Does our course content and our approach to teaching cause students to identify problems on the frontier of knowledge, use their basic sciences in thinking about such new possibilities, begin to hypothesize regarding solutions and think of how such new knowledge could be used to improve the quality of life? Or do we focus almost exclusively on past problems that have been solved?

Does the current curriculum prepare students to manage people? Do we include in the curriculum personnel selection, motivation of employees, communicating with employees and employee counseling?

Are we preparing students who can be the kind of subject matter specialists that farmers and agribusiness operators will hire, people who have in-depth knowledge, excellent problem solving skills, and a detailed knowledge of commercial operations?

What are we doing now to educate consumers? What are we doing to be sure college of agriculture graduates will be effective at educating consumers about agriculture?

Change We Must

Our individual and collective response to the above questions will determine how we as professors of agriculture will meet and/or usher in the future.

It is apparent that the business and industry of agriculture, both on and off the farms, will increasingly become more technological, more specialized, more business oriented, and more efficient. The number of part-time small farmers will increase. The consuming public will have little direct knowledge of agriculture. Education in agriculture at the college level must change with the changing agricultural environment. A future orientation will allow for further growth and development. The challenge of change also will bring opportunities to serve the public in new and improved ways. Agriculturalists should resolve to meet the challenge!

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SURVEY REPORT

1983 Computer Use in Poultry Science Curricula

G.M. Pesti and R.K. Noles

Abstract

The results of a survey of 37 of the 50 institutions teaching poultry science in the United States and Canada are reported. The various departments were asked how computers were being used in their curricula. Responding departments were divided into those teaching primarily poultry science and those concerned with both poultry and large animals. Poultry majors were not identifiable in most of the "animal sciences" departments (those teaching more than one commodity). Computer use in undergraduate and graduate instruction was similar for courses in nutrition, physiology and business management among the department types. Computers were used in breeding and genetics courses in "animal sciences" departments but not for similar courses in poultry science departments. Thirty-five programs for instructional use were reported to be available for sharing amongst the departments (list available from authors).

Introduction

Computers are rapidly becoming an integral part of most agri-business. Their uses include keeping financial records, preparing balance sheets, performing break-even analyses, projecting budgets, keeping production records, summarizing reports of production, formulating least-cost rations, and preparing income tax statements (Anonymous, 1982).

Educators at all levels have become concerned with preparing students to deal with technologically advanced equipment, including computers. Although most educators agree that students should be "computer literate" there seems to be little agreement on what this means. In a recent article "Computers in Education" in a popular magazine, Watt (1983) stated:

> "In the past year or two, computer literacy has become a kind of political football at the federal, state, and local levels. No one quite knows what it is, but everyone is sure that it's good for us".

In an effort to determine the present status of computer use in poultry science curricula, various teaching departments in the United States and Canada were surveyed during the first half of 1983. A secondary objective of the survey was to compile a list of software already prepared that is available for teaching poultry science.

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Methodology

The survey reported herein was conducted by mailing a questionnaire to the fifty-five departments teaching poultry science in the United States and Canada listed in the July 1982 PSA Newsletter (Bray, 1982). Questions included: 1) the type of department (poultry vs. animal sciences, or other unit); 2) the number of undergraduate and graduate students and graduates per year; 3) computer hardware and software available for teaching purposes; 4) how the equipment is used to fulfill the academic goals of the department; and 5) curriculum support from outside the department.

Departments and Students

Responses were obtained from 42 of the 55 departments receiving the questionnaire. Five departments, at Lincoln University (Nebraska), Idaho, Brigham Young, California State University (Fresno) and Massachusetts, returned questionnaires only to confirm that they no longer offered instruction in the poultry sciences. The survey thus had a 74% (37/50) response from the pool of probable active programs. A summary of the student numbers in the 37 departments completing the questionnaire is presented in Table 1. Since poultry majors could readily be identified and summarized in departments identified as Poultry Departments but not in others, the data were classified by department designation.

The 14 departments having a Poultry Science designation counted 393 undergraduates and 225 graduate students (Cornell was unique in reporting no specified undergraduate majors in poultry science and only identifies graduate majors). These schools produce approximately 110 baccalaureate poultry majors and 74 graduate degree holders annually.

Other schools maintain a Department of Animal Sciences with poultry combined with at least one other animal specie. In contrast to departments offering only poultry, which averaged 27 undergraduates, these "animal science" departments averaged 290 undergraduates. More often than not, no poultry interest was identified in the "animal sciences" Departments. On the basis of these reports one can reasonably conclude that fewer than 5 percent of the 5808 students reported by these departments have a serious interest in poultry. The contrasts were striking. Arkansas listed 52 of 312 undergraduates as poultry majors. In Kansas 5 of 450 undergraduates were poultry majors; in Michigan 5 of 260. In more than one school the poultry interest was measured by the number of students taking the one or two poultry courses offered.

