus (in vivo and in vitro).

Start date: 02/14/86

Termination date: 09/30/88

Project Number: TEXV-0501

Title: Comparative Medicine

Objectives: Determine the feasibility of enzyme replacement therapy for genetic diseases. Determine the effects of ochratoxin A in the partially nephrectomized rat. Determine the acute biologic and toxic effects of halogenated pollutants in humans. Develop a model system for virus-induced atherosclerosis in humans. Determine the effect of aerobic conditioning on the pathobiology of atherosclerosis in miniature pigs. Determine the electrophysiological, histological, and behavioral effects of four pyrrolidine derivatives in a mouse model of Huntington's Disease. Elucidate the expression of cloned human genes in bacteria. Determine the kinetics of melanoma regression in swine.

Start date: 10/01/81

Termination date: 09/30/88

Project Number: TEXV-0505

Title: Cellular and Molecular Toxicology

Objectives: Gamete and preimplantation embryo physiology and genetic engineering. Bioactivation of mycotoxin aflatoxin B-1. Prenatal toxic and teratogenic symbols to identify hazardous agents associated with fossil fuels. Morphologic and metabolic responses of astrocytes in cattle and in culture to epliptogenic agents. Surface cables and surface coats of pathologic cardiac cells. Ontogeny of cligodendroglia. Epidermal implant union in percutaneous implants. The role of ion channel blockers in neurotoxicity. Membrane mechanisms of alcohol. Brain mechanisms of motor control. Marmoset wasting syndrome. Structural studies of the Bowhead whale and a marine stranding network. Behavioral evaluation of cat litter usage.

Start date: 11/02/84

Termination date: 12/31/92

Project Number: UTA00112

Title: Immunotoxicity of Naturally Occurring Feed
Contaminants

Objectives: Evaluate effects of selected mycotoxins, e.g., aflatoxin B(1), fusarium toxins in selected species of food animals and laboratory animals. Investigate factors that influence or moderate effects of mycotoxins on immunologic responses, and compare the immunotoxic effects of mycotoxins in food animals vs. laboratory animals, in order to characterize the mechanism of effects.

Start date: 07/01/87

Termination date: 06/30/92

Project Number: UTA00126

Title: Mechanisms of Action of Animal Toxicants

Objectives: Assess the molecular effects of various mycotoxins (principally Aflatoxins) and poisonous plant alkaloids (principally Senecio and Larkspur) using in vitro cell cultures from important food animal species. The most commonly used cell line will be bovine kidney tubular. In some cases, whole animal studies will be initiated to validate in vitro work.

Start date: 07/01/87

Termination date: 06/30/92

Project Number: UTA00129

Title: Pulmonary Toxicology of Aflatoxin B(1)

Objectives: The carcinogen aflatoxin B(1) is a common contaminant in respirable grain dusts. The plan of the proposed research is to assess the carcinogenic potential of AFB(1) to the respiratory system in agricultural workers.

Start date: 04/01/84

Termination date: 09/30/86

Project Number: UTA00476

Title: Improve Food Safety Through Discovery and Control of Natural and Induced Toxicants

Objectives: Detect and identify presently unknown toxicants in raw and processed foods. Develop rapid and sensitive analytical and bioassay methods for screening known toxicants in foods. Determine effects and mode of action of natural toxicants in animals and assess human health risk.

Start date: 10/01/87

Termination date: 09/30/92

Project Number: VA-135066

Title: Application of Molecular Cloning Methods to the Study of Aflatoxin Biosynthesis

Objectives: Study the mechanism of regulation of aflatoxin biosynthesis at the level of transcription of genes specific for secondary metabolism. Assess the genetic competence of strains of fungi to synthesize aflatoxin.

Start date: 04/01/87

Termination date: 03/31/92

Project Number: VA-136033

Title: Mycotoxins of Corn and Other Feed Grains

Objectives: Study the epidemiology, biochemistry, and physiology of mycotoxigenic fungi and the role of arthropods in dissemination.

