

UCSU6/53.2/C33/1995

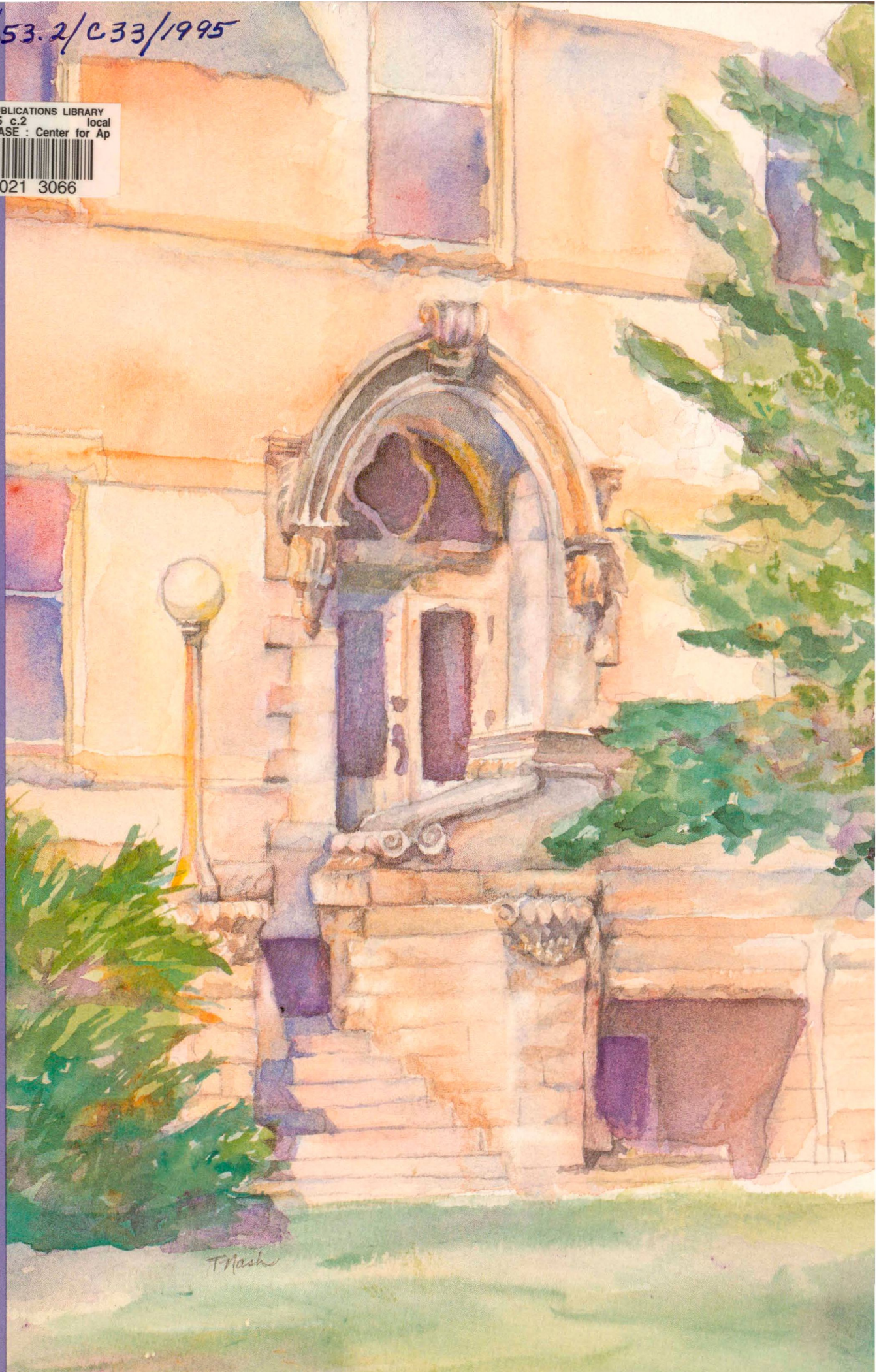
c.2

COLORADO STATE PUBLICATIONS LIBRARY  
UCSU6/53.2/C33/1995 c.2 local  
Colorado State Univ/CASE : Center for Ap



