August 2003 FREC RR03-03

StatLab
ANNUAL REPORT
2002-2003 Academic Year

Statistics Program
Food and Resource Economics
University of Delaware

Dr. Lidia Rejto, Associate Professor and Director
Dr. Tom Ilvento, Professor and Chair
Xiangrong Cai, StatLab Graduate Assistant
Pavel Nedanov, StatLab Graduate Assistant
Yihuan Xu, StatLab Graduate Assistant

FOOD & RESOURCE ECONOMICS

FREC Research Reports

Department of Food and Resource Economics • College of Agriculture and Natural Resources • University of Delaware

College of Agriculture and Natural Resources

StatLab Annual Report 2002/2003

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INTRODUCTION

The purpose of this report is to briefly describe the activities of the StatLab during the 2002/2003 academic year. The StatLab (Statistical Laboratory) was first established at the University of Delaware in 1983. In the Spring of 1997, the lab closed its operation. In 2001 the Statistics Program left the Mathematics Department and moved into the Department of Food and Resource Economics. As part of this move the graduate program in statistics was re-established as was the StatLab. The StatLab is jointly supported by the Statistics Program of the Food and Resource Economics Department and Research and Data Management Services of the IT-User Services.

This report provides a brief summary of the role and services of the StatLab as well as a discussion of the activities of the lab in the 2002-2003 academic year.

OVERVIEW OF THE STATLAB

The StatLab provides statistical consulting services to graduate students, faculty, staff, and researchers throughout the university, as well as non-University agencies and companies. The StatLab is jointly supported by the Statistics Program of the Food and Resource Economics Department and Research & Data Management Services of the IT-User Services.

Our mission is:

- **Education:** to train students of the Statistics Program to interact effectively with investigators from a variety of disciplines
- **Research participation**: to enhance the quality of experimental and other research at the University by providing high-quality statistical advice
- **Collaboration:** to encourage collaborative research between statisticians and investigators from other disciplines both within and outside of the University of Delaware

The laboratory is staffed with a director and experienced graduate students. During the 2002/2003 academic year, Lidia Rejto served as director, during the Fall of 2003 Pavel Nedanov and Yihuan Xu and during the Spring of 2003 Xiangrong Cai were the StatLab Graduate Assistant. The secretarial support was provided by Vicki Taylor. An advisory committee, consisting of university statisticians, research methodologists from various disciplines, and subject matter specialists from industry provide additional support (see the list at the end of this report).

Services of the Statistical Laboratory

The StatLab is designed to help researchers in the use of effective and appropriate statistical techniques in the analysis of data, including assistance in:

- **Research Design** – Assistance prior to conducting research
- **Statistical Analysis** – Assistance in methods for analyzing data
- **Statistical Computing** – Assistance in the selection of statistical packages and interpretation of statistical output

The StatLab is organized to provide easily accessible, high quality statistical consulting services to university graduate students, faculty, staff, administration, and outside units. The primary focus is to further the learning and research activities of our clients. The staff helps clients design experiments, analyze data and interpret results. They also assist clients with the statistical components of research and grant proposals.

RESULTS FROM THE ACADEMIC YEAR 2002/2003

Spring 2002 was the first time the StatLab was opened since 1997. In preparation for the opening of the StatLab, the Statistics Program wrote a mission statement, established policy, advertised on the UD Campus, and designed a web site with the relevant materials (http://www.udel.edu/FREC/STATLAB/). The Appendix contains the basic fact sheets for the StatLab.

One unique aspect of the current StatLab is that we are partnering with Data Management Services of the IT-User Services. The arrangement allowed us to use the facilities in Smith Hall as well as draw on Data Management Services for the clients. We are grateful for the cooperation and assistance of Dick Sacher and H. Larry Hotchkiss.

During 2002/2003 the StatLab assisted with 33 projects from 12 faculty, 17 graduate students and 4 outside clients. We served 19 units from 6 colleges within the University of Delaware and in addition, we assisted with projects of the Delaware Health and Social Services, Division of Public Health, of the Christiana Spine Center, of International Data Corporation and of the Bailey Associates.

