other inputs is utilized in making judgments and recommendations. Responses from teaching faculty indicate that faculty believe the students and department heads are those in position to appropriately evaluate instruction. Better than 80 percent of the teaching faculty indicate that they desire student input into the evaluation but that students should not be the only criteria in this process. Performance and contributions, including that of student advising, are factors reviewed annually by heads of departments and the administration of the School in making recommendations for salary increases, promotions and tenure. Sincere efforts are made to judge the individual on his or her responsibilities. More attention is being paid at the time of employment to being sure that the individual has a clear understanding of the responsibilities of the position for which he or she is employed.

Evaluating and recognizing outstanding teaching on a campus is a continuum. Students, alumni, faculty, heads of departments and administrators at various levels have responsibilities. If these responsibilities are meshed and are throughout the structure of the university, a climate will evolve for promoting and recognizing quality instruction.

Nash N. Winstead

It is very important for all academic faculty and administrators to recognize that academic advising, as well as classroom and laboratory instruction, is an important component of the teaching function. Indeed poor advising and improperly scheduled students can make classroom instruction very difficult even for the best teacher.

As Provost it is my responsibility to try very hard to make people really believe that teaching is important and that it is rewarded. I do believe this is true at North Carolina State University; however, most faculty have additional responsibilities and the reward structure for an individual is rarely based on teaching alone. A Provost can encourage, but unless the faculty in a department consider teaching to be important, it will not be important.

As Provost I require that facets of classroom teaching, contributions to the curriculum and innovation be addressed in all promotion and tenure decisions. However, the true and most effective evaluation must be done by the faculty in the department. We strongly encourage student evaluations also. There is no way, after a teacher has been around for a few years, that the other teaching faculty can be unaware of the quality of teaching in fields of agriculture. It is much better for this evaluation to be as sound as possible and not based on gossip. Although we don't require classroom visitation by other faculty and are not likely to do so, it should be encouraged. I know that it helped me and that I was helpful to others, especially young faculty, in a few instances. Another help which I received from colleagues was in the review and revision of tests. In other words, we should try to evaluate, but evaluative efforts should also be efforts to improve instruction.

I do not believe that teaching faculty should be tenured unless they are good to excellent teachers. Most of our faculty in the School of Agriculture and Life Sciences are more heavily involved in reasearch and/or extension than in teaching. For this reason all persons must be rewarded on the basis of the quality of accomplishment in the assigned functions. This split of functional responsibility has enhanced the quality of each of the three functions and I believe it has been especially valuable in assuring quality instruction.

While reward is most often thought of in terms of dollars and salary, there are (besides the personal reward that a teacher receives when students have learned — which continues to be the most important of all) other recognitions which help. These include student club recognitions, departmental or school recognitions or as we have at N.C. State University the Academy of Outstanding Teachers, Mini-Grants for the improvement of instruction and the Alumni Professorships.

Winstead is Provost and Vice Chancellor, North Carolina State University, Raleigh. Presentation given at the 31st Annual NACTA Conference held June 16-19, 1985 at North Carolina State University, Raleigh.

IDEA SHARING SESSION

Oral Presentations

Poster Format for Individualizing Instruction

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Frequently teachers of forage crops would like their students to have at least minimal familiarity with 20-40 species of forage plants, including identification, as well as familiarity with adaptation, use, limitations, and special features about the plants. Learning this material in a lecture or conventional laboratory setting is often limited. In addition, the auto-tutorial approach may be boring and the student is somewhat isolated from others in the class.

We have developed an alternative method to teach about forage species that combines the desirable features of several teaching methods and meets the learning styles of a wide range of students. Our first approach was to remove all the materials about individual forage species from lecture and incorporate them into a conventional two-hour laboratory. The specific information about the plants was included in the laboratory manual and the plants were discussed in a slide illustrated lecture-discussion session.

Since this approach was not very stimulating, we decided to individualize instruction by preparing a learning station for each plant. The station consisted of: (1) a poster illustrating the identification, adap-

tation, and uses of the plant, (2) a pressed plant specimen, (3) a live plant specimen, and (4) a seed sample. Students were provided with a complete description of the plant in their laboratory manual and a form to fill out from information on the poster and observations of the live and pressed plants. After a brief (5-10 minute) introduction by the teacher, the students went from station-to-station gathering their own information and interacting with other students and the lab teacher on a one-to-one basis. Since some of the labs were offered with the station approach and some were offered in the illustrated lecture approach, students were asked to evaluate both approaches. Over 50 percent thought they learned more from the conventional laboratory approach than the station approach where they gathered and synthesized their own information. The students that preferred a structured setting preferred the conventional approach and those that preferred interaction and an unstructured environment preferred the station approach. In written comments many indicated that they felt that a combination of the two methods might be the best approach.

We took their suggestions and our current approach combines the methods. At the beginning of the laboratory there is a relatively short (30 minute) slide-illustrated lecture-discussion (mostly lecture) describing each plant as to its identification characteristics, uses, and adaptation. The stations are set up around the room and following the lecture students go to the stations to reinforce what they saw on the slides, fill out their worksheets, and fasten the sample of seed in their lab books with cellophane tape. The lab instructor moves from station-to-station to ask and answer questions and to point out some of the fine points of identification on the live or pressed plants. After laboratories are over for the week, the stations are moved to a learning center where students have access to them until the next laboratory period when they have a quiz.

This combined approach retains the flexibility of individualized instruction while providing some structure which many students prefer. This method promotes interaction among students and between the teacher and students. Often in this atmosphere students want to discuss problems or situations they have encountered with certain forage species or forage production practices. Others with limited experience ask questions they might not, in front of other students. We feel that this adds greatly to the learning process. We think that our current method is effective in teaching about forage species to undergraduate students and avoids the machinery cost of auto-tutorial instruction. Although we have applied this to forage species we believe the method could have application in other areas.