3 1799 00021 3066

CENTER  
FOR APPLIED  
STATISTICAL  
EXPERTISE



T. Nash

# CASE

## *Center for Applied Statistical Expertise*

*“Statistics is the science of turning data into information.”*

The past twenty years have revolutionized our ability to collect data. Business, industry and government have made the investments needed to understand their activities, to control and to improve their operations. Yet without specialized skills, and without the knowledge to turn data into useful information, much of that investment is wasted.

*CASE provides access to statistical expertise in a totally new way.*

By harnessing the skills and knowledge of the leading statistics group in Colorado, CASE enables clients to improve all areas of information development and utilization:

- problem formulation and model building
- survey design and analysis
- experimental design, analysis and interpretation
- management advice on information utilization

Contact CASE to discuss any of these areas of expertise:

Center for Applied Statistical Expertise  
Department of Statistics  
Colorado State University  
Fort Collins, CO 80523  
Phone: (970) 491-5268 Fax: (970) 491-7895  
Email: [case@stat.colostate.edu](mailto:case@stat.colostate.edu)

Director: Professor Richard Tweedie

Associate Director: James zumBrunnen

# Using CASE

## *The Need for Statistical Expertise*

The Center for Applied Statistical Expertise (CASE) provides access to a unique group within Colorado, aiming to assist business, industry and government to use the most modern and efficient methods in all areas of data collection, evaluation and analysis.

Over the past two decades, the use of computers has meant that more and more data is collected in almost every area of every organization, but this often leads to an overload of data which is not put to good use. Statistical methods are designed to make more accurate and more efficient use of this power to collect data; but without statistical expertise, the efforts involved in such collection can be far less effective than they should be.

CASE is organized to provide such expertise to both

- organizations with in-house statisticians who can use CASE to provide specific and specialist expertise, and
- organizations with no individual in-house statistical support who need both general and expert advice.

## What is CASE?

The Center for Applied Statistical Expertise enables the skills and expertise of the faculty, staff and graduate students at the Department of Statistics at Colorado State University to be made available for all types of needs locally, in the state of Colorado, and more widely where the internationally known skills of the group are in demand.

The Department of Statistics comprises some 15 statistical experts with Ph.D. qualifications and research interests in areas ranging over

- sample design
- quality management techniques
- experimental design
- forecasting methodology
- engineering modeling
- biometrical modeling

State-of-the-art computing resources enable the CASE team to create excellent graphical displays, manage and manipulate large data bases, perform complicated statistical analyses, and customize reports and output to our clients' specifications.

# To Contact CASE

CASE is located within the Department of Statistics on the campus of Colorado State University. Your first call will put you in contact with one of the CASE Project Supervisors:

**Richard Tweedie, Ph.D.:** Director of CASE, specializing in management statistics and modeling

**James zumBrunnen, M.S.:** Associate Director of CASE, specializing in survey statistics, biostatistics and statistical software usage

**Jennifer Hoeting, Ph.D.:** Specializing in social statistics, health statistics, and statistical computing

**Craig Mallinckrodt, Ph.D. (Animal Science):** Specializing in agricultural and biomedical applications

Initial contacts and problem definition will be carried out at no charge. Project definition should lead to detailed project quotes on a full commercial basis.

# Setting Up CASE Projects

## *Using CASE at Project Conception*

The largest proportion of a project's cost is often the data collection phase. By using sophisticated design of questionnaires, sampling frameworks, and project overviews, statisticians can frequently cut such costs by half or more.

## *Using CASE for Data-gathering*

Gathering data can be an expensive endeavor. Costs can be reduced and accuracy increased by expert design of collection instruments tailored to achieve the ultimate goals of the project.