Overview of 2002/2003 Projects

A wide variety of statistical techniques were used in the 33 projects, including linear and nonlinear regression, design of experiments, principal component analysis, logistic regression, and time series analysis. Computer packages used include: SAS, S-Plus, Minitab and SPSS. A full description of the projects was listed in Table 1 below.

The most interesting projects were reviewed in the StatLab Review Session (STAT 641). This is a seminar-type class, which is required for all graduate students. The purpose of the seminar is two-fold. First, it provides an opportunity to teach students applications of statistics in real world situations with a range of clients. The StatLab Review Session also provides valuable input into the recommendations from the StatLab. Students, faculty, and industry statisticians all participate in the seminar and provide ideas and suggestions to the clients. As such, the session provides an excellent way to introduce our program and students to the surrounding community. This Spring a former PhD student of the statistics program Devan V. Mehrotra, Director of Biostatistics at Merck Research Laboratories met with the students and gave a talk in a StatLab review session about his work.

The following is a brief summary of some of the projects brought to the StatLab sessions.

One of the most interesting projects was brought to us by Meredith Blades, a graduate student from Marine Studies. Her goal was to compare the number of boat accidents in jettied vs. non-jettied inlets along the East Coast from New York to Florida. We suggested her to use a stochastic model based on Poisson distribution and several visualization of the data set were suggested. Diccon Bancroft from Gore & Associates helped to assist the client.

Another interesting project was brought to us by Bill Farquhar from Health and Exercise Sciences. The purpose of his study is to determine if infusion induced changes in blood sodium concentration alter indices of sympathetic activity in healthy humans and to determine if it differs in those in essential hypertension. To a final experimental design we suggested to use initial sample to determine variances for the actual sample sizes. The client submitted a grant proposal including funds for the StatLab.

Andrew Wilson, a graduate student in Entomology conducted a study to assess the impact of herbicide application timing on the European corn borer. We concerned that the collected sample size was far too small, but we were able to suggest him a nonparametric method, Wilcoxon rank sum statistics, to analyze the data. Mike Free helped to assist the client.

Janine Haynes from Plant and Soil Sciences. She is comparing the effects of two types of beneficial bacteria, a mutant and a wild type, living in a symbiotic relationship with peas. A two-way Analysis of Variance approach was suggested to the client.

We did seek to get an evaluation from each of the clients to the StatLab to obtain their level of satisfaction with the services and to determine areas where we can improve. Overall the personal comments from clients were very positive. However, the evaluation is voluntary and we received only nine responses. On a scale of 0 to 9, seven of the respondents rated our usefulness in terms of helping them solve their problem 9, one for 8 and one for 7. We will seek to increase the response rate of the evaluation form in the future. We welcome comments and suggestions from users and others in the University community concerning our services and will continue to seek ways in which we can improve.

Table 1: Summary of StatLab Projects from the Academic Year 2002/2003

No.	Client	Department	Time	Project
1	Bonnie R Albertson UD staff	Delaware Center for Teacher Education, CHEP	20 hours	Efficacy study of formulaic writing in high-stakes writing assessments.
2	Eun-Kyung Sun, PhD student *Advisor*: W.Idsardi	Linguistics, College of Arts and Sciences	11 hours	Production and perception of flaps in American English and Korean.
3	Chad M. Gruhl, PhD student *Advisor*: D.Blacker	Education, CHEP	4 hours	Compulsory attendance policies in higher education.
4	Andrew Wilson, MS student *Advisor*: J. Hough-Goldstein	Entomology, College of Agriculture and Natural Resources	6 hours	The impact of herbicide application timing on the European corn borer.
5	Marci Drees	Delaware Health and Social Services	60 hours	Study of Delaware infant mortality between 1993 and 2000.
6	Julie Marley	Christiana Spine Center	6 hours	Comparison of the use of intrathecal morphine with intravenous and oral one for post-operative pain control.
7	Tao Cheng, PhD student *Advisor*: H.E.Allen	Civil and Environmental Engineering	4 hours	Establish a model to predict free Zn concentration.
8	Mark Richardson MS student *Advisor*: J.Swasey	Plant Sciences College of Agriculture and Natural Resources	6 hours	C/N ratio and the competitive ability of the exotic invasive weed allaria petolata (garlic mustard).
9	Cindy Sobasky, MS student *Advisor:* J.Swasey	Longwood Graduate Program, College of Agriculture and Natural Resources	3 hours	Study to examine the relationship between interactivity and visitors interest in public children's garden.
10	Christine Bloom, MS student *Advisor*: J.Burnside	Animal Science, College of Agriculture and Natural Resources	6 hours	Determine gene expression profiles in chicken after Marek's disease vaccination.
11	Ali A. Poorani, UD faculty	Hotel Restaurant Management, CHEP	5 hours	Survey design to learn about the success factors of the spa industry.

