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Agricultural Research Division News

The Institute of Agriculture and Natural Resources

Office of the Dean, 207 Ag Hall
Lincoln, NE 68583-0704
Phone (402) 472-2045

University of Nebraska-Lincoln

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COMMENTS FROM THE DEAN

State and federal decision-makers are closely scrutinizing budgetary expenditures including those allocated for support of research by Land-Grant University faculty members. Although SAES scientists have a tremendous history of accomplishments, members of Congress, State Senators and support groups are saying "Don't tell me what you did for us yesterday, but tell me what you are doing for us today and will do for us in the future". They also say "How are you changing to meet the future needs of Nebraska's agriculture, businesses and people". In other words, justify why you should continue to receive funding from the taxpayers.

Most scientists find it difficult to explain their accomplishments in lay terms or to provide a clear and simple justification for their research project and, thus, organized efforts are needed. During the past few years, ARD has undertaken several activities to increase the visibility of faculty research efforts. In-depth news releases have been disseminated to highlight specific research accomplishments and to explain the benefits from investments in research, the "Highlights" section of the **ARD Annual Report** has been strengthened by professionals writing about faculty accomplishments in lay terms. **RESEARCH Nebraska!** was created to provide a reader-friendly picture of our research programs and **Endeavors** was recently published to focus on selected research outcomes of interest to a broad range of Nebraskans. **Endeavors** is a low-cost, four-page handout that will be used to show how investments in ARD research payoff in a wide variety of ways. The publication will be used in discussions with members of the Unicameral and Congress, support groups, and state and university officials.

ARD will continue to disseminate information about research accomplishments in all ways possible, but we need the assistance of faculty to ensure that our collective message is delivered to broad audiences. There are several actions that faculty can take: (i) ensure that information generated in research is provided to users at the earliest possible time through Cooperative Extension or other providers of information, (ii) work cooperatively with Vicki Miller and other members of the ICCS staff on news releases, in-depth stories and electronic media interviews, and (iii) take every opportunity to speak about your research with neighbors, service clubs, Chambers of Commerce, etc. Your assistance is crucial if we are to maintain our current level of programs.

Darrell W. Nelson
Dean and Director

106TH ANNUAL REPORT FOR ARD

The 106th Annual Report for the Agricultural Research Division was recently published. The report is mandated by legislation that established the Nebraska Agricultural Experiment Station in 1887 and is officially prepared for the Governor. Copies of the Annual Report have been provided to unit administrators and members of the ARD Advisory Council. We have asked that unit administrators circulate the Annual Report to all faculty members. A few extra copies are available for faculty who have a need and desire for a personal copy. Please contact the ARD office if you wish to receive a copy of the report.

Steve Waller and Dora Dill provided leadership for the Annual Report. We would also like to acknowledge the efforts of Terry Meisenbach and the ICCS staff in ensuring that a top-quality report was published.

FORM FOR RECORDING ALLOCATION OF PROGRAM RESOURCES

In response to requests from deans, directors, and unit administrators a "Form for Recording Allocation of Program Resources" has been developed by the Office of Sponsored Programs. The form will provide information needed to document the percent of effort/activity by units on proposals and grants/contracts prepared for external funding. This will assist the Comptroller's Office in crediting indirect cost recovery to the proper unit. This form should be attached to the Proposal Approval and Routing Form. This form is needed **only** when more than one unit is to receive funding from a grant. The signatures of the unit administrator and dean will confirm the division of resources. The blank forms have been sent to the units by the Office of Sponsored Programs.

The Agricultural Research Division provides information and educational programs to all people without regard to race, color, national origin, sex or handicap.

