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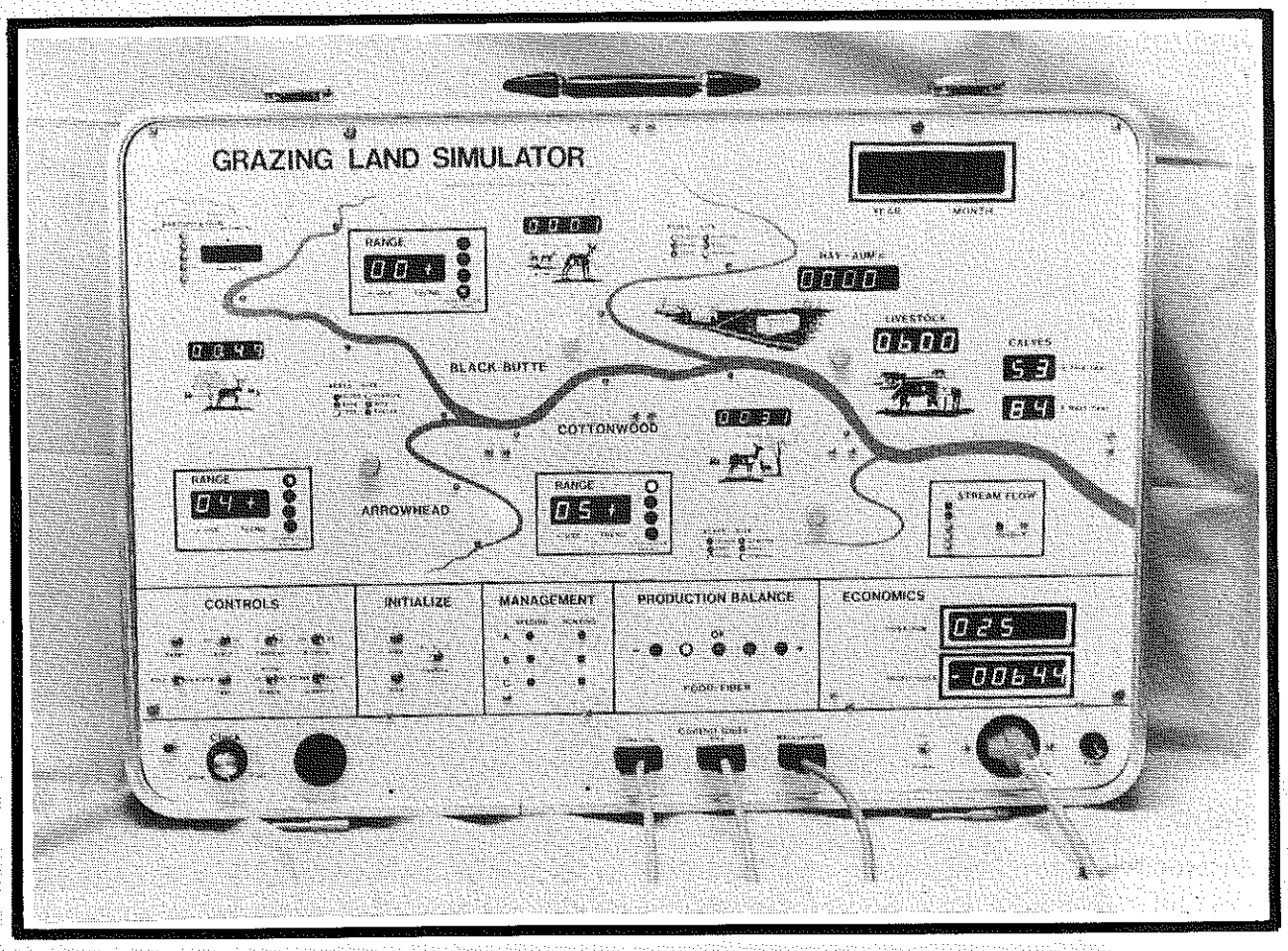