No.	Client	Department	Time	Project
12	James C. Galloway UD Faculty	Physical Therapy, College of Arts and Sciences	9 hours	To test specific hypothesis about how infants learn to control joint dynamics of early limb movements.
13	Michele Rosen	International Data Corporation	8 hours	To develop model in order to estimate and forecast the number of professional developers on 178 countries.
14	Bill Farquhar UD faculty	Health and Exercise Sciences, College of Health and Nursing Sciences	6 hours	Sympathetic-Osmotic interactions in humans.
15	David Metzler, MS student *Advisor*: H.E.Allen	Civil and Environmental Engineering	2 hours	Study of the effect of cadmium exposure on algae.
16	Katie Elzer, MS student *Advisor*: J.Swasey	Longwood Graduate Program, College of Agriculture and Natural Resources	2 hours	To identify trends in planned giving program management in botanical gardens.
17	Xiaofei Wang UD staff	Animal Science, College of Agriculture and Natural Resources	20 hours	Identify differentially expressed genes in chicken liver cells in case of thyroid and/or growth hormone manipulations.
18	Richard Garvine, UD faculty	Marine Studies	2 hours	Statistical model of the response of subtidal frequency sea-level to wind forcing.
19	Janine Haynes, UD faculty	Plant Science College of Agriculture and Natural Resources,	20 hrs	Phenotypic assessment of root nodule formulation by a mutant strain of Rhizobium leguminosrum.
20	Larry Cogburn, Xiaofei Wang UD faculty	Animal Science, College of Agriculture and Natural Resources	60 hours	Compare RT-PCR. Gene expression measurements with microarray measurements in growth hormone manipulated chickens.
21	Melissa A. Houlette PhD student *Advisor*: S.Gaertner	Psychology College of Arts and Sciences	14 hours	Effects of time pressure, task type and information distribution on intergroup bias and group decision accuracy.
22	Karen Bauer UD staff	Office of Undergraduate Studies	13 hours	Longitudinal study examining undergraduate research.

No.	Client	Department	Time	Project
23	Bill Bayley	Bailey Associates	10 hours	Quantitave estimate of net demand of senior living nursing home.
24	Meredith Blaydes MS student *Advisor*: J.Firestone	College of Marine Studies	9 hours	Analysis the frequency and severity of accidents in jettied vs. non-jettied inlets of the US from New York to Florida.
25	Tim Parosky, MS student *Advisor*: M.P.Craig	Health and Exercise Sciences, College of Health and Nursing Sciences	8 hours	The effect of extended upper body flexibility training for post coronary artery bypass patients.
26	Anna E. Klene PhD student *Advisor*: F.E.Nelson	Geography College of Arts and Sciences	7 hours	The Barrow urban heat island study.
27	Ling Liu, MS student *Advisor:* T.Ilvento	FREC College of Agriculture and Natural Resources	4 hours	The impact of data collection technology within a self-administered survey on response rate, cost and data quality.
28	Preethi Natarajan, MS student *Advisor*: D.Heider	Center for Composite Materials, College of Engineering	3 hours	Analyzing quality of composite parts.
29	Mark Highland, MS student *Advisor*: J.E.Swasey	Longwood Graduate Program, College of Agriculture and Natural Resources	3 hours	Compost production and utilization at Longwood Garden.
30	Marie Kuczmarski UD faculty	Nutrition and Dietetics, College of Health and Nursing Sciences	2 hours	Preliminary suggestions for statistical analysis of “Pathway to Health” program.
31	Carroll E. Izard UD faculty	Psychology, College of Arts and Sciences	1 hour	Infant emotion developmental changes.
32	Kathie Guhl, PhD student *Advisor*: J.Sherrier	Plant Sciences, College of Agriculture and Natural Resources	1 hour	Design of experiment to demonstrate the initiation and maintenance of root cell tissue development.
33	George Malone UD staff	Cooperative Extension, College of Agriculture and Natural Resources	1 hour	Evaluate data set on poultry breaders.