NEW OR REVISED PROJECTS

The following station projects were approved recently by the USDA Cooperative State Research Service:

NEB-11-091 (Biological Systems Engineering) Development of Engineering Solutions for Machine Control Systems for Handicapped Farmers
Investigator(s): L. I. Leviticus and M. F. Kocher
Status: New State project effective March 1, 1992

NEB-11-094 (Biological Systems Engineering) Use of Global Positioning Systems in Production Agriculture
Investigator: L. L. Bashford
Status: New Hatch project effective September 3, 1992

NEB-12-225 (Agronomy) Studies on the Mechanisms Found in Corn, Sorghum and Pearl Millet Which Improve N Uptake & Use
Investigator: J. W. Maranville
Status: New Hatch project effective October 1, 1992

NEB-12-226 (Agronomy) Determination of Carbon Tetrachloride Transport Coefficients in Porus Media
Investigator: J. Skopp
Status: New Hatch project effective October 1, 1992

NEB-12-227 (Agronomy) Perennial Forage Grass Breeding for Nebraska
Investigator: K. P. Vogel
Status: New State project effective October 1, 1992

NEB-15-022 (Biochemistry) Regulation of Photosynthetic Processes
Investigator: R. Chollet
Status: Revised Hatch project that contributes to regional project NC-142 effective October 1, 1992

NEB-16-048 (Food Science & Technology) Development of New Processes and Technologies for the Processing of Poultry Products
Investigator: G. Froning
Status: Revised Hatch project that contributes to regional project NC-183 effective October 1, 1992

NEB-17-045 (Entomology) Black Fly Damage Thresholds, Biology and Control
Investigator: K. P. Pruess
Status: Revised Hatch project that contributes to regional project NE-118 effective October 1, 1991.

NEB-20-048 (Horticulture) Influence of Sulfur and Nitrogen on the Growth and Development of Ornamental Plants
Investigator: E. T. Paparozzi
Status: Revised Hatch project effective November 1, 1992

NEB-21-050 (Plant Pathology) Genetic Engineering of Crop Plants to Sclerotinia Resistance
Investigator(s): A. Mitra and M. Dickman
Status: New Special Grant effective July 1, 1992

NEB-26-022 (Forestry, Fisheries & Wildlife) Wildlife and Sustainable Agroecosystems
Investigator: R. M. Case
Status: New State project effective January 6, 1993

GRANTS & CONTRACTS RECEIVED DECEMBER 1992 AND JANUARY 1993

Agricultural Meteorology	
Miscellaneous Grants Under $5,000 each	3,481
Agronomy	
Sander, D. H. - Pioneer Hi-Bred International	46,000
Miscellaneous Grants Under $5,000 each	22,555
Animal Science	
Miscellaneous Grants Under $5,000 each	20,757
Biochemistry	
Ragsdale, S. - ONR	70,000
Biological Systems Engineering	
Weller, C. - USDA/CSRS	67,000
Center for Sustainable Agricultural Systems	
Helmers, G. - University of California	47,030
Director's Office	
Waller, S. - USDA/CSRS	75,000
Entomology	
Miscellaneous Grants Under $5,000 each	33,175
Food Processing	
Miscellaneous Grants Under $5,000 each	1,100
Food Science & Technology	
Miscellaneous Grants Under $5,000 each	10,105
Forestry, Fisheries & Wildlife	
Brandle, J. R. - USDA	19,569
Hoagland, K. - ONR	93,726
Horticulture	
Miscellaneous Grants Under $5,000 each	19,875
Northeast Research & Extension Center	
Miscellaneous Grants Under $5,000 each	21,280
Panhandle Research & Extension Center	
Miscellaneous Grants Under $5,000 each	6,930
South Central Research & Extension Center	
Miscellaneous Grants Under $5,000 each	7,000
Veterinary Science	
Miscellaneous Grants Under $5,000 each	10,330
Water Center	
Miscellaneous Grants Under $5,000 each	15,000
West Central Research & Extension Center	
Miscellaneous Grants Under $5,000 each	2,025
Grand Total	**$ 591,938**

PROPOSALS SUBMITTED FOR FEDERAL GRANTS

The following is a listing of proposals that were submitted after October 1, 1992 by faculty for federal grant programs. While not all grants will be funded, we applaud the faculty member's effort in submitting proposals to the various agencies.