The 18 Animal Sciences Departments from which data were obtained averaged 52 graduate students of which 8 work on only poultry related interests.

Computer Use

While departments with other than poultry interests generally offered fewer courses specifically associated with poultry, the use of and training in the use of computers in the instruction effort was quite similar (Table 2). Only four departments of all those responding have some form of specialized computer requirement in the undergraduate curriculum. Commonly, however, there is student exposure through statistics, business or agricultural economics courses, especially for students with business or management options. A wide range in the course requirements supporting the computer sciences also exist. Mathematics requirements range from a single course in algebra to a year of math which may include matrix algebra or two courses in calculus. Some schools specifically referred to the application of computer skills in the required course in statistics.

The overall impression, however, is that there is a high level of interest in the potential for computers and that there is access to courses where use of computers is taught. However the use of the computer in the poultry science curriculum remains limited. The single exception to this comment is in feed formulation. Three-fourths of the schools responding to the questionnaire use computers for teaching ration formulation, especially at the graduate level. This is the only widespread consistent use of the computer among departments. Approximately 10 percent of the departments use the computer in physiology courses. At least six animal sciences departments use computers in genetics and/or breeding classes.

Table 1. Summary of Student Numbers at 37 United States and Canadian Schools Offering Instruction in the Poultry Sciences.

	Undergraduates			Graduates		
Unit	Students	Poultry Majors	Poultry grads per year	Students	Poultry Majors	Poultry grads per year
Poultry Science[1]	393	357	110	225	171	74
Avg.[2]	30(13)	27(13)	9(12)	19(12)	14(12)	6(12)
Animal Sciences[3]	5808	NR	NR	998	113	39
Avg.[2]	290(20)			52(19)	8(14)	3(13)

[1]Includes Alabama (Auburn), British Columbia, California (San Luis Obispo), Florida, Georgia, Maryland, New York (Cornell), N. Carolina (State), Ohio, Oregon, S. Carolina (Clemson), Texas (A & M), Virginia (V.P.I.) and Wisconsin. California (San Luis Obispo) has no graduate program and New York (Cornell) only identified the number of graduate students that are graduated since they have no specified undergraduate poultry major. At British Columbia fish culture is included in Poultry Science.

[2]Numbers of departments in parenthesis.

[3]Twenty-three schools reporting, however, data on undergraduate poultry majors were meaningless since schools frequently do not identify major.

Table 2. Number of Departments Which Indicated Specific Uses of Computers in Their Curriculm

Departments	Require Computer Course	Least-cost Feed Formulation	Physiology	Genetics & Breeding	Business Management	Graduate
Poultry (12)[1]	2	11	2	0	4	4
Animal Sciences (23)	2	17	3	5	8	4

[1](no. of departments)

Computer programs used are especially adapted to large animals. Finally, while much of the computer application in management instruction takes place in business or agricultural economics courses, approximately one-fourth of the departments teaching poultry science management classes. Typical programs have to do with flock records such as egg production and broiler performance, and cash flow problems with a limited number of management problems.

The use of computers is much more widespread in graduate programs than undergraduate curricula. Most departments apparently require the development of computer skills at the graduate level though the point was not extensively developed on some questionnaires. The most common requirement is through statistics and/or specialized instruction in statistical packages, especially SAS (Anonymous, 1979). In one institution a poultry department is introducing a statistical data and word processing course at the graduate level.

Hardware

The computer hardware available for teaching purposes at responding institutions is listed in Table 3. A more important consideration than cost when acquiring hardware is often software availability and cost. Software written for one machine usually will not run on other models of the same or other manufacturers, even when written in the same language. In the case of microcomputers, data transfer from one machine to another may be complicated by differences in disk format even when the language and operating system are compatible. Transferring data through other computers may circumvent incompatible disk-format problems.

The introduction and acceptance of standard operating systems has the potential of eliminating the problem of data and program transfer from one manufacturers' machine to another. This survey, however, provided no indication of any standard or agreement on the number of operating systems and languages that are being used for poultry science curricula software development.

Outlook

The continued introduction and expansion of computer aided and assisted instruction appears to depend on several factors. First, the expertise in computer skills among the faculty is most important. One faculty training effort which seems to work particularly well is to schedule intensive training sessions for faculties between academic terms. Second, problems of administrative approval and the lack of money have significantly influenced the introduction of computers on many campuses. This was evident from many responses received. Presently, modest sums of money seem to be available at most institutions for hardware purchases, but software development or acquisition remains a faculty responsibility. The lack of software specifically designed for poultry use is an obvious limitation. Persons seeking to implement computer-assisted instruction in quality curricula will undoubtedly encounter one of these problems.