Horticulture Alumni Profile

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The objective of our two year technical college is to train young men and women for mid-management, semi-professional positions in the broad fields of agriculture and rural living. As a faculty member of our horticulture program, I'm often asked how successful we are in reaching our objective. Is horticulture a frill, fancy, a popular "in thing," or does our program actually train people for industry positions?

To these questions, a survey of our graduates in horticulture was formulated to better determine what they are doing — in particular — whether or not they are engaged in the horticulture industry.

The survey was completed with 95.4% of the graduates replying. The information gathered revealed a very high number of graduates entered jobs in the horticulture field, started their own business or went on to further education. The results showed that this amounted to 88.7% of the total graduates.

The survey covered a ten year period of graduates and at the close of the survey 51.5% of the total were still actively employed or self employed in some phase of horticulture.

Interesting results as to male and female graduates were noted. At the time of graduation, females accounted for nearly two-thirds of the class, but the total still in horticulture remained at above 60%.

Reasons for graduates no longer pursuing careers in horticulture are varied and include such items as marriage, rearing a family, disenchanted with work, low pay, went back to school and not full time employment.

This survey addresses only one aspect of accountability or creditability of a program, but it does give some substantial evidence of meeting the college objective not otherwise available. Future surveys are in order to enable us to produce a track record and further substantiate our initial survey.

Integrating Computers Into Agronomic Instruction

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Use of computers to aid teaching and research has increased dramatically. First main-frame units, and more recently, microcomputers have become widely available as a resource for instruction. As at many institutions, we in the Department of Agronomy are integrating the use of computers into both undergraduate and graduate teaching programs. It is vital to provide computer competency for our students, as well as computer literacy for the faculty.

During the last three years, the department has made a major effort to develop its computer capability. We allocated space for a computer laboratory and installed 7 Televideo terminals directly wired to the main-frame computer. This allows direct access to many available software programs. Addition of full screen editing capability and an on-line printer has

made this an efficient and well-used facility. In 1984, our department employed a 0.7 time Teaching Assistant, primarily to adapt and/or develop software for use in Agronomy courses and to assist faculty to become proficient in the use of microcomputers. This readily available assistance for faculty has speeded the development of computer literacy. Individual faculty members have obtained Zenith Model 150 microcomputers and we have recently purchased a Zenith Model 160 portable microcomputer and Limelight video output projector for classroom and laboratory use.

Eight faculty are currently using computer programs in their courses to teach concepts of residue management, soil erosion, optimum cropping systems, planning forage systems, weed control recommendations, and modelling crop growth and nutrient cycling. Other uses presently include grade books, examination question files and test preparation, tabulation of the Kansas FFA Crops Judging Contest, preparation of overhead transparencies and visuals for classroom use and displays. Word processing is regularly used to prepare hand-out materials and examinations.

In summary, computers are a vital resource for agronomic instruction. Uses of computers are limited only by our creativity and resourcefulness.

The Last Lecture

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The final period of my Woody Plant Materials II course is the culmination of two semesters of rigorous work. After studying 250 plans and taking 12 pop quizzes, 24 lab quizzes, 6 lecture exams, and doing 6 projects, I feel the students and I need a break. Instead of going through my traditional lecture in which I show slides of woody plants and discuss their characteristics, I change the format considerably during our last session.

The last lecture consists of a 30 minute slide show accompanied by background music. Two carousel projectors synchronized by a dissolve unit are used to enable the pictures to fade in and out on the screen. I present the show in the student union where the seating is more comfortable, the screen is larger and the atmosphere is not as formal as the lecture hall.

Over 300 slides are shown and consist of pictures of students, plant materials, "quotable quotes," landscapes, and sometimes unrelated subjects. I arrange them in chronological order starting with early fall and progressing from winter into spring. There are times for laughter and times for tears as the students see themselves and the plant materials they studied over the preceeding year. It's interesting to hear their reactions as they remember the rainy days, deep snow, and cold winds they encountered on their weekly plant walks on campus.

I take pictures throughout the year of students and plants. Since we go outside regardless of the weather, I always end up with pictures of students braving all kinds of inclement weather. Most of the lab periods are spent in the campus arboretum studying plants and taking I.D. quizzes.

Reviewing the year's work with a slide show and music has been a positive experience for my classes. Attendance is usually close to 100% and this is the only time I ever hear applause for one of my woody plant lectures. I have fun putting it together and feel that my "Last Lecture" is an effective way to summarize and bring to a close my courses in plant materials.

Use of Oral Examinations in Advanced Agricultural Science Courses

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Abstract

We use the oral examination as the final examination in a senior level course in Integrated Pest Management (IPM). The group setting including several interdepartmental examiners motivates students to prepare for the examination. Examination questions are projected onto a screen and students randomly selected to respond. Examiners rate individual students' responses, expand on the questions, correct errors, and add information that should be helpful to students. This immediate feedback increases learning opportunities for students.

Oral testing of students is frequently done in such fields as medicine, dentistry, foreign languages, and in such performance classes as music, speech, and drama. There is no evidence, however, of its regular use in the agricultural sciences except as a protocol for completing graduate degrees. Oral examinations are used to evaluate the intellectual achievements of students as well as their verbal skills. Both may be critical during students' academic careers, in job interviews, and for eventual success in a job.