THEME: Staying Current — Crop and Food Production

THE
AGRICULTURAL EDUCATION
MAGAZINE

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ARTICLE SUBMISSION

Articles and photographs should be submitted to the Editor, Regional Editors, or Special Editors. Items to be considered for publication should be submitted at least 90 days prior to the date of issue intended for the article or photograph. All submissions will be acknowledged by the Editor. No items are returned unless accompanied by a written request. Articles should be typed, double-spaced, and include information about the author(s). Two copies of articles should be submitted. A recent photograph should accompany an article unless one is on file with the Editor.

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EDITOR'S PAGE

Expanding the Mission of Agricultural Education

BY BLANNIE E. BOWEN, EDITOR

(Dr. Bowen is an Associate Professor in the Department of Agricultural Education at The Ohio State University.)

Several changes are evident in mission statements for departments of agricultural education. THE DIRECTORY OF AGRICULTURAL TEACHER EDUCATORS (Rogers, 1984) bears witness to these changes. While the title "Department of Agricultural Education" remains popular, various titles suggest that traditional teacher education roles have expanded considerably. Further, departments that have not changed names may also be changing missions. These name or mission changes merit substantial debate by the profession.

Serious questions are being posed about the scope and mission of Departments of Agricultural Education. Interestingly enough, these changes are occurring much later than they did in secondary and post-secondary institutions. Missions for vocational agriculture programs were changed, on paper at least, by legislative actions in the 1960s. It appears that changes coming to departments of agricultural education have different roots.

Mission and name alterations are occurring as non-land grant institutions implement programs to prepare teachers of vocational agriculture. Historically, departments of agricultural education in land grant institutions were almost sole suppliers of vocational agriculture teachers. In many states, however, there are now three or more teacher education programs. Numerous examples are available in states such as Illinois, Tennessee, Kentucky, California, Missouri, Texas, et al.

Alternatives to Teaching

The increase in teacher education programs involves complex factors too numerous for this article. However, a prominent factor concerns graduates having career alternatives in lieu of teacher certification and Extension. Evidence to this effect was found when this writer and two other researchers (Parmley, Bowen, & Warmbrod, 1979) examined data collected annually for the Supply and Demand for Graduates of Agricultural Education report that is based on figures provided by teacher education programs.

Historically, the pool of graduates is adequate to fill teacher vacancies if every graduate teaches. Fortunately, not all agricultural education graduates seek careers in the classroom for a variety of reasons: lack of interest, poor skills, financial opportunities, teaching positions too far from home, etc. What happens to agricultural education graduates who do not teach? Evidently, there are several employment options.

While arguments can be made that students should not be in agricultural education if they have no desire to teach, this position cannot hold water. Contrary to popular belief, the profession is not facing a new phenomenon because over the years many graduates have not entered teaching. Departments of Agricultural Education are simply formalizing majors and courses to meet the needs of students who have no intention of teaching. As departments move through this evolutionary stage, three trends are evident.

Three Trends

Trend #1 involves relationships with the Cooperative Extension Service. Many departments proclaimed for years that they were tied to Extension. This relationship is becoming clearer as faculty with Extension experience are hired to develop or expand courses and degree options for students who desire Extension positions or careers in non-formal education.

Trend #2 has many departments expanding their course offerings and faculty involvement in international agriculture. While it is easy to question this trend, the efficiency of American farmers requires that world markets be sought and nurtured. Advances in air travel, technology, and communications warrant an understanding of agriculture in a global context.

Trend #3 concerns departments of agricultural education acquiring academic responsibility for agricultural communications students. This major appears to be attracting former FFA members and state officers who want to maintain ties with the FFA and vocational agriculture. Females are also a high percentage of the agricultural communications majors. In many instances, faculty are being hired to advise these students and their student organizations and publications.

Summary

As these changes unfold, questions are being asked about their effects on agricultural education departments.