Dale Swartzendruber - U.S. Environmental Protection Agency - Simultaneous Movement of Water/Chlorinated Hydrocarbon/Air in Porous Media as Measured by Dual-Energy Gamma-Ray Attenuation - $239,897

Joseph Skopp - U.S. Environmental Protection Agency - Determination of Unsaturated Hydraulic Conductivity in Porous Media for Two Chlorinated Hydrocarbons - $225,997

William E. Easterling - Dept. of Energy's National Institute for Global Environmental Change - Administration of the Great Plains Regional Center for Global Environmental Change - $16,223

Joel E. Cahoon, Dean E. Eisenhauer and William Powers - National Research Initiative Competitive Grants Program - USDA - Predicting the On-Farm Impact of Surged Flow Irrigation - $57,491

Kathy Prochaska-Cue, E. Raedene Combs and Elizabeth P. Davis - USDA/Special Research Grant - Housing Affordability in Rural Areas - $75,725

Raymond J. Supalla, Derrel L. Martin and John C. Allen - USDA/Water Quality - Analysis of Public Policy Alternatives for Improving Groundwater Quality in Irrigated Regions of the Central Plains - $127,829

Roy F. Spalding and Vitaly Zlotnik - USDA/Water Quality - Groundwater Herbicide Mobility and Persistence under Induced Flow Conditions - $107,052

Roy F. Spalding, Dennis R. Alexander, Derrel L. Martin and Mary E. Exner - USDA/Water Quality - Sprinkler Irrigation as a Remedial Technique for VOC-Contaminated Groundwater - $147,249

Garald L. Horst, William L. Powers, Patrick J. Shea and Steven D. Comfort - USDA/Water Quality - Irrigation Schedule Modification to Minimize Chemical Transport Below Turfgrass - $149,618

Richard B. Ferguson, Gary W. Hergert, Joel E. Cahoon, Todd A. Peterson and Carol A. Gotway - USDA/Water Quality - Factors Influencing Spatial Yield and N Use Efficiency of Furrow-Irrigated Corn - $149,854

Wayne E. Woldt, Istvan Bogardi, Carol Gotway and Mohamed Dahab - USDA/Water Quality - Use of Imprecise Information on Spatial Variability to Control Nutrient Leaching - $105,891

Steve L. Taylor and Dan A. Neumeister - USDA/Special Research Grant - Development and Quality/Safety Enhancement of Specialty Food Products - $47,328

Robert G. Wilson, Gary L. Hein and Eric D. Kerr - National Research Initiative Competitive Grants Program - USDA - Integrated Systems for Control of Canada Thistle - $127,040

Shawn M. Kaeppler - National Research Initiative Competitive Grants Program - Genetic Map Distances Versus Physical Chromosome Distances in Maize - $223,109

P. Stephen Baenziger and Yang Yen - National Research Initiative Competitive Grants Program - Exploring the Interface of Qualitative and Quantitative Genetics - $200,900

Judy Anne Driskell and Marilyn Schnepf - Aerobic Capacity of Smokers & Nonsmokers & Antioxidant Vitamin Supplementation - $154,448

Gregory D. Binford - U.S. Geological Survey - Minimizing Nitrate Contamination of Groundwater During Production of Corn Following Sugar Beets - $26,200

Kyle D. Hoagland - U.S. Geological Survey - Synergistic and Chronic Effects of Agricultural Pesticides on Benthic Algal Communities in Nebraska Streams - $38,165

Blair D. Siegfried - U.S. Geological Survey - Biochemical Determinants of Pyrethroid Toxicity to Selected Aquatic Insects - $13,530

Steven D. Comfort and Patrick J. Shea - U.S. Geological Survey - Predicting Pesticide Degradation and Transport Characteristics in the Vadose Zones of the Platte River Valley - $52,725

Garald L. Horst and Steven D. Comfort - U.S. Geological Survey - Irrigation Schedule Management to Minimize Chemical Transport Below Turfgrass - $26,055

Milford A. Hanna - USDA/Special Grant - Industrial Agricultural Products Center - $103,858