Aiken (1) and Ebel (2) present comprehensive reviews of the literature and discuss the advantages and disadvantages of oral testing. The traditional criticisms, some of which are based on empirical data, are that oral examinations are more time consuming to prepare and administer, may have lower reliability than written tests, are open to lack of objectivity, and place students under stress. Nevertheless, oral examinations provide flexibility in the evaluation of responses beyond what is possible in written exams. Careful structure of the examinations and design of the questions (with prior

agreement on the answers acceptable), use of several knowledgeable examiners, and sufficient examination length to allow examinees to feel comfortable and demonstrate their skills can produce reliable and valid test scores (1,2).

For several years, we have used the oral examination as the final examination in a senior level course in Integrated Pest Management (IPM). We had concluded that the traditional written final examination did not always stimulate in-depth subject matter review for optimal performance by students, thus diminishing the learning opportunities an examination should offer. Furthermore, students need opportunities to deal with the stress of oral presentations and to justify and expand on their ideas. We encourage students to prepare for this examination throughout the semester, especially in study groups, rather than rely on individual last-minute preparation.

We elected the group setting, as opposed to 1:1 faculty/student for this examination believing that it further encourages students in their preparation. Because the students are IPM majors or other senior and graduate students with an interest in IPM and a desire to work in this area following graduation, an underlying incentive for quality preparation comes from peer pressure. Students want to impress their colleagues and faculty who might be in positions to serve as their references later.

The size of the classes has been small, generally not exceeding 25 students. This contributes to the feasability of this testing procedure. The examination is two to three hours long. Prior to the examination, we develop an array of questions that we believe are of comparable difficulty. Questions are projected onto a screen, and students are randomly selected to respond. Three or four faculty members from several departments grade the responses, expand on the questions, correct errors, and add information that should be helpful to students. This immediate feedback increases the learning opportunities for students, while the examination helps faculty better assess students' knowledge and communication skills.

The final examination grades are based on the accuracy of students' responses, together with some consideration for verbal presentation skills. Students answer at least three questions. Final examination grades for each student are an average of the letter grades (A-F) given to each answer by the examiners. These letter grades subsequently are transformed numerically. This examination constitutes 10-15% of a student's final course grade, thereby not unduly penalizing anyone, especially those individuals who might be particularly uncomfortable with this format. Our observations, as well as student comments, indicate that students are generally receptive of the oral testing format, and afterward have a better grasp of their own expertise and communication ability and how their performance compares with that of their colleagues and faculty expectations. We hope that their personal, peer, and faculty appraisal will enhance their self-confidence and desire to improve.

In conclusion, we feel that there is merit to oral examinations when evaluation of subject knowledge, synthesis of that knowledge, and communication abilities are important.

Aiken, Lewis R. 1979. The case for oral achievement testing. ERIC system number ED 222578, 15 pp.

Ebel, Robert L. 1979. *Essentials of Educational Measurement*, third edition. Prentice Hall, Inc., Englewood Cliffs, N.J. 388 pp.

Programming Skills: Its Importance and Place in Higher Education

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The introduction of microcomputers has brought a new era to higher education. The number of micros and students using them is increasing, but the development of software and its application has not kept pace with this increase. This has prompted the need for programming skills in all educational fields. Programming skills is significant at various stages and to different groups of people of the "computer revolution" on campuses.

One such stage is the development of course-specific software. Since the use of computer will not be exclusive of a specific range of fields, good course-specific software can be produced if educators and students from all majors participate in developing them. There must be more emphasis on programming skills in all educational areas to incorporate the subject-specific knowledge of educators to create appropriate courseware in these fields. Universities must make a more concerted effort toward meeting future demands of courseware and this is possible via programming skills.

Programming skills should be taught not only to those interested in developing software but also to users of software. Users who are skilled in programming can write special programs or modify existing ones to match specific needs. Additionally, they will be better equipped to evaluate all existing software. Programming also develops mental discipline, logical thinking, and organizing skills, all of which are necessary for coping with contemporary computer culture.

Programming skills may also change the attitude of novices toward computers. Research has shown that novices exposed to programming prior to using computer aided instruction (CAI), expressed lesser anxiety than their counter-parts without such experience.

To teach programming skills, the myth that equates programming with the complexity and sophistication that only a specialist may have, must be erradicated with educating people about the existing programming languages, which are appropriately suited to different capabilities, interest, and styles. The inclusion of programming languages that accept common language (English) commands will especially be instrumental to convincing novices that they too can master programming skills.

Linear Structures for Verbal Concept Formation

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Students entering N.C. State University's Agricultural Institute program score poorly on the verbal portion of the SAT. Institute students are required to enroll in two Agricultural Communications courses, courses which contain strong elements of language fundamentals, including spelling, vocabulary building, and problems of usage.

Patterns of inappropriate oral verb usage, already habitually ingrained, do not easily change. Students are introduced to a system of verb concept formation which can be utilized in written communications, which more readily lend themselves to the thoughtful application of appropriate word sequencing.

Appropriate word sequencing in verb formation begins with the variations in spelling of verb forms. Irregular verb forms are emphasized because these have the most variations in spellings and also cause the most difficulty in oral and written usage.

For example, if the concept of moving one's body from one place to another can be expressed by the word **go**, the possible spelling variations are: **go, goes, went, gone,** and **going.** Similarly, **sing, sings, sang, sung, singing,** etc. Numbering these spelling variations from left to right 1-5, we find that spellings 1, 2, and 3 are single word verbs. Spellings 4 and 5, if they are to be used as verbs rather than as participles and gerunds, must be preceeded by an auxiliary or helper word. These auxiliaries are **be, am, is, are, was, were, been,** and **have, has,** and **had.** Thus we derive such linear sequences as **were gone, were going, have gone, have been going,** etc.

Other auxiliaries can combine with the first spelling. They are: **do, does, did, can, could, shall, should, will, would, may, might, must, need,** and **dare,** the last two most frequently in negative statements (as **dare not go**).

Then in linear structures the second group of auxiliaries can combine with the first group for such combinations as **could have been gone, might have been going,** etc.