Poultry science students (and faculty) will undoubtedly need to be personally computer-literate to compete in future job and professional opportunities. This survey indicated an accelerating availability of computer training and a commitment to use of com-

Table 3. Computer Hardware Available for Teaching Purposes at Responding Institutions

	Number of Institutions	%
Main Frame		
IBM[1]/AMDAHL[2]	24	65
CDC[3]	5	14
DEC[4]	4	11
UNIVAC[5]	2	5
None	6	17
Micro		
Apple II[6]	12	32
TRS 80-Model II[7]	7	19
IBM PC[1]	7	19
TRS 80-Model III[7]	5	14
Commodore Pet[8]	2	5
Hewlette-Packard[9]	2	5
Kaypro II[10]	2	5
Other	6	16
None	10	27

[1]International Business Machines, White Plains, NY 10601
[2]Amdahl Corp., Sunnyvale, CA 94086
[3]Control Data Corp., Minneapolis, MN 55440
[4]Digital Equipment Corp., Maynard, MA 01754
[5]Sperry Univac, Blue Bell, PA 19424
[6]Apple Computer, Inc., Cupertino, CA 95014
[7]Radio Shack, Fort Worth, TX 76102
[8]Commodore Business Machines, Inc., King of Prussia, PA 19406
[9]Hewlett-Packard Co., Palo Alto, CA 94304
[10]Non-Linear Systems, Inc., Solane Beach, CA 92075

puters for both instructional and management tasks in poultry science. Specific instructional uses may include drill and practice, instructional gaming, instructional management and support, problem solving and research, simulation, test construction and analysis, and tutorial instruction (Hilgenfeld, 1981). The potential impact, in our considered opinion and judgment, on poultry science instruction and research of the unparalleled technological development of computers is unique in our history and vital to our future.

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One Teacher's Experience

A Computerized Grade Book

Robert O. Burton Jr.

For many faculty members, teaching is a stimulating and rewarding activity. But one monotonous activity associated with teaching is the recording and averaging of students' grades.

In response to this necessary but tedious chore, I used a microcomputer and spreadsheet software as a grade book. Two desires motivated this project: the desire to find a better way to record and average grades, and the desire to learn to use spreadsheet software. This paper shares the results of the experience.

Since recording and averaging of grades is an obvious application of spreadsheet software which has been used by other faculty, this is not a new idea. But at a time when computer literacy of agricultural students is a major concern, there is a need to identify and discuss useful applications which may be used to improve the computer literacy of faculty. Therefore, this paper is oriented to faculty who wish to learn how to use spreadsheet software and are therefore seeking a simple but useful application.

Spreadsheet Software

Stimulated by the observation that a calculator, pencil, and paper are used in solving many computational problems, computer programmers have developed spreadsheet software which takes advantage of the capabilities of microcomputers (Fylstra and Kling). A spreadsheet, also called an "electronic worksheet," is organized as a network of rows and columns. When names have been assigned to these rows and columns, coordinates may be used to specify the location of alphabetic or numerical information stored on the worksheet. Since the information is electronically stored, it may be retrieved for further uses, such as numerical calculations. Several different spreadsheet software programs are available for use on several different microcomputers. Potential purchasers of spreadsheet software should be aware that different combinations of software and hardware do not all have the same capabilities (McMullen and McMullen).

Summary of Application

I used spreadsheet software called VisiCalc®, with an APPLE® II PLUS microcomputer[1]. I had limited previous knowledge of spreadsheet software but had worked with mainframe computers and had taken a non-credit introductory course about microcomputers. The time required to learn the software was minimized by requesting help from people who were experienced in the use of VisiCalc. Additional knowledge was obtained by using the VisiCalc manual's index, experimenting, and asking further questions.

The grade book's design is explained in general terms since details, such as specific command sequences, may be different for different versions of spreadsheet software. One class had 65 students enrolled and 7 scores on which the final grade was based; another had 20 students and 10 scores. The grade book was originally set up as a traditional grade book is, with the first column containing students' names and each successive column containing scores. Then the average, high, and low scores were displayed at the bottom of each column. As new scores were recorded, a revised worksheet (or grade book) was stored as a file on a floppy disk. Because of fear of possible errors which might result in loss of the computerized grades, a copy of the grade book was printed each time a significant change was made. An example grade book is shown in Appendix 1.

At the end of the semester, the final numerical averages were automatically calculated and stored in a column to the right of the previously stored scores, letter grades were recorded in a column to the right of the final numerical averages, and the column of names was moved to the column at the left of the final numerical grade for ease in reading when transferring the final grades to official university record forms. The final

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[1]Apple and VisiCalc are registered trademarks of Apple Computer, Inc. and VisiCorp™, respectively.