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Expanding the Mission of Agricultural Education

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Are these new efforts subtracting financial resources, time, and support staff members? Do faculty members have the interest, time, and expertise to effectively handle the new thrusts? A more appropriate question might be: What will happen if agricultural education departments do not adopt new thrusts, missions, and names? These questions merit serious debate by all agricultural educators.

Dr. Doug Bishop of Montana State University served as theme editor for this issue on staying current in crop and food production. An authority on this topic, Dr. Bishop is to be congratulated for getting such individuals to join him in preparing materials for the theme.

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Parmley, J.D.; Bowen, B.E.; & Warmbrod, J.R. (1979). The supply and demand for teachers of agriculture: Can the situation be explained? Paper presented at the Central Region Research Conference in Agricultural Education, Kansas State University, Manhattan, KS.

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THEME

Staying Current: Crop and Food Production

BY DOUGLAS BISHOP, THEME EDITOR

(Dr. Bishop is a Professor of Agricultural and Industrial Education at Montana State University, Bozeman, Montana 59717.)

An important benefit many people seem to take for granted is a plentiful supply of wholesome food. Millions of people worldwide are either underfed because they do not have enough food or poorly fed because they have the wrong kind of food. American producers have taken advantage of our soil, water, and climate along with modern technology to provide food for the most diverse diet available to humankind.

Production of crops and livestock is the foundation of American agriculture, but there is far more to our agricultural system than just crop and livestock production. The American farmer is very efficient. Most Americans pursue a variety of careers because they need not worry that food will be available to them. Our nation has become a world leader in science, technology, medicine, and the arts largely because our country has a strong agricultural system.

Challenge of the Future

Adequate food, clothing, and shelter are considered to be the three essentials for a comfortable human life. The struggle to obtain an adequate food supply is older than written history. During the past quarter of a century, we have witnessed amazing strides in agricultural technology which have allowed our producers to establish new standards of crop productivity.

Education has played an important part in solving the problems that have faced American agriculture. Education of those associated with producing crops and those processing these crops into usable food products offers hope for the future as the demand for efficiency and productivity continues.

Technology in Crop Production

Everyday one can read about some new high technology apparatus that has been introduced into business or manufacturing. Although high-tech in agriculture receives less news coverage, it is becoming increasingly important to American agriculture in order to maintain a high level of food production.

Recently, I read an article where farmers were using inflatable scarecrows with electronic motion detectors that trigger alarms to frighten the varmits away from the crops. The modern combine is practically operated by a series of computerized circuits and electronically controlled irrigation systems have been common for years. Precision planters, pesticide applicators as well as new breakthroughs in plant genetics and breeding are helping put high technology "down on the farm." Are the programs now being offered to vocational students and adults and the teaching methods used to deliver this knowledge designed for today's agriculture?

Everyone Affected

Neither the agriculture student, producer, agribusiness person, or the teacher will be able to avoid the sometimes difficult task of keeping current in crop and food production. Teacher educators, vocational agriculture teachers, and county agents alike have a tremendous responsibility. Much of the success of our programs will depend upon educators like ourselves. We must all work together to modify the present program or, if necessary, develop a completely new delivery system that will help assure a strong agriculture community in the future. The articles that appear in this issue address different approaches being used to keep various segments of our agricultural constituency technologically prepared.

The Articles

Three of the writers have addressed the problems of keeping students in the vocational agriculture classroom current. The authors share their ideas on using contests, computer simulation, and educational tours to agribusinesses as a means of keeping students up-to-date. Two articles describe how different agricultural education departments are attempting to keep the secondary teachers in their respective states current in crop and food production, marketing, and processing through inservice education programs. Finally, a local county agent describes how he provided a summer training program for producers in integrated pest management as a means of helping the local farmer produce more efficiently with little additional cost. Quality agricultural education can continue to provide a foundation upon which to build agriculture.