Spellings two and three, if correctly used **never** take an auxiliary. In oral usage especially, students will be inclined to attach an auxiliary to the third spelling.

The Advisor's Perspective on Student Stress

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I do not have any particular recipe for dealing with student stress. I have made some observations over the years and I would like to share some of them with you and start with a short story.

Once upon a time on a dangerous seacoast where ship wrecks often occur there was a crude life saving station. The building was nothing more than a hut and there was only one boat, but the few devoted members kept a constant watch over the sea. They went out day and night even in stormy weather searching for the lost.

Many lives were saved as a result of the efforts of these men at this little station. Some of the men who were saved and others of the community were naturally grateful to these men and the station so they gave up their time and money and more boats were purchased and other crews trained.

Ultimately, some of the members became unhappy with this crude building and the poor equipment so they took out the emergency cots for the victims and put in soft chairs and lounges and soon the station became a popular gathering place for members and nonmembers alike.

As time went on, the members of the station got disturbed when their social activities were interrupted while out on the ocean saving men. So they hired specialists to do all the lifesaving. They also set up showers outside the new building to wash the dirty victims because they tended to mess up the floors and furniture of the station.

Finally, the effort to save lives and row boats full of dirty people on days when they had social programs scheduled at the station became too much. So, they dissolved the life saving station and incorporated a social club that better served themselves and their own needs.

I use this story from time to time to remind me that I may be one of the causes for student stress. I, like the little life saving station started out some 20 years ago with crude equipment for counseling students, but I was enthusiastic about it and felt that in some ways my job compared to that of the coast guard. I also kept careful watch over the "sea" of students and when one showed signs of stress I offered the warm blanket of my concern and tried very hard once the student had been acclimated to my personality to find him a ship on calmer waters.

However, I got more and more interested in building stations and less and less in saving students. In fact, students started to get in the way of my research. They always seemed to appear at the most inconvenient times when I was preparing for class, or about to tell a joke to my secretary or about to leave for a meeting where I was to present a paper on "good advising."

Yes, when students became my greatest cause of stress — I soon became theirs!!!

Fragmented Freshmen

For those of you who know me, you realize that I'm speaking with tongue in cheek. I really am not the only source of the student's stress. Just one of them. The college student's stress begins early, perhaps the first few days on campus. When the freshman arrives on a hot summer day in late August — after the long drive from home; after the moving of the T.V., the fan and refrigerator; after the hamburger at Wendy's; after

the location of a parking place and after finding the Coliseum; and after he finds that MA 111 is over-enrolled and the BS 100 lab comes on Friday afternoon — only then does he find he must come again tomorrow for "change day."

Yes, he or she is a fragmented freshman. For the next few days we, the faculty, like Andy Rooney take turns giving him "pieces of our mind." The student finds himself **registered, oriented, taught, guided, counseled** and **referred,** all by different people. Each doing his job well but none seeing the "oneness" of the student. Is it any wonder that students wear signs saying, "Please do not fold, spindle or mutilate?"

We advisors could relieve some of that stress if we could convince this fragmented and frustrated freshman that the "buck stops here;" that we have the information, we have the experience, we have the confidence and we are **not** going to refer him or her to one more person unless it's absolutely necessary. We are the student's advocate.

Causes of Stress

Student stress is not limited of course to freshmen and each of us could probably cite numerous causes of stress that occur later in the college career. There are some that occur more commonly than others. Those that I have noted are:

(a) **The stress caused by the fear of failure.** It is certainly up to us as advisors to encourage students to attempt the difficult course, take on the new responsibility, read the challenging book. But it is also up to us to remind them when they fail academically (and some of them will) that they have not failed as persons. Grades do not measure integrity, endurance, manual dexterity, graciousness honesty or one's sense of duty. Furthermore, if the campus does not give one the "freedom to fail," where else?

(b) **The stress caused by a conflict between the student's dreams and his or her capabilities.** Unfortunately, some students come with **dreams** sponsored by parents and enlarged upon by well-meaning but uninformed teachers that are completely unrealistic for that particular student. There is bound to be a stress when a student dreams of being a commercial farmer but whose experience is in a backyard garden; or who dreams of being a researcher but avoids all courses in the biological or physical sciences. We who advise should be able to help the student sort this out. We are the student's counselor.

(c) **The "stress" caused by peer pressure to be everything to everybody...** in the classroom, in the fraternity or sorority, in the club, on the athletic field or in campus politics. Yes, one beer ad says, "you can grab the gusto," but unlike the other beer ad they "can't have it all."

(d) **The stress caused by the feeling of "lostness,"** particularly in the first two years when the student is taking what he or she considers to be strange courses in strange areas of the campus that represent strange bodies of knowledge that appear to have little if any relationship to the student or their current interests. Is a B.S. degree in agriculture worth this price? How do we as advisors convince these students that these courses are not a price but a privilege? And only time and life's experiences will whet the appetite for music or literature and a sense of history?

We could go on — the stress of "senior syndrome," the "I've done it all" complex, etc., etc. But some forms of student stress are not cyclic, seasonal or class oriented. The older advisors in the group remember the "Vietnam crisis" on campus when students asked or even tortured themselves with questions. Were they moral pacifists or cowards? These were trying days for advisors, even for those of us who are veterans. There were no pat answers, no advisor's kits. We listened much and talked little. Good advisors are good listeners.

In summary, I like to think that the advisor's role in either relieving stress or counseling students to live with it is more than the bureaucratic activity of record keeping, student plans, preregistration and the choice of curriculum.