TABLE 2: LIST OF PROJECTS BY UNIT, Academic Year 2002/2003

University/Outside Units	Client Requests
Agriculture and Natural Resources	
Animal and Food Science	3
Cooperative Extension	1
Entomology and Applied Ecology	1
FREC	1
Longwood Graduate Program in Public Horticulture	3
Plant and Soil Sciences	3
Arts and Sciences	
Geography	1
Linguistics	1
Physical Therapy	1
Psychology	2
College of Engineering	
Civil and Environmental Engineering	2
Center for Composite Materials	1
Health and Nursing Sciences	
Health and Exercise Sciences	2
Nutrition and Dietetics	1
Human Services Education and Public Policy	
Delaware Center for Teacher Education	1
Education	1
Hotel Restaurant and Institutional Management	1
Marine Studies	2
Office of Undergraduate Studies	1
Outside Clients	
Christiana Spine Center	1
Delaware Health and Social Services	1
International Data Corporation	1
Bailey Associates	1
Total	**33**

Costs of StatLab Services

The Statistical Laboratory was designed for multiple purposes, including instruction of Statistics MS students and to provide a service for the statistical needs of campus and the region. Currently, there is no funding for the services of the laboratory other than funds provided by the Department of Food and Resource Economics. The goal of the StatLab is to provide free consultation services for up to two visits. However, users are encouraged to pay for services if they have funds available and are required to pay for and consultations that go beyond two visits or require analysis by the staff of the StatLab. These stipulations are included in the Request for Statistical Consulting form (see Appendix).

During the 2002-2003 academic year we estimated 1,324 person hours contributed to the StatLab from the projects, hours of operation, seminars, and the Director and the Graduate Students. The department contributed the graduate assistantships, a computer, printer, and software, and additional resources totaling approximately $28,000. The breakdown of this effort is given in Table 3.

Table 3: Person Hours Contributed to the StatLab, Academic Year 2002-2003

Hours of operation (2 x a week, 4 hrs each)	224 hours
Director's time	224 hours
Additional Graduate Student Time	283 hours
Seminar Time	260 hours
Projects	333 hours

TOTAL	1,324 hours

We are especially pleased to assist users with the preparation of the statistical components of grant applications. This semester two of our clients included StatLab support in their grant proposal, and we had one UD and one outside client who paid for our services. We believe that grants will provide a significant source of future revenue to the StatLab. We believe a well-planned statistical design and outline of the analytic procedures could increase the chances of funding a grant proposal.

An important source of learning experience for the students and of financial support for the Statistics Program is internship and corporate associate internship program. DuPont internships were granted for the 2002/03 academic year for two statistics students; they are C. Fan and S. Cho. and for X.Cai and Y. Xu internship granted for the year of 2003. During the academic year L. Xiao, was a corporate intern for the Gore & Associates, P. Nedanov was a corporate intern in First U.S.A, and H. Li was a corporate intern at AstraZeneca. We continue to investigate the possibility of closer ties with other companies in the nearby area. We also continue to investigate the possibilities of joint grant proposals with the other colleges and departments within the University of Delaware.