The Cover

The computerized simulator is used by Extension Range Specialists in Montana to teach vocational agriculture students to manage rangeland on the simulator before trying on their home situations. The portable simulator is approximately 18 x 24 inches in panel size and weighs about 31 lbs. (Photo courtesy of Douglas Bishop.)

THEME

Grain Marketing Inservice Education In the Pacific Northwest

BY VAN SHELHAMER & HENRY BAHN

(Dr. Shelhamer is an Assistant Professor of Agricultural and Industrial Education at Montana State University, Bozeman, Montana 59717. Dr. Bahn is an Assistant Professor and Marketing Specialist with the Cooperative Extension Service, Montana State University, Bozeman, Montana 59717.)

The current farm crisis affects all aspects of American agriculture. Low commodity prices and reduced export shares have a serious impact on grain producers who struggle with volatile prices and depressed local markets. Grain marketing becomes critically important in times of depressed prices as producers attempt to minimize operating losses and maintain a positive cash flow.

Educators must be prepared to serve the expanded needs of agricultural clientele as the volume of market related information increases and as clientele awareness in the importance of marketing increases. Effective, innovative instructional programs must be developed to keep educators current with technology. The changing economic and political environment also influences the marketing of agricultural products in both domestic and foreign markets. These factors, combined with the fact that preservice training programs for vocational agriculture teachers and county agricultural agents may contain only rudimentary economics, provide justification for an effective inservice program in agricultural marketing.

Responding to this opportunity, the Agricultural & Industrial Education Department at Montana State University joined with the Cooperative Extension Service and the Montana Wheat Research and Marketing Committee to sponsor and conduct a week-long travel seminar designed to provide vocational agriculture teachers and county agricultural agents with first-hand exposure to the grain marketing process. This was accomplished by directly involving the agencies and institutions which constitute the Pacific Northwest wheat market.

Change Agents

Figure 1 illustrates the institutional and educational linkages which formed the foundation for the travel seminar and demonstrates how the concept of involvement of different agencies can be used to improve the quality of education.

The role of the change agent is to bring the educational clientele together with information sources to reach specific educational goals. The specific educational or learning goals which define the activity are derived by

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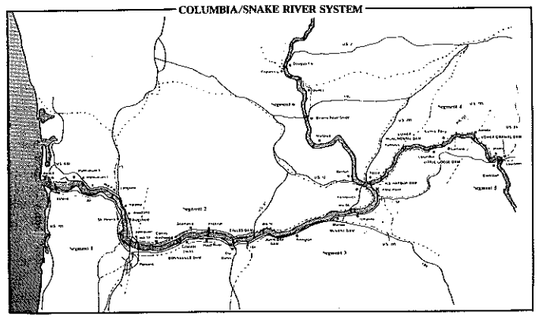
Grain Marketing Inservice Education In the Pacific Northwest

(Continued from page 5)

examining the needs of producers (for example their marketing function) and the changing market environment in which they operate. If education clientele are to apply the principles and concepts received in the inservice education programs to achieve higher quality education, they must be able to transfer their knowledge to the audiences they serve. While learning goals are needed to guide the change activities, specific educational goals that will be utilized in the instructional process of the educational clientele should be formulated after participating in the change activity. This way informational sources such as industry and government have a direct input into the educational process.

These concepts were utilized in developing a project proposal which was developed and submitted to the Montana Wheat Research and Marketing Committee (MWR&MC). Upon receiving project approval, an itinerary which would follow a load of grain from a local Montana farm to Pacific Northwest export markets was developed. Specific grain market functions were specified and the travel itinerary was designed to follow the physical movement of the commodity.

To prepare the participants for specific activities, lecture and discussion sessions were conducted by marketing specialists and the informational officer of the MWR&MC while traveling between activities. While this approach did not provide an ideal teaching environment, it allowed program coordinators to reduce the length of the seminar by two days. On the other hand, the "Rolling Lectures" made it possible to prepare the participants for their learning activities, thus enhancing the interchange with industry personnel. Opportunity for interchange was enhanced through meal and social functions with specific market and industry representatives. These functions allowed participants to develop an understanding of what they were going to see prior to visiting each organization.