Bertrand Russell defines wisdom as a word concerned "partly with knowledge and partly with feeling." We are not born with either the knowledge or the feeling, but on our good days we advisors do have the **wisdom** (the knowledge and the feeling) to deal with student tension. We trust they have the wisdom to deal with **ours.**

A Videotape for Teaching Egg Formation in the Domestic Fowl

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The avian egg serves many useful purposes in scientific research, in reproduction and in human nutrition. The synthesis of the egg constituents and the packaging of such a useful resource has been of interest to man for centuries. This quest for knowledge concerning egg production and its control required an understanding of several disciplines. Among these are anatomy, endocrinology, nutrition, physiology and reproduction, all integrated in the process of egg production. As an instructor, the task of presenting material of such diversity to an unknowing and sometimes unwilling audience is difficult at best and in such situations visual aids enhance the ability to comprehend and retain information.

With this in mind, an instructional videotape of avian egg formation was created to help the student visualize the entire process of reproduction in the chicken. The filming of this event involved surgical procedures to film ovulation, laparoscopy techniques to film the passage of the egg through the reproductive tract and oviposition and overt observation of oviposition, using a videotape camera.

The entire videotape was created using Single Comb White Leghorn hens which are kept commercially for white egg production. Hens were maintained in individual cages and oviposition times were recorded. The time of oviposition was used to predict ovulation time and the presence of an egg in the desired portion of the reproductive tract, according to Sturkie (1976). Several hens were used in the filming of egg formation, each with an egg in a different portion of the reproductive tract.

The videotape of egg formation begins with ovulation, or the releasing of the egg yolk from the ovary. Although the ovary was viewed *in situ* with the laparoscope, we were unsuccessful in filming ovulation with laparoscopic techniques. Therefore, a surgical procedure was developed to exteriorize the ovary, making filming of ovulation much simpler. Immediately following oviposition, a hen was anesthetized with sodium pentobarbitol and an ovarian follicle was exposed, using surgical techniques, through an 8 cm incision between the last two left ribs. The procedure required approximately 10-12 minutes. Attempts to artificially induce ovulation using LH solutions and prostaglandin E1 solutions were unsuccessful. After considerable experimentation to stage ovulation, a simple procedure was developed using a small hemostat to apply pressure to the follicular stalk and ovulation was initiated and captured on film.

The presence of an egg in various parts of the reproductive tract was filmed using laparoscopic techniques. Laparoscopy in birds has been used for sex determination in species without consistent visible sexual dimorphism. The techniques described by Bush (1980) were modified and used in filming egg formation. Ketamine hydrochloride was administered intramuscularly to induce anesthesia. Inhalation of halothane using an endotracheal tube maintained anesthesia in the hen during the procedure. After preparation of the surgical site, a small skin incision approximately 10 cm in length was made behind the last rib on the left side of the chicken. A trocar-cannula was inserted through the skin incision, the trocar was withdrawn and the laparoscope was inserted through the cannula into the chicken.

Egg formation events including albumen secretion and shell membrane formation were filmed through this incision, using laparoscopic techniques. The final stages of egg formation were filmed by inserting the laparoscope through the cloaca and vagina of the chicken, facilitating the recording of shell formation in the uterus. Finally, oviposition or the actual laying of the egg, was filmed using a video camera positioned at the rear of the chicken. Each chicken was restrained and injected with 8 IU's of oxytocin IV immediately prior to the expected oviposition time.

In summary, the events of egg formation, ovulation through oviposition, have been recorded on film and incorporated into an instructional videotape. The techniques used in filming this videotape of egg production can be applied to other areas of agriculture to facilitate teaching animal production and husbandry.

Bush, M., 1980. *Animal laparoscopy*. Harrison and Wildt, ed., Williams and Wilkins Publishers, Baltimore, MD.

Sturki, P.D., 1976. *Avian physiology*. 3rd ed. Springer-Verlag, New York, NY.

"Collaborative Library Research Project: Animal Health Class, ATI"

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A collaborative approach to the classroom research needs of the animal industries students at ATI has led to an ongoing, evolutionary teaching process with active participation in the classroom by the Librarian. To assist the development of the necessary research skills by the students, the Librarian makes a presentation in the classroom which outlines the resources available to them and the specific information available by species of livestock.

This process has evolved over the past four years. Bibliographies of materials, both reference and periodical were prepared and presented to the class in a standard lecture format in the first year, a synchronized slide/tape presentation in the second year and a videotape and lecture in the third and fourth years. In response to the specific needs of this course, the tables of contents of relevant magazines were photocopied and bound together in a three-ring binder labeled "Livestock Index." These assist the students by filling a gap in published subject indexes which tend not to include breed and other farm related publications.

Student evaluations were completed at the end of the course in 1982, 1983 and 1984 (the second, third and fourth years of the project).* These indicated a high percentage of students (1982 77.3%, 1983 82.9% and 1984 87.1%) were able to find materials in the Library. Similarly 86.3% in 1982, 90.1% in 1983 and 88.1% in 1984 indicated they felt the instruction on resources in the Library was "sufficient" or "very thorough" in their responses. The professor has been relieved of student resource development questions and the skills developed by the students has resulted in better quality papers in the course.

* Completed responses evaluating this phase of the course were returned by 22 of 27 students (81.5%) in 1982, 41 of 45 (91%) in 1983 and 31 of 31 (100%) in 1984.

Effective Ways of Teaching Hay, Silage and Feedstuff Identification

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Teaching identification of hay, silage and feedstuffs was not necessary when the majority of animal science students came from farm backgrounds. However, 65% of today's students have urban backgrounds. The animal background of these students is generally limited to pets and/or horses and even many of the farm reared students are only exposed to 1-2 species of animals. Feed identification is now a necessary part of feeds and feeding courses.