## *Using CASE for Statistical Analysis*

To realize the greatest level of information from the money expended, an expert analysis of collected data is of primary importance.

## *Using CASE for Interpretation and Decision-making*

Research enables us to make better decisions and to understand processes and products. Unless real expertise is used in turning the data gathered into information, much of the value of a project can be lost.

## *Using CASE for Troubleshooting*

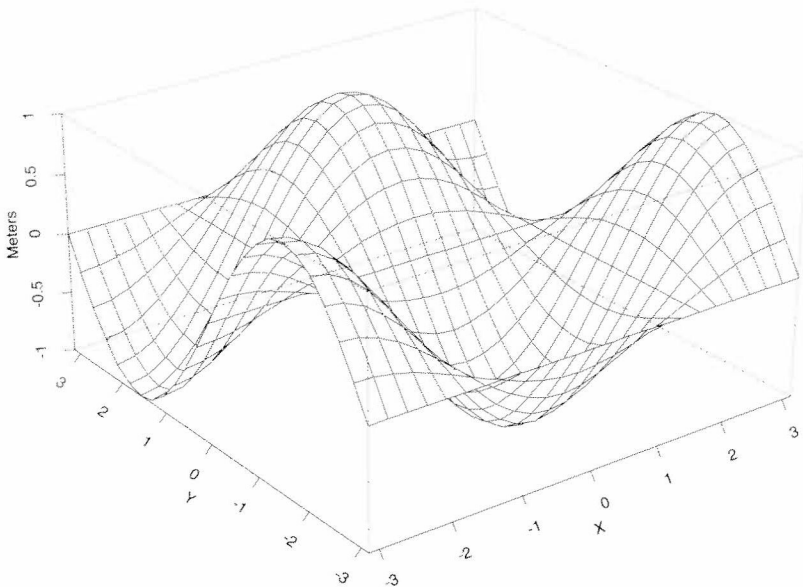
Statistics can be used to fix problems and even to solve crises. Expert advice facilitates troubleshooting and ensures that decisions are based on the most reliable information available.

## *Environmental Applications*

CASE works widely in the area of environmental applications. The use of state-of-the-art computing equipment enhances CASE's ability to apply the most advanced techniques available to a wide variety of environmental applications.

Environmental applications carried out by members of the CASE team include:

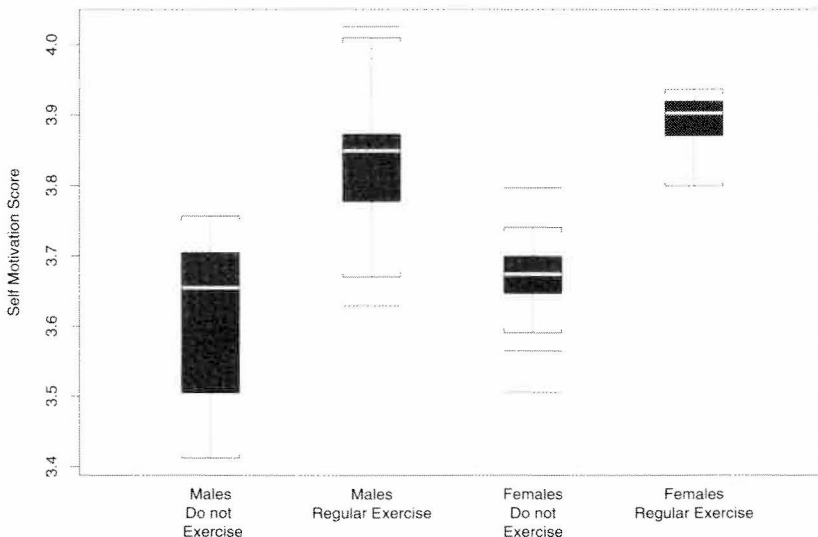
- Air quality monitoring for the National Park Service
- Assessment of plutonium levels in soils for Rocky Flats
- Household radon assessment
- Wildlife population estimation for the National Forest Service, the U.S. Department of Wildlife and Fisheries, and the North Slope Borough, Alaska.
- Growth and mortality rate assessment of trees for the National Forest Service



