

June 2002

FREC RR02-04

StatLab
ANNUAL REPORT, 2002

Statistics Program
Food and Resource Economics
University of Delaware

June, 2002

Dr. Lidia Rejto, Associate Professor and Director
Seoae Cho, StatLab Graduate Assistant
Dr. Tom Ilvento, Professor and Chair

**FOOD
& RESOURCE
ECONOMICS**

FREC Research Reports

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

StatLab
ANNUAL REPORT, 2002

Statistics Program
Food and Resource Economics
University of Delaware

June, 2002

Dr. Lidia Rejto, Associate Professor and Director
Seoae Cho, StatLab Graduate Assistant
Dr. Tom Ilvento, Professor and Chair



College of Agriculture and Natural Resources

StatLab Annual Report 2002

Dr. Lidia Rejto, Associate Professor and Director
Seoae Cho, StatLab Graduate Assistant
Tom Ilvento, Professor and Chair

INTRODUCTION

The purpose of this report is to briefly describe the activities of the StatLab during the Spring Semester of the 2001/2002 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 reestablished 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 Spring of 2002.

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 an experienced graduate student. During the Spring of 2002, Lidia Rejto served as director and Seoae Cho was 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 SPRING 2002

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 the Spring of 2002 the StatLab assisted with 20 projects from 10 faculty, 8 graduate students and 2 outside clients. We served 13 units from 6 colleges within the University of Delaware and in addition, we assisted with projects of the Department of Natural Resources and Environmental Control of State of Delaware and the Women's Correction Institution of the State of Delaware (see Table 2).

Overview of 2002 Spring Projects

A wide variety of statistical techniques were used in the 20 projects, including linear and nonlinear regression, design of experiments, principal component analysis, logistic regression, and times series analysis. Computer packages used include: SAS, S-Plus, Minitab and SPSS. A full description of the projects were 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. The following is a brief summary of some of the projects brought to the StatLab session.

One of the most interesting projects was brought to us by Kerry Kopitsky (MS student, Marine Studies, advisor: M.H. Taylor). The project focused on the number of captured sea turtles as a function of the distance from shore and other location factors. We suggested she use Poisson regression for the analysis. Diccon Bacroft of Gore provided additional assistance to the client.

Another project came to us from C. Frazer from the Women's Correction Department. The purpose of the study was to determine the effectiveness of new teaching methods for inmates by comparing them with a traditional method used in the past. We suggested using simple graphical analysis of the lickert scale differences and then using the nonparametric sign test for the analysis. Tom Ilvento and Mike Free helped assist the client.

B. Wilson, a graduate student in Geology, conducted a study on how climate change and salt water intrusion in Dennis Creek effected tree growth. Correlation and regression analysis and time series analysis were suggested to the client. T. Awokuse helped assist the client.

Another interesting project was brought to us by L.A. Jones from the Department of Natural Resources and Environmental Control Division of Water Resources, State of Delaware. The main goal of the project was to determine the effect of drainage ditches on the depth of the seasonal high water table as a function of soil texture and distance from the drainage ditch. The client had more than 8000 units of data from different locations. They also were interested in how precipitation effects the water table around the ditches. We grouped the data by distance from the ditch and by soil type and used regression and correlation analysis. V. LaRiccia helped assist 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 was very positive. However, the evaluation is voluntary and we received only five responses. All of the respondents rated our usefulness 8 or higher in terms of helping them solve their problem. We will seek to increase the response rate of the evaluation form in the future. One comment from users reflected a weakness in the StatLab expertise in survey design and research. This methodological area is not a course component of our Statistics Program. We decided to include some instruction in this area in future StatLab seminars to improve our knowledge and expertise in this area. 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: StatLab Projects from Spring, 2002

No.	Client	Department	Time	Project
1	Michael Higgings, UD staff	Health& Nursing Sciences	12 hours	Comparison of impact data on a mouth and head of a NOCSAE Headform with and without sports helmets
2	Brian Ladman, MS student Advisor: Dr. Gelb	Animal Science, College of Agriculture	6 hours	Protection of chickens following live and inactivated Virus Vaccination against the infectious Bronchitis Virus.
3	Marie Kuczmariski, UD faculty	Health& Nursing Sciences	2 hours	Assistance in Developing a grant proposal for a Child After School Program
4	Matthew Robinson, UD faculty	Health& Nursing Sciences	1 hour	The impact of the days of the week attendance on selected socio- demographic characteristics and consumption patterns of spectators at a LPGA event.
5	Jack Gingrich, UD faculty	Entomology, College of Agriculture and Natural Resources	2 hours	Epidemiology and ecology of West Nile fever vectors and amplifying hosts in Delaware.
6	Kerry Kopitsky, MS student Advisor: Malcolm H. Taylor	Marine Studies	26 hours	Pelagic ecology of olive ridley sea turtles in the eastern tropical Pacific ocean
7	Larry Cogburn, UD faculty	Animal and Food Science Department, College of Agriculture and Natural Resources	30 hours	Chicken microarray gene expressions before and after hatching
8	Cihan Cobanoglu, UD faculty	Hotel and Restaurant Management	9 hours	Comparison of response rates of mail, fax and web-based surveys of business travelers taking into account speed, incentives, and costs.
9	Michael T. Smith, UD faculty	USDA-ARS. Beneficial Insects lab, College of Agriculture and Natural Resources	9 hours	Asian Long horned Beetle Development of Detection and biological control technologies for an invasive tree pest from China