Feed identification can be aided by the use of descriptions and pictures in books, slides, field trips to farms and feedmills or by bringing feeds into the classroom. The most effective and reliable method has been to bring the feeds into the classroom, incorporate them into lectures and labs and have them available for students during non class hours. Containers for the feeds must be appropriate both for use in the classroom and for easy storage between terms. The containers we have used in the past and are now using for hay, silage and feedstuffs are described below.

Hay Sample Containers

Proper identification and quality evaluation of hay requires that one sees, feels and smells the hay. Initially, portions of hay bales in large garbage bags were displayed in the laboratory. However, after examination by 25 students, the entire feeds laboratory and hallways were covered with hay. These large bags also required a large area for storage. To reduce mess and increase ease of storing, hay boxes (40×40×14 cm) were constructed with one side of clear plexiglass and the other side of solid plywood (figure 1). The samples can be easily viewed through the plexiglass and the sliding back panel allows easy access to touch, smell and handle the hay.

Materials for construction of 1 box includes a 2×14×54 cm (pine, fir, etc.) board, a 38×38×.2 cm sheet of plexiglass, a 38.5×38×.5 cm sheet of plywood or masonite, 8 #10 (wood) screws and a handle. First, place a 4 mm groove in the 2×14×154 cm board on one side approximately 1 cm from the top edge (make groove wide enough to hold the plexiglass sheet). Then cut a 37 cm piece from the grooved board. Reduce the width of this board by cutting 2 cm from the bottom with a table or circular saw. On the remaining 117 cm board another groove (8 mm) is placed on the same side approximately 5 mm from the opposite edge (make groove wide and deep enough to allow the plywood bottom to slide). The grooving can be done with a router, table saw or dado. The board is then cut into two 40 cm pieces and one 37 cm piece.

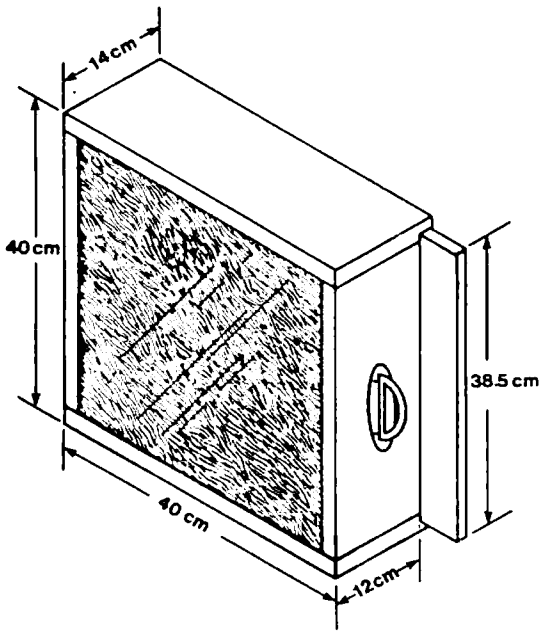

Figure 1. Hay Sample Box for Teaching Identification and Evaluation of Hay.

The box is assembled with two screws at each corner and with the plexiglass permanently in place (figure 1). The sliding plywood or masonite may need some sanding in order to increase ease of sliding.

These boxes have worked very well. They allow the students to see and even handle the hay with little or no mess. However, extensive handling will destroy the natural arrangement of the hay and may result in leaf loss. Samples of hay can easily be changed or the same samples used year after year providing there was minimal handling. Boxes can be moved easily (by the handles), stacked and storage requires little space.

Silage Sample Containers

Proper identification and quality evaluations of silage, as with hay, requires that one sees, feels and smells the sample. The higher moisture content and volatile constituents of silage require that a container be air tight. To accomplish this, we have modified 5 gallon pickle buckets. These buckets can be sealed air tight and vet be easily re-opened. To allow the escape of fermentation gases yet not allow entrance of oxygen, a 2.5 cm hole is drilled into the cover of the bucket and plugged with a stopper fitted with a bunson valve.

Silage is then placed in the bucket either at time of ensiling (the bucket acts as a silo) or directly from a silo. The material is packed into the bucket, the lid placed on and the silage sample is retained in original condition until used in class. The bucket is usually opened before class because some mold will grow at the very top of the bucket. This material is removed and the silage below is in its original condition. The same bucket of silage can be used for several labs or even up to 2 years after initial packing. These containers allow students to see, feel and smell silage as if they were at a large silo. We have used these buckets to show students different qualities (amount of grain and/or maturity), kinds (corn, sorghum, legume or grass silage) and type (good vs. poor fermentation). In addition, samples have been used to teach students how to estimate moisture content of silage. Storage of these buckets requires little space and the buckets can be stacked.

Feedstuff Sample Containers

Common feedstuffs in the US were collected for use in class. Storage of the samples is a problem because of insects, rodents and moisture. Initially, samples were stored in glass mason jars. These allow the student to see the feedstuff, keep it air tight and protected from rodents. However, mason jars are breakable and some are awkward to store. We also have used zip lock freezer bags and whirl packs to display and store samples but these bags tend to wear out before the end of a term.

To display and store samples, we now use rectangular (5×6×9 cm) clear plastic vacuum seal containers. These are also available in several sizes. The lids can be easily removed to gain access to the feedstuff. Our feedstuff collection contains whole and processed grains, feed by-products, minerals,

premixes, additives and feed mixes for different species. The entire collection can be stored in 2 small boxes.

Feedstuff Cards

Students are required to assemble a feedstuff collection by placing samples in a 24 compartment seed mount card (available from NASCO). This allows the student to view the feeds at their own convenience outside the classroom and gives them a permanent collection for later reference in other classes. Students have enthusiastically prepared and used these seed mount cards.

To evaluate the effectiveness of this method an identification quiz was given before and after the students had assembled their seed mount cards. Students were able to identify 26% of the samples prior to and 90% after assembling their collection.