Charles A. Francis - USDA/Special Grant - Integrated Crop/Livestock Research for Sustainable Systems in Nebraska - $66,091

Joel Cahoon and Dean Eisenhauer - USDA/Water Quality - Observation/Response Techniques to Enhance Furrow Irrigation - $78,263

John P. Markwell and John C. Osterman - National Research Initiative Competitive Grants/USDA - Overexpression of Chlorophyll - $115,564

James R. Brandle - National Research Initiative Competitive Grants/USDA - Microclimate Impacts of Shelterbelts in Agroforestry Ecosystems - $95,412

Amit Mitra and James L. VanEtten - National Research Initiative Competitive Grants Program - Strong Plant Promoters from Chlorella Viruses - $299,696

Paul E. Staswick - National Research Initiative Competitive Grants/USDA - Jasmonate Signaling in Plants - $209,681

H. Edward Grotjan, Debora L. Hamernik and Yuannan Xia - National Research Initiative Competitive Grants/USDA - Bovine Luteinizing Hormone Bioactivity: Role of Oligosaccharides - $340,939

Joel E. Cahoon and Dean E. Eisenhauer - National Research Initiative Competitive Grants/USDA - Tillage Practice Influence on Surged Flow Irrigation Performance - $71,211

Debora L. Hamernik - National Research Initiative Competitive Grants/USDA - Regulated Expression of the GnRH Gene in Ruminants - $252,645

James E. Kinder - National Research Initiative Competitive Grants/USDA - Ovarian Follicular Development in Prepubertal Heifers: Role of LH, FSH and Estradiol - $242,202

Blair D. Siegfried, Tony Zera and Z B Mayo - National Research Initiative Competitive Grants/USDA - Biochemistry of Insecticide Resistance in the Greenbug, *Schizaphis graminum* (Homoptera: Aphididae) - $165,377

Gerald E. Duhamel, Raul G. Barletta and Michael J. Wannemuehler - North Central Region/IPM - Application of Salmonella-Carrier Pig Detection to Swine Herd Health Management - $75,000

Bruce E. Anderson, John E. Watkins and Steve D. Danielson - North Central Region/IPM - Pest Control in Alfalfa as Affected by Grazing, Haying, Burning or Tillage - $73,464

Raul G. Barletta and Louis Perino - North Central Region/IPM - Mycobacteriophages as Epidemiological and Diagnostic Tools for Paratuberculosis - $75,000

James E. Partridge and James E. Specht - North Central Region/IPM - Soybean Disease Resistance Mechanisms Subordinate to Heat Shock Response - $75,000

Robert J. Wright, Ronald C. Seymour and John B. Campbell - North Central Region/IPM -Irrigation Practices for Preventive Management of Corn Spider Mites - $64,402

Catherine E. Dewey - North Central Region/IPM - Eradication of Pseudorabies: A Geographical Computer-based Approach - $74,832

Subramaniam Srikumaran, and Clinton J. Jones - North Central Region/IPM - Molecular Cloning and Characterization of the Cellular Receptor for Bovine Herpesvirus 1 - $75,000

Catharine E. Dewey - North Central Region/IPM - Associations Between Disease, Antibiotics, Management, and Production in Swine - $74,529

Robert G. Wilson, Gary L. Hein and Eric D. Kerr - North Central Region/IPM - Integrated Systems for Control of Canada Thistle - $75,000

Clayton L. Kelling, Richard D. Oberst and Louis J. Perino - Concurrent Viral Respiratory Infections of Cattle - $74,996

Leon G. Higley - North Central Region/IPM - Narrow Rows as a Preventive Tactic Against Soybean Arthropod Defoliators - $17,550

James R. Brandle and William E. Easterling - NIGEC - Assessment of Climate Change on Mixed Agricultural and Forested Landscapes on the North American Great Plains - $362,100

Kyle D. Hoagland and Stephen G. Ernst - NIGEC - Impacts of Global Climate Change on Phytoplankton Productivity in Lakes Along a Thermal Gradient - $248,848