ACKNOWLEDGMENTS

The Director appreciates the strong support and help of Thomas Ilvento, Chair of the Food and Resource Economics Department. Without his help we would not be able to provide this service. The Director acknowledges the assistance of Dick Sacher and Larry Hotchkiss of Research and Data Management Services of the IT-User Services. The Director acknowledges the assistance of the Advisory Committee, who provides a variety of extra assistance for our clients (see Table 4). The Director highly appreciates the help of Vicki Taylor. Her patience taking the phone calls of the clients and organizing the schedule of the StatLab was an important component of our successful work.

TABLE 4: STATISTICAL LABORATORY ADVISORY COMMITTEE, ACADEMIC YEAR 2002-2003

Bancroft, Diccon, M.S. Yale University; Statistician, W. L. Gore & Associates, Statistical applications, experimental design, and survival analysis.

Eggermont, Paul, Ph.D., SUNY Buffalo; Associate Professor, Statistics Program, FREC Department, Nonparametric estimation, statistical computing, regression.

Free, Spencer M., Jr., Ph.D., North Carolina State University; Biostatistics Consultant.

Ilvento, Thomas, Ph.D., Pennsylvania State University; Chair and Professor, FREC Department, regression methods, survey methodology, social demography.

LaRiccia, Vincent N., Ph.D., Texas A & M University; Associate Professor, Statistics Program, FREC Department, Goodness-of-fit, parameter estimation and testing, order statistics, EDA, and regression.

Mason, David M., Ph.D., University of Washington-Seattle; Professor, Statistics Program, FREC Department, Goodness-of-Fit, order statistics nonparametric statistics, time series.

Pesek, John D., Ph.D., University of Michigan; Associate Scientist, Statistics Program, FREC Department, Agricultural statistics and design of experiments, and analysis of variance.

Sacher, Richard, Ph.D., Stanford; Manager, Research and Data Management Services of the IT-User Services. Scientific Computing, statistical computing, mathematical optimization, linear and non--linear regression.

Schiffelbein, Paul, A., Ph.D., University of California, San Diego; Statistical Consultant, QMTC DuPont Engineering, experimental design, EDA, statistical process control, regression analysis.

Thorpe, Daniel, Ph.D., University of Wisconsin, Madison; Statistician, W. L. Gore & Associates.

APPENDIX

Documents and Policy Connected with
the StatLab, Academic Year 2002-2003

Statistics Laboratory

Director: Dr Lidia Rejto
214 Townsend Hall
University of Delaware
Newark, DE 197171-1303
Ph: 302-831-8034
Fax: 302-831-6243
e-mail: rejto@udel.edu

Policies and Procedures

The StatLab is designed to help researchers on campus and in the Delmarva Region in the use of effective and appropriate statistical techniques in the analysis of data. The StatLab is jointly supported by the Statistics Program of the Food and Resource Economics Department and Research & Data Management Services of the IT-User Services. We have limited resources so we need to establish terms of services and charges for extended service to clients. All proceeds for the STAT Lab go back into the lab to fund students, software, and other supplies. The following is our guidelines for use of the STAT Lab:

Initial Consultation No charge provided the client completes the necessary forms.

The StatLab consultant meets with the client and discusses the statistical problem and other relevant information. The emphasis on this visit is to get all the required information concerning the research, data, and potential analysis. In some cases a solution may come from this visit. The client is required to complete a "Request for Statistical Consulting Form" prior to scheduling an appointment. The relevant forms can be found on our web site: http://www.udel.edu/FREC/STATLAB

Second Consultation No charge if no other funds are available. After the initial consultation we reserve the right to charge the client if funding is available from grants or project money

This is an extended discussion on suggested design, techniques, interpretation, or dealing with statistical problems. Some time may be spent working on the problem by Statistical Consultants or the Director prior to the consultation. We hope that many problems will be satisfactorily addressed by the second visit.

Additional Consultations Additional work may require fees. We reserve the right to charge the client for additional work if funds are available from grants or project money.