No.	Client	Department	Time	Project
10	Dianne K. Pledge, MS student <i>Advisor:</i> Dr. Janet Johnson	Political Science, College of Arts and Sciences	26 hours	Death penalty Politics in the states: Culture, Partisanship, and Ideology
11	Reed Ferber, UD faculty	Physical Therapy, College of Arts and Sciences	12 hours	Comparison of within and between day reliability of discrete 3-D lower extremity variables in runners.
12	Jun Ding, PhD student <i>Advisor:</i> Dr. Stuart Bineler	Physical Therapy, College of Arts and Sciences	3 hours	Experimental and predicted curve analysis
13	Kelly Bailey, MS student <i>Advisor:</i> Dr. Linda Buchir	Nursing, Health and Nursing Sciences	5 hours	Comparison of electrocardiogram interpretation by triage nurses and emergency department physicians
14	Bartholomew Wilson, MS student <i>Advisor:</i> Dr. Ronald E. Martin	Geology Department, College of Arts and Sciences	11 hours	Dendrochronology and sea level along the New Jersey coast
15	Daniel Camenga, MS student <i>Advisor:</i> Dr. Dave Frey	Longwood Graduate Program, College of Agriculture and Natural Resources	3 hours	Visitor benefit analysis at Longwood gardens, Pennsylvania
16	C Frazer	Baylor Women's Correction Department	5 hours	Determine if varied instructional diversification will produce increased teacher/student satisfaction
17	John Harrods, MS student <i>Advisor:</i> Dr. Jim Swasey	Longwood Graduate Program, College of Agriculture and Natural Resources	2 hours	Public garden wetland types of management and success standards
18	Reline E. Maser, UD faculty	Health & Nursing Science	1 hour	Treatment of subsequent episodes of Gestational Diabetes Mellitus
19	John Sawyer, UD faculty	Business Administration, College of Business and Economics	6 hours	Decision making Performance in Racially Diverse Cross-Functional Teams

No.	Client	Department	Time	Project
20	Lyle A. Jones	Division of Water Resources, DNREC	62 hours	Determining the drainage effects of ditches on the depth to the seasonal high water table as a function of soil texture and distance from the drainage ditch.

TABLE 3: LIST OF PROJECTS BY UNIT, SPRING 2002

University/Outside Units	Client Requests
Agriculture and Natural Resources	
Animal and Food Science	2
Entomology and Applied Ecology	3
Longwood Graduate Program in Public Horticulture	2
Arts and Sciences	
Geology	1
Political Science and International Relations	1
Physical Therapy	1
Business and Economics	
Business Administration	1
Health and Nursing Sciences	
Health and Exercise Sciences	2
Medical Technology	1
Nursing	1
Nutrition and Dietetics	1
Human Services Education and Public Policy	
Hotel Restaurant and Institutional Management	1
Marine Studies	1
Outside Clients	
DNREC	1
Women's Correction Institution of State of Delaware	1
TOTAL	20

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 in 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 Spring semester 2002 we estimated 638 person hours contributed to the StatLab from the projects, hours of operation, seminars, and the Director and the Graduate Student. The department contributed the graduate assistantship, a computer, printer, and software, and additional resources totaling approximately \$15,000. The breakdown of this effort is given in Table 3.

Table 3: Person Hours Contributed to the StatLab, Spring 2002

Hours of operation (2 x a week, 4 hrs each)	112 hours
Director's time	112 hours
Graduate Student Time	50 hours
Seminar Time	130 hours
Projects	234 hours

TOTAL	638 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 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. We reinstated the DuPont internship program, and for the 2002/03 academic year internships were granted for two statistics students; they are C. Fan and S. Cho. We established a new corporate internship program with the Gore company. During the next academic year our student, L. Xiao, will be a corporate intern for the Gore company. 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 (manager of Research and Data Management Services of the IT-User Services), who arranged a temporary main campus location at Smith Hall for us. The Director acknowledges the assistance of the Advisory Committee, who provide 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, 2002 SPRING

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, Spring 2002



Statistical 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

ANNOUNCING THE UNIVERSITY OF DELAWARE STATISTICAL LABORATORY

The Statistical Laboratory (StatLab) will open beginning in Spring semester, 2002. 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 an experienced graduate student. An advisory committee, consisting of university statisticians, research methodologists from various disciplines, and subject matter specialists from industry provide additional support.

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

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 web site at: <http://www.udel.edu/FREC/STATLAB>

The STAT Lab assistance is available during the Spring Semester 2002 at the following times and locations

Monday	1:00 to 5:00	201 Townsend Hall
Wednesday	8:00 to 12:00	002C Smith Hall (RDMS Lab)

To schedule an appointment call 302-831-2512 or vtaylor@udel.edu

To get more information contact Dr. Lidia Rejto 302-831-8034



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 during the Spring Semester 2002 at the following times and locations:

Monday	1:00 to 5:00	201 Townsend Hall
Wednesday	8:00 to 12:00	002C Smith Hall (RDMS Lab)

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 e-mail.

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)

REQUEST FOR STATISTICAL CONSULTING

Statistical Laboratory

210 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

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 as available (maximum two sessions),
- 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

The STAT Lab is jointly supported by the Statistics Program of the Food and Resource Economics Department and Research & Data Management Services of the IT-User Services.

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

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.