David W. Stanley-Samuelson - NIH - A Beckman TLX Ultracentrifuge and Rotors - $37,320

Stephen W. Ragsdale and Marion H. O'Leary - NIH - Purchase of an Ultracentrifuge - $37,320

John Golbeck - NSF -Resolution & Reconstitution of Photosystem I in Cyanobacteria & Higher Plants: Molecular Biological & Physiochemical Studies - $8,000

William E. Easterling - NIGEC - Great Plains Regional Center for Global Environmental Change - Administration - $41,671

Wayne E. Woldt - NIGEC - Implications of Global Environmental Change on Environmental Functions of Wetlands in the Great Plains - $238,420

S. B. Verma, T. J. Arkebauer and F. G. Ullman - NIGEC - An Integrated Investigation of Methane and Carbon Dioxide Fluxes in Mid-Latitude Prairie Wetlands: Micrometeorological Measurements, Process-Level Studies and Modeling - $523,800

ESCOP RESEARCH INITIATIVES

Each year the Experiment Station Committee on Organization and Policy (ESCOP) prioritizes research initiatives on a regional and national basis by obtaining rankings from all SAESs. ARD ranked the research initiatives using input from the ARD Advisory Council and unit administrators. ESCOP attempts to obtain new resources for initiatives at the top of priority list. **These rankings do not reflect the relative importance of research thrusts but rather indicate priorities for the use of new funds.** Listed below are the rankings for ARD, the North Central Region SAESs, and all SAESs.

Thrust	ARD	NC Region	All
Protecting & enhancing soil & water resources.	2	2	1
Compatibility of ag., natural resources & environment.	1	1	2
Ensuring food safety & quality	3	3	3
Plant pest management strategies	9	7	4
Alternative uses of ag. products	4	4	5
Sustain. forest & range resources	7	10	6
Improving competitiveness	11	5	7
Plant systems (plant biology)	6	9	8
Plant genome & genetic enhanc.	17	13	9
Impacts of new technology	15	6	10
Optimal health thru nutrition	5	11	11
Enhance. of animal efficiency	10	14	12
Understand. & adapting to change	8	8	13
Developing processes for food & fiber products	14	12	14
Animal health & well-being	12	15	15
Animal production systems	13	16	16
Understand. dietary patterns & food consumption behaviors	16	17	17

DISTRIBUTION OF FEDERAL "BASIC" RESEARCH FUNDS BY PROGRAM AREA

Given below are data regarding federal investments in "basic" research programs during FY1985 and FY1990. Most basic research funding is devoted to health, general science and space programs. The proportion of research funding provided to agriculture is low and declining. There have been funding increases for research in natural resources and the environment during the past seven years.

	"Basic" Research Budget		% Change
Research area	FY1985	FY1990	FY85-FY90
	- - - % of total - - -		
Health (NIH)	41.5	41.3	43.7
General science (NSF)	22.7	20.4	29.6
Space (NASA)	6.4	12.3	178.9
National defense (DOD)	11.0	8.5	12.6
Energy (DOE)	5.5	6.7	77.8
Agriculture (USDA)	5.2	4.0	12.3
Natural resources & environment	2.6	3.0	63.1
Transportation	3.3	2.1	- 5.1
Total	—	—	44.5

NSF Special Report

COMPARISON OF INVESTMENTS IN AGRICULTURAL RESEARCH

During the last 30 years, the U.S. has been making modest increases in the amount of resources devoted to agricultural research while other competing countries have made major increases in funding for agricultural research. Although the U.S. has a comparable level of investment in total research and development (R&D), the proportion of R & D funds provided to agricultural research in the U.S. is much less than that of other countries.

Characteristic	France	Germany	Japan	U.K.	Italy	U.S.
Ave. ann. increase in ag. research $, 1960-1985)	20	7	-	11	22	8
R & D as % of GNP:						
1971	1.5	2.0	1.9	1.5	0.9	1.6
1988	1.8	2.7	2.9	1.7	1.4	1.9
Ag. research as % of R&D funds-1988	4.6	3.1	6.5	5.5	-	1.9

NSF Special Report 91-301 (April 1991) and Science 257:1187.