Issues that require extended work will require support from the client. We will discuss with the client the fees for additional work before moving forward. If the client wishes assistance in data analysis, data manipulation, or collection of the data, it will require a formal contract and funding of Graduate Research Assistants in the Statistics Program.

Please note: The StatLab is not designed to teach statistics or serve as a tutor for graduate students. We expect clients to have some background in applied statistics before coming to the lab with questions. We can offer suggestions on resources to help learn statistics or courses that we offer at the undergraduate and graduate level to build skills in statistics.

Use of information in StatLab Review Session (STAT 641)

With permission of the client, some research problems that come to the StatLab will be discussed in the StatLab Review Session. The StatLab Review Session is a once a week seminar during Fall and Spring semesters where graduate students, faculty, and other statisticians meet to discuss interesting statistical problems that come to the StatLab. The client also is invited to attend these sessions. All information will be kept confidential to the extent possible.

Priorities in consulting

From time-to-time the StatLab will need to establish priorities for work depending on the caseload and available limited resources. First priority will be given to paid projects, followed by projects from within the University of Delaware. Clients will be notified if any delays in serves are expected.

StatLab Services are available only during the Fall and Spring semesters at the University of Delaware.

The StatLab assistance is available at the following times and location:

Monday	1:00 to 5:00	201 Townsend Hall
Wednesday	8:00 to 12:00	201 Townsend Hall

To get assistance Statistical consultation is available by appointment only.

Users are requested to submit a brief written statement of the problem to the Laboratory prior to scheduling an appointment. A form is available on our web site and can be mailed, faxed, or attached to an email.

Please send to:

StatLab
213 Townsend Hall
Newark, DE 19717
Voice: 302-831-2512
Fax: 302-831-6243
For e-mails send to: Vicki Taylor (vtaylor@udel.edu) or Dr Lidia Rejto (rejto@udel.edu)

Statistical Laboratory

Director: Dr. Lidia Rejto
214 Townsend Hall
University of Delaware
Newark, DE 19717-1303
Ph: 302-831-8034
Fax: 302-831-6243
e-mail: rejto@udel.edu

StatLab
Fall 2003 Schedule

The Statistical Laboratory (StatLab) is currently open for Fall 2003. The StatLab provides statistical consulting services to graduate students, faculty, staff, and researchers throughout the University, as well as non-University agencies and companies. The StatLab is jointly supported by the Statistics Program and Research & Data Management Services of the IT-User Services.

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Services of the Statistical Laboratory. The StatLab is designed to help researchers in the use of effective and appropriate statistical techniques in the analysis of data, including assistance in:

Research Design – Assistance prior to conducting research

Statistical Analysis – Assistance in identifying methods for analyzing data

Statistical Computing – Assistance in the selection of statistical packages and interpretation of statistical output

Users are strongly encouraged to visit the Statistical Laboratory *prior* to collecting their data or attempting to conduct an analysis.

To Get Assistance

Statistical consultation is available only by appointment. Users are requested to submit a brief written statement of the problem and file a form prior to scheduling an appointment. The form is available on our website at: http://www.udel.edu/FREC/STATLAB

The STAT Lab assistance is available during Fall Semester 2003 at the following times and location

Monday	1:00 to 5:00	201 Townsend Hall
Wednesday	8:00 to 12:00	201 Townsend Hall

To schedule an appointment call 302-831-2511 or email vtaylor@udel.edu
To get more information contact Dr. Lidia Rejto at 302-831-8034.

REQUEST FOR STATISTICAL CONSULTING

STATISTICAL LABORATORY

213 Townsend Hall Newark, DE 19717

Name: _____ **Date:** _____

Address: _____ **Dept./Agency**: _____

_____ _____

College: _____ **Telephone:** _____

Fax: _____

E-Mail: _____

Requestor Status " Faculty " Staff " Student " Outside UD

MS Ph.D.

For students, Advisor's name: _____

Advisor Signature: _____

Project Title:

Abstract: Please attach a one-page abstract or summary of the project to brief the consultant on the nature of the problem.