## *Survey Design and Analysis*

The CASE team has the ability to efficiently analyze data collected from a wide variety of survey designs. Following are some examples of survey analyses with which our consultants have assisted:

- Assessment of health care needs for a county in Colorado serviced by a tri-county health organization
- Assessment of citizens' opinion about local government policies and services in three Front Range communities
- Evaluation of land and property appraisals for the state of Colorado
- Survey design and analysis for graduate students at Colorado State University as part of their graduate research

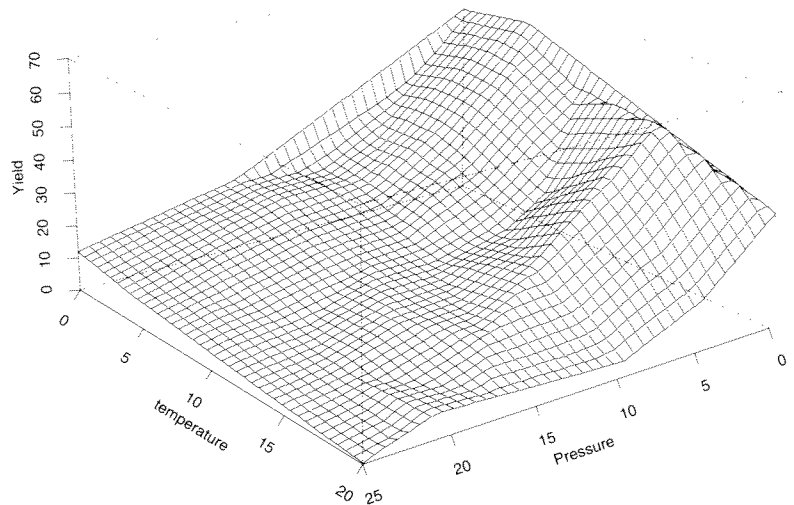


## ***Pharmaceutical Applications***

Pharmaceutical companies constantly search for better and more affordable drugs to relieve or cure diseases and conditions that afflict humans and animals. There is also an urgent need to assess bioequivalence of generic drugs versus brand name drugs. New and more reliable study designs and improved data analytic procedures are extremely helpful in each of these areas.

CASE statisticians have the expertise in this area including:

- Design of clinical and preclinical trials
- Survival and risk analyses
- Consumer product trials
- Developing prognostic factors
- Analyses including genetic effects
- Dose-response studies
- Bioequivalence studies
- Crossover trials



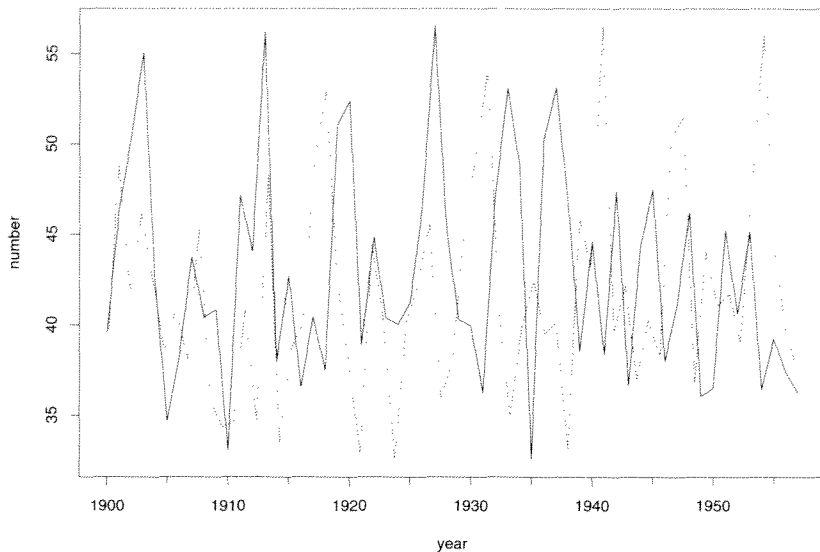
## ***Statistics and Health Care***

The health care system is under great pressure to become more efficient and effective. From the development of new drugs to the identification of health hazards to the efficient operation of hospitals, statistics plays a central role in coping with these pressures.