Conclusions

Utilizing the hay, silage and feedstuff containers allows us to successfully bring feeds into the classroom. These containers are unbreakable, easy to display and to store. After viewing the feeds collection the student can confidently identify feeds and evaluate their quality.

What I've Observed in 35 Years of Teaching

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To be a successful teacher, one needs to have a positive attitude. One must have a lot of self confidence. Needless to say this is something one gains with experience.

I can recall when I first started teaching at Iowa State, as a Senior Teaching Fellow and a graduate student, I was rather scared when I faced that first class. However, I soon looked forward to meeting a new class each semester. I realized the way one conducted that first class, meeting new students for the first time, was probably the most important of the semester. One needs to let the students know what you expect them to be responsible for, and what they can expect from you. That is the type and number of examination, whether you will give make-up exams in case of students missing an exam, etc.

I learned, early in the profession, that one must be very fair with all students. One can not show any favoritism to any student. I have always made it a point to get to the classroom at least five minutes before the time for the class period to begin. I spend this time moving about the classroom asking students how things are going for them, etc. If I detect students who are "up-tight" or worried about something, I ask them to come to my office after class, and we discuss what is bothering them and causing them to do work below their ability.

If a student does poorly on an exam I always write a personal note, and ask them to come to my office after class so we can try to figure out what happened. I have found students really appreciate this personal interest. Many of them later ask me to be their academic advisor.

Over the years, I have worked a lot with many International students both graduate and undergraduate. I have found many of them require extra help, understanding and encouragement.

Education never stops or stands still. One must keep himself well read and be progressive to be successful as a teacher or advisor.

Honors Program - A Contributor to Quality Education

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Enrichment programs in the School of Agriculture and Life Sciences (SALS) at North Carolina State University provide opportunity for some students to be involved in seminars, research projects, and as classroom and/or laboratory assistants. One enrichment activity, the SALS Honors Program, provides a mechanism for students to study a research area in some depth, assist with a class or lab and conduct seminars. At N.C. State, a student has opportunity to participate in an Honors Program during each of the four years in residence. Freshmen (second semester) and sophomores with a GPA of 3.0 and up (4.0 basis) are invited to participate in an Honors Seminar, designed to have six or eight sessions of one and one-half hours each. A broad range of topics is covered and one student subgroup is responsible for each seminar, including securing the speaker (under direction of faculty seminar leader).

Juniors and seniors with a GPA of 3.0 and above receive a written invitation to participate in honors research or as an honors teaching assistant. Students are given a list of research projects with names of project leaders and a list of faculty who teach courses and have indicated an interest in having an honors student assistant. Students contact faculty members and arrange their honors program for the semester. A written report is required at the termination of the project.

A student may take a maximum of eight semester credits of honors work toward a degree. Honors seminar is one semester hour credit and Honors Research/Teaching is three hours. The courses are graded on an S-U arrangement.

Honors research/teaching programs provide in depth study in a particular area that is of mutual interest to the student and faculty member. In many cases the student is stimulated to pursue a career in research and/or teaching because of participation in honors. Certainly, this type of program contributes to a quality education.

Using the PAS Organization in Teaching Agriculture

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The national Postsecondary Agricultural Student organization was created in 1979 to provide leadership skills and recognition for students studying agricultural

subjects at postsecondary institutions. Institutional membership is open to any school teaching agricultural subjects at less than the baccalaureate level.

Since its inception, the leaders of PAS have been developing programs to enhance instruction and provide leadership opportunities for members. The first activity of this nature was the employment interview contest started in 1981. Since postsecondary technical education is aimed primarily at employment, such a contest is a natural for the organization. Contestants are judged on the quality of their resume, cover letter, written application, and mock interview.

The ability to express one's self in an oral manner is emphasized in the two "Speakers for Agriculture" contests — prepared and impromptu. Awards are sponsored by the FFA Alumni Association.

The Partners in Agricultural Leadership/Personal Education Evaluation and Recognition (PAL/PEER) project is deeply based in the educational program of the individual student. For PAL, the student studies his chosen field of agriculture to determine what a successful worker in that field must know. A personal plan is then developed detailing how that individual will learn what he needs to know. The student's plan and his success in following that plan are evaluated by peers, and recognition is given for outstanding achievement. Awards are sponsored by FMC, Deere and Company, Pioneer, 21st Century Genetics, Pfizer and the American Simmental Association.

The newest PAS program is the Agricultural Equipment Service Technician award. Here, the student demonstrates knowledge and skill in diagnosing and repairing problems in agricultural equipment. This award is sponsored by Deere and Company.

Participation in club activities can be an interesting and enjoyable way to enhance agricultural education. PAS is providing the opportunity for this to take place.

Factors Affecting Student Evaluations

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Asking students to evaluate courses and professors is a common practice in the Department of Agriculture at Southwest Missouri State University. This is a report of a study of some of the factors that may influence how students make those evaluations. It involved end-of-semester evaluations by 501 students over a period of eight semesters in an introductory course in animal science. Analyses of variance were made by year, season (fall versus spring semesters), major, expected grade and sex. No differences were observed among years or between seasons. The overall mean evaluation score was 85.3 on a 100 point scale. The error standard deviation was ± 8.0.

Four majors were compared. The mean evaluation score was 86.4 for animal science majors, 84.6 for agricultural business majors, 85.1 for other agriculture majors, and 84.9 for non-agriculture majors. Although the scores were highest for animal science majors and lowest for agricultural business majors, the difference of less than two units was not statistically significant.

Students were asked to indicate the letter grade that they expected to earn for the course. They had previously been provided with information that would allow them to make valid judgments of these expectations. The mean score was 87.1 for students expecting an A, 85.9 for B students, 83.9 for C students, and 81.3 for those expecting a D or an F. The differences were significant ($P \blacktriangleright .005$).