Use the following questions to help organize your abstract:

- What are your research objectives?
- Do you have specific hypotheses to test?
- What factors are important in the study design?
- How will the data be collected?

Please attach any graphs, plots or summary tables which would help the consultant to understand the research problem.

SERVICE AND PAYMENT OPTIONS

" Funds are available from the following source: _____.
I request a meeting with a faculty member or staff consultant.

" Funds are not available at this time. I request free consultation (maximum two sessions) as available from the statistical consultants,

" I request a meeting with faculty or staff consultant to discuss collaboration leading to joint publications and/or grant proposals including funds for statistical consulting.

_____
Signature

STATLAB EVALUATION FORM

I am a:
Student ☐ Faculty ☐ Staff ☐ Visitor ☐

My department or agency: _____

A. How difficult it will be for you to carry out the StatLab's advice?

1 2 3 4 5 6 7 8 9
Very Easy Very Hard

B. How much prior experience have you had with the statistical procedure recommended to you by the StatLab?

1 2 3 4 5 6 7 8 9
Very Little Quite a Lot

C. How well did the StatLab consultant perceive your statistical background?

1 2 3 4 5 6 7 8 9
Underestimated Overestimated

D. How effective were the StatLab consultants in explaining their recommendations?

1 2 3 4 5 6 7 8 9
Ineffective Effective

E. How would you rate the statistical competence of the StatLab consultant?

1 2 3 4 5 6 7 8 9
Novice Expert

F. How confident was the consultant in the recommendations made?

1 2 3 4 5 6 7 8 9
Unsure Confident

G. How do you feel about the overall usefulness of the StatLab in helping you solve your problem?

1 2 3 4 5 6 7 8 9
Not Helpful Very Helpful

H. Please use the back of this sheet for additional comments.

Please return it to: Vicki Taylor, Statistical Laboratory,
Department of FREC, 213 Townsend Hall

The Department of Food and Resource Economics
College of Agriculture and Natural Resources
University of Delaware

The Department of Food and Resource Economics carries on an extensive and coordinated program of teaching, organized research, and public service in a wide variety of the following professional subject matter areas:

Subject Matter Areas

Agricultural Finance
Agricultural Policy and Public Programs
Environmental and Resource Economics
Food and Agribusiness Management
Food and Fiber Marketing
International Agricultural Trade
Natural Resource Management
Operations Research and Decision Analysis
Price and Demand Analysis
Rural and Community Development
Statistical Analysis and Research Methods

The department's research in these areas is part of the organized research program of the Delaware Agricultural Experiment Station, College of Agriculture and Natural Resources. Much of the research is in cooperation with industry partners, other state research stations, the USDA, and other State and Federal agencies. The combination of teaching, research, and service provides an efficient, effective, and productive use of resources invested in higher education and service to the public. Emphasis in research is on solving practical problems important to various segments of the economy.

The department's coordinated teaching, research, and service program provides professional training careers in a wide variety of occupations in the food and agribusiness industry, financial institutions, and government service. Departmental course work is supplemented by courses in other disciplines, particularly in the College of Agriculture and Natural Resources and the College of Business and Economics. Academic programs lead to degrees at two levels: Bachelor of Science and Masters of Science. Course work in all curricula provides knowledge of tools and techniques useful for decision making. Emphasis in the undergraduate program centers on developing the student's managerial ability through three different areas, Food and Agricultural Business Management, Natural Resource Management, and Agricultural Economics. The graduate program builds on the undergraduate background, strengthening basic knowledge and adding more sophisticated analytical skills and business capabilities. The department also cooperates in the offering of an MS and Ph.D. degrees in the inter disciplinary Operations Research Program. In addition, a Ph.D. degree is offered in cooperation with the Department of Economics.

For further information write to: Dr. Thomas W. Ilvento, Chair
Department of Food and Resource Economics
University of Delaware
Newark, DE 19717-1303

FREC Research Reports are published as a service to Delaware's Food and Agribusiness Community by the Department of Food and Resource Economics, College of Agriculture and Natural Resources of the University of Delaware.