Start date: 10/01/82

Termination date: 09/30/88

Project Number: VA-137007

Title: Effect of Selenium on Immune Responses and Disease Resistance in Beef Cattle

Objectives: Determine optimal dietary selenium (Se) concentration for maximum immune response and disease resistance in weaned beef calves. Determine effect of parenteral Se on immune response. Determine which components of immune response, i.e., humoral vs. cell mediated, are enhanced by Se supplementation. Determine if optimal dietary selenium concentration for weanling beef cattle, which was determined in the first year of study, will also enhance humoral immunity of cows and the passive immunity of their calves. Determine effects of optimal selenium in these same parameters. Investigate interaction of the optimal level of selenium supplementation with aflatoxin, a known immunosuppressive mycotoxin, with respect to humoral immunity and production parameters in beef calves.

Start date: 10/01/86

Termination date: 09/30/89

Project Number: VA-137065

Title: Immodulation in Swine With Vitamin E and Selenium

Objectives: Establish optimal concentrations of selenium and vitamin E in the diet for the maximum immune response in swine. Determine if enhanced immune response measurements correspond with animal resistance as measured by bacterial and toxin challenges.

Start date: 10/01/85

Termination date: 09/30/88

Project Number: WIS02041

Title: Immunochemical Studies on Carcinogenic Mycotoxin

Objectives: Develop a method for the production of antibody against several carcinogenic mycotoxins (aflatoxins, T-2 toxin, penicillic acid, patulin, sterigmatocystin, and a group of cocarcinogenic mycotoxins) and their metabolites and DNA adducts. Develop a radioimmunoassay (RIA) and enzyme-linked immunosorbent assay (ELISA) for mycotoxin detection.

Start date: 01/01/84

Termination date: 12/31/90

Project Number: WIS02830

Title: Elimination of Aflatoxin From Milk

Objectives: Maximize elimination of aflatoxin from milk using hydrogen peroxide plus riboflavin or lactoperoxidase, bisulfide, bentonite, or irradiation. Determine safety of treated milk and suitability of such milk for manufacture of some dairy products. Determine fate of aflatoxin in treated milk.

Start date: 07/01/83

Termination date: 06/30/86

Project Number: WIS02919

Title: Effects of Feeding Aflatoxins to Sows on Disease Susceptibility in Young Pigs

Objectives: Determine if corn contaminated with aflatoxins causes significant immunosuppression in fetal or neonatal pigs when sows are fed during gestation or the lactation period.

Start date: 09/15/84

Termination date: 09/30/88

Project Number: WIS05110

Title: Occurrence of Mycotoxins in Feeds and Foods and Their Effects on Animal and Human Health

Objectives: Characterize toxigenic fungi, substrates, and environmental conditions associated with mycotoxin production. Detect, identify, and quantitate mycotoxins and their metabolites in feeds and foods. Investigate effects of mycotoxins on animal health and productivity. Improve diagnostic criteria, techniques, and treatments for mycotoxicosis. Study the biosynthesis and disposition of mycotoxins and their metabolites in microbial, plant, and animal systems.

Start date: 10/01/85

Termination date: 09/30/90

Project Number: WIS05147

**Title: Marketing and Delivery of Quality Cereals and Oilseeds
in Domestic and Foreign Markets**

Objectives: Relate quality factors to urgent safety and health problems, such as dust explosions, microorganisms, mycotoxins, and chemical (pesticide) contamination. Develop techniques and instrumentation for improving the detection and quantification of quality factors in market channels.

Start date: 01/01/83

Termination date: 09/30/88

Project Number: WYO-184-83

Title: Improve Food Safety Through Discovery and Control of Natural and Induced Toxicants

Objectives: Determine effects and mode of action of natural toxicants in animals and assess human health risk.

Start date: 10/01/87

Termination date: 09/30/92

Project Number: WYO-01000

Title: Effects of Selected Mycotoxins on Immunological and Resistance Mechanisms of Animals

Objectives: Determine the presence, extent, and nature of suppression by selected mycotoxins on humoral and cellular mechanisms of immunity. Investigate possible synergism in immunogenesis by aflatoxin and T-2 toxin.

Start Date: 03/28/83

Termination Date: 12/31/87

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