Female students rated the instructor significantly higher ($P \blacktriangleright .005$) than did male students: 86.9 versus 84.5, respectively. One of the things the author will be looking for in the next phase of the study is whether male students rate female instructors higher than do female students.

A Procedure for Merit Evaluation of Faculty

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Assistant Provost for Academic Affairs
Byron Harrison
Associate Professor and Division Director
University of Minnesota Technical College, Waseca

A merit reward system demands accountability. To be accountable requires a workable system to evaluate fulltime faculty. A workable system is a need of many institutions and particularly of our institution, the University of Minnesota Technical College, Waseca (UMW). The evaluation of fulltime faculty is a difficult task. However, we do not believe that it is impossible. Therefore, we have established a procedure that has as a goal to bring about accountability and reliability to a very difficult process.

It is clear that if we are going to have a successful evaluation and merit program, administrators and faculty have to be systematically involved in the development of the entire program. These were the guidelines that we attempted to follow as we developed the system at UMW.

A system for merit evaluation was developed which follows general guidelines required of all faculty teaching within the University of Minnesota and which corresponds to the promotion and tenure process of the University. These factors included, teaching, scholarly activity, and service. In addition, it was felt important to include individual, professional development as well. Because teaching is defined in amount by the University of Minnesota agreement with the University Education Association, we decided to emphasize the quality of instruction rather than the quantity of teaching. The teaching category must also include the advising of students, assisting students in their work experience activities, and guiding students through special programs. Because UMW is not a research institution, scholarly activity generally relates closely to the development of teaching materials and the evaluation of the performance of these teaching materials.

The merit adjustment evaluation form (completed by faculty and reviewed by division directors) consists of the following sections.

1. A cover page which includes the period being evaluated, appointment, and division.
2. Teaching (including special projects and quality)

3. Disciplined Inquiry (measuring both quantity and quality)
4. Service and professional development
5. Summary

The following recommendations are proposed for educational units considering this type of merit evaluation system. To ensure its success, it is essential that you have the support and consensus of both faculty and administration. To be successful, subjective discussion about merit evaluations must be changed to action which involves the gathering of objective information so objective decisions may be made.

In conclusion, it is recognized that UMW's process for merit evaluation is a long way from being a perfect system. There are still many problems and concerns to be eliminated. This is a better system than our previous, more subjective one used in the past.

IDEA SHARING SESSION

Poster Presentation

Developing Problem-solving Abilities in the Agronomy Classroom

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Agricultural and Extension Education
Roger E. Pennock Jr.
Professor
Department of Agronomy
Penn State University

The college/university agronomy classroom is **not** an "ivory tower learning center" isolated from society's problems. The currently existing or developing agronomically related issues and problems should provide the basis for a "charged" learning environment involving instructors and students actively exchanging viewpoints and debating potential solutions to problems. The classroom need not be characterized by a one-way flow of information from instructor to students; followed by students repeating the same information on an examination. Learning is an **active process** in which the student assimilates information and/or concepts resulting in reaffirming their current behavior or changing their thinking, doing or feeling behaviors.

During a College of Agriculture Curriculum Workshop conducted in May 1985, the faculty identified the development of student's problem-solving abilities as the major resident instruction emphasis for the 1985-86 academic year. Within the context of undergraduate instruction, problem solving focuses upon the ability of the student to effectively solve a broad range of social, economic and technical problems.

The problem-solving teaching approach as used in Agronomy 217 (Forest Soils) at Penn State consists of the following major steps.

1. Students identify and recognize specific problems related to forest land use at a specific forest site.
2. Students develop potential forest land use solutions.
3. Students secure needed information related to the implementation of each land use solution.
4. Students formulate a final plan in which they develop complete site maps, make soil profile descriptions and determine forest productivity ratings for each mapping unit.
5. Students implement the plan developed by formally presenting the plan to Department of Forestry personnel, Soil Conservation Service personnel and peers. This discussion simulates the "real world" situation they will encounter where they will need to communicate and defend their ideas.

The problem-solving teaching approach as used in Agronomy 217 provides a general framework that may be used in most any college classroom. The problem-solving teaching approach is one means of reducing student passivity and enhancing the creation of a learning environment in which student and teacher **collectively** assume responsibility for teaching and learning. The classroom and laboratory become an extension of the agronomy profession, and students and teachers develop a mental linking mechanism wherein facts and information are analyzed within the context of a structured wholeness.

Cards, Copiers, and Computers Help With Examinations

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H. B. Moore
Professors of Entomology
N.C. State University

Shingled 5×8-inch cards, over-size acetate covers with binders, photocopiers, and computer analysis were combined to increase the level of thinking required to answer multiple-choice questions. Families of questions may be created and stored in folderettes. Diagrams may be more easily used than in computer-prepared examinations. Reduced teacher-stress during examination preparation was an unanticipated extra.

Introduction

In seeking ways to improve production, assembly, and performance of our examinations, we developed a system combining 5×8-inch cards, the photocopier, and a test-analysis computer program (QUIZANAL 1985). Use of the computer analysis limited the type of questions to true-false or multiple-choice. (Composition skills are encouraged in daily quizzes.) From the literature, we determined that many types of multiple-choice questions could be devised (Commission on Undergraduate Education in the Biological Sciences 1967, Gerberich 1956, Graduate Record Examination Board 1983, Gronlund 1982), some of which would test the higher "levels of learning" (Bloom 1956).

The basic unit of the system is a 5×8-inch card bearing the test item, its record of use, its classification and the correct answer (Fig. 1). A 1½-inch right margin on the card permits binding on that edge with