Recent achievements of the CASE group in health related areas include:

- Development of clinical trials techniques to allow for efficient use of new drugs and procedures
- Evaluation of epidemiological data relevant to product liability cases in the United States and Australia
- Analysis of operating methods at local hospital leading to increased efficiency and better patient care

## Forecasting and Systems Modeling

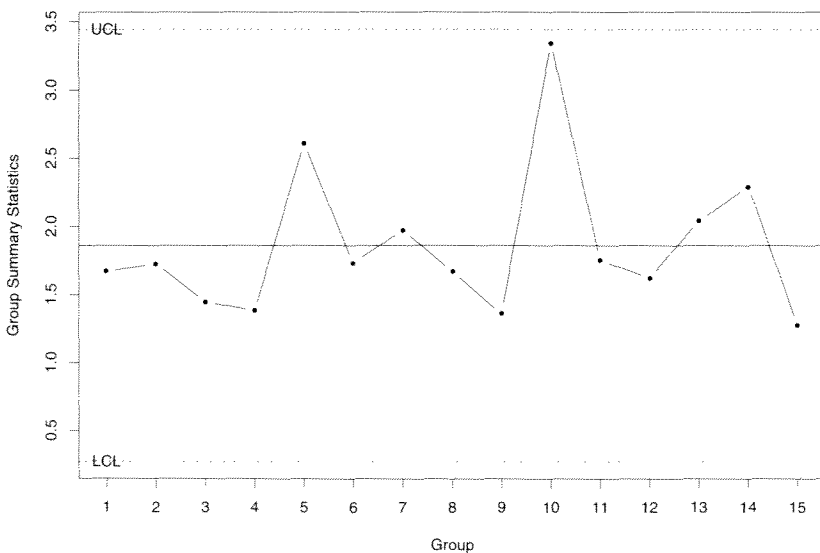


Management of any operation demands accurate analysis of data and forecasts of future trends. CASE allows access to some of the nation's strongest experts in these areas. Recent achievements of the CASE group include:

- Development of methods and software to monitor spillage from underground gas tanks, enabling rigorous EPA standards to be met at a fraction of the previous cost
- Analyzing service procedures for the Australian Tax Office leading to significant cuts in waiting times
- Design and implementation of the ITSM Time Series Package used at major colleges and business schools

## Industrial Experimentation

Competition demands constant improvement in product quality and process efficiency. Determination of conditions to optimize productivity requires extensive experimentation. Modern theory of experimental design provides powerful tools to help achieve these goals.



CASE statisticians have expertise in designing complex industrial experiments. Some have consulted with local high-tech manufacturing firms and government agencies. Others have consulted with and conducted workshops at nationally known food companies. The following are some examples:

- Designing experiments to reduce product variability
- Experimental design to determine the type and proportions of raw material that lead to a new breakfast cereal with specified characteristics
- Experimental design to develop an Eddie Current Probe for nondestructive determination of faults and cracks in metal

## ***Quality Assurance and Improvement***

Total Quality Management (TQM), Continuous Product Improvement, Quality Control: in the last decade manufacturing firms, service oriented businesses, government organizations have all realized the importance of these approaches to ensure greater profitability in an internationally competitive world.

TQM is an approach to management that relies on the collection and evaluation of data as the tool to improving productivity, identifying customer needs and increasing profits. Unlike other management “philosophies”, this central use of statistics provides a philosophy of management with a solid prescription for improvement.