PROGRAM SIZE AND FY 1991 RESEARCH EXPENDITURES OF SELECTED AGRICULTURAL EXPERIMENT STATIONS

The table below provides some data regarding the relative size of research programs and funding of selected state agricultural experiment stations (SAESs) in the North Central region. ARD compares favorably with many of the leading SAESs in terms of projects, scientist years , and state appropriations. We are below average in "Formula Funds and CSRS Special Grants" and "Industry and Other Grants" and "Total Expenditures". Our relatively good ranking in "Federal Competitive Grants and Contracts" is in part the result of significant "Specific Cooperative Agreements" and "Research Support Agreements" with ARS.

	AGRICULTURAL EXPERIMENT STATION					
	NE	MN	KS	IA	IL	WI
No. of Projects	320	399	382	390	338	531
Scientist Years	154	190	176	146	168	174
Formula Funds & CSRS Special Grants[1]	4,755	5,718	5,097	9,242	6,572	7,781
Federal Competitive Grants and Contracts[1]	4,746	3,606	4,111	9,425	2,778	18,613
Industry & Other Grants[1]	3,371	9,148	4,148	12,141	7,430	9,794
State Appropriations[1]	22,770	33,500	20,524	22,921	14,066	25,054
Total[1]	35,631	51,971	33,883	53,729	30,847	61,242

[1] Dollars expended in thousands (does not include product sales).

SAES LEADERSHIP DEVELOPMENT COURSE

The Leadership Development Course implemented by the ESCOP and ACOP is in its second year. This course was developed to provide education and leadership opportunities for faculty members who have interest in becoming Land-Grant University administrators. Dr. Jeff Keown is a participant in Class 2 of the course. An announcement concerning Class 3 has been sent to all IANR units. If you are interested in the program, please contact your unit administrator or ARD. Jeff can provide you with some first-hand information about the course. Applications are due **March 15th.**

The SAES Leadership Development Course is designed for faculty who aspire to develop and refine leadership skills important for administering research programs. The course is targeted at senior Associate Professors and junior Professors who have research appointments and an interest in learning about academic administration. The course consists of three phases: (i) a six-day theory and skill development workshop in September, (ii) an internship experience with ARD, and (iii) a three-day capstone experience in Washington, D.C. during June. The Agricultural Research Division will sponsor one faculty member for this course during 1993. Any faculty member with interest is encouraged to apply. Participants will be selected with assistance of the ARD Advisory Council.

COMPARISON OF SAES FUNDING SOURCES - FY1991

Presented below is a table giving the funding sources for state agricultural experiment station (SAES) programs during fiscal year 1991. For most funding sources, ARD was similar to the average of all SAESs, however, we had a lower percentage of our total expenditures on federal formula, industry, and federal agency grant funds than the average. ARD had a higher proportion of our expenditures on product sales (revolving) then the average due to our extensive animal research programs.

Funding Source	ARD	All SAESs
	--- % of total ---	
State appropriations	54.7	54.4
Federal formula *	7.7	10.3
Contracts and grants:		
CSRS Special & Competitive	2.9	4.0
Other USDA	4.0	3.1
Other federal agencies	7.2	9.2
Industry	8.9	13.1
Product sales	14.6	7.3

* Includes Hatch, regional research, McIntire-Stennis and Animal Health funds.

COMPARISON OF PROGRAM SIZE - FY1991

Listed below is a table giving some information about the size of the ARD research program relative to the total of all SAESs. There are currently 59 SAESs in states and territories of the U.S. Our program expenditures and SYs are larger than average. Likewise, ARD expenditures per SY are 12% above average.

Parameter	ARD	All SAES	ARD as % of all
Total expenditures, $ x millions	41.4	1,679	2.5
Total SYs	144.5	6,576	2.2
$/SY, thousands	286.7	255	112.4

SY is a scientist year and is equivalent to an IANR FTE.