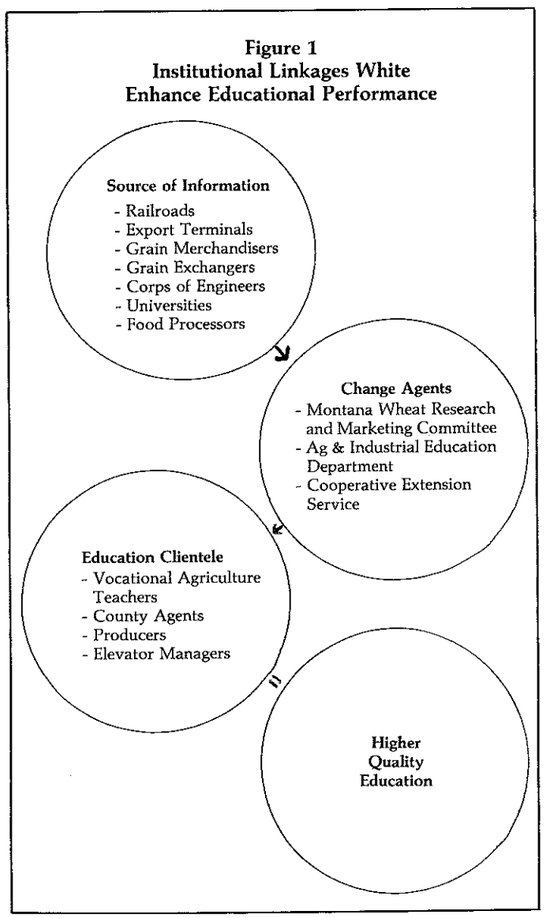
Montana grain was followed from the time it entered the river system on the right until it arrived at the export terminals on the left. (Courtesy of U.S. Dept. of Agriculture)

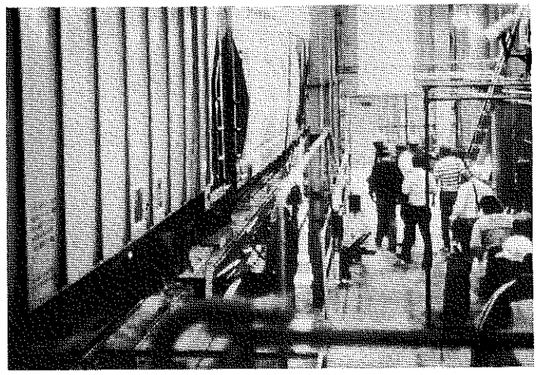
Seminar Highlights

Highlights of the seminar were a visit to the Port of Lewiston, Idaho, where participants met with the Port Manager and grain terminal personnel to observe the operation and function of a river port. While at Lewiston, personnel from the U.S. Army Corps of Engineers explained the role of the Columbia Snake River System in trade and commerce. A tour of the Burlington Northern Hump Station at Pasco, Washington, provided participants with details of how freight trains are formed and routed. A visit to Ice Harbor Dam on the Columbia River provided an opportunity to observe the movement of a grain barge tow moving downriver through dam locks.

Upon arrival at Portland, Oregon, the seminar group received a briefing from U.S. Wheat Associates, an organization which plays a pivotal role in market development. During the meeting, discussion centered around the educational programs that are being conducted in foreign countries to create or enhance the demand for U.S. grain

Figure 1
Institutional Linkages White Enhance Educational Performance





Teachers and county agents observe a unit train of Montana wheat being unloaded at a grain export terminal. (Photo courtesy of Van Shelhamer.)

products. A bus tour of the Port of Portland and walking tour of an export grain terminal provided an experience which broadened participants understanding of the crucial role of the terminal port in grain export. Lunch with Japanese wheat merchandisers broadened the group's understanding of grain needs