CASE can provide advice on all the areas of such statistical use, including:

- Questionnaire and survey design to track customer attitudes and needs
- Development and implementation of statistical quality control procedures
- Design of industrial experiments enabling improvement in production by locating sources of problems without disruption to existing workflows
- Training of management in the key statistical methods required for setting a TQM process in place

## ***Product Liability and Reliability***

Statistical methodology enters into product safety considerations in many different ways. Statisticians can provide expertise for:

- Developing tests for products to meet government specifications
- Implementing sampling schemes to meet ISO9000 and other quality control specifications
- Product design, where the use of industrial experimental design tools can greatly reduce the time needed to set up efficient production lines
- Customer reaction analysis, ensuring that products meet customer expectations

## ***Statistical Use in Legal Cases***

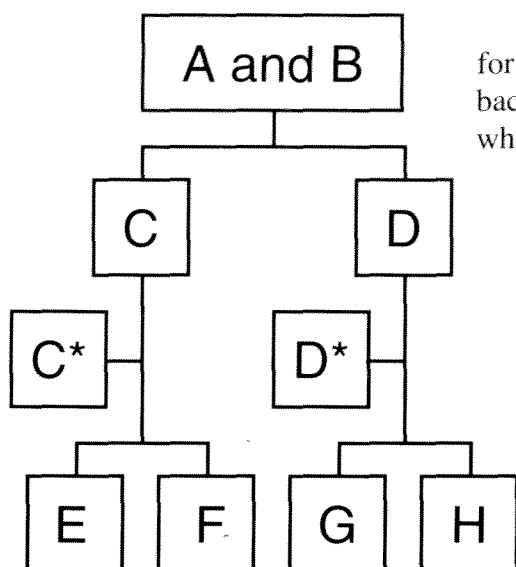
There is an ever increasing need for independent assessment of data as it arises in the settlement of legal cases. As computer power increases, the amount of data used in court cases can become vast, and it becomes increasingly difficult to interpret the meaning of the data in an objective and coherent manner.

CASE can give access to senior practicing statisticians who are able to provide independent, objective and expert advice. Experience in legal cases covers such areas as:

- Validity of survey data used in industrial disputes
- Evaluation of scientific studies used in assessing product liability
- Analysis of statistics used in equal-opportunity cases
- Professional opinion on the bias in presentation of data in criminal cases



## *Agricultural and Animal Science Applications*



More and more businesses in today's agriculture industry are looking for an edge to achieve higher profit margins. CASE personnel have a strong background in Animal Science and Agronomy. Some examples of studies in which CASE personnel have played an instrumental role include:

- Livestock disease treatment and prevention studies
- Comparison of management alternatives for beef cattle in the areas of breeding management and estrus synchronization
- Genetic prediction and estimation
- Analysis of heavy metal content of cattle and sheep drinking water
- Study of hormone therapies for osteoporosis in sheep to select regimes for potential study in humans
- Feed, fertilizer, and variety trials

## **Courses and On-Site Training Programs**

CASE offers training and education in a wide variety of statistical and mathematical areas. Courses can be tailored to meet the needs of individual clients.

Short courses on a wide variety of topics are available. Some examples include:

- Data collection and management
- Experimental design
- Total Quality Management
- Survey design
- Clinical trials
- Forecasting

A sampling of statistics courses available through Colorado State University Division of Continuing Education and SURGE include:

- Design of Experiments
- Probability Theory
- Mathematical Statistics
- Linear Models
- Stochastic Processes
- Time Series Analyses
- Nonparametric Analyses
- Sampling Theory
- Categorical Data Analysis

RECEIVED

APR 24 1995

STATE PUBLICATIONS  
Colorado State Library

Colorado State University is an equal opportunity/affirmative action institution and complies with all Federal and Colorado State laws, regulations, and executive orders regarding affirmative action requirements in all programs. The Office of Equal Opportunity is located in Room 21 Spruce Hall. In order to assist Colorado State University in meeting its affirmative action responsibilities, ethnic minorities, women, and other protected class members are encouraged to apply and to so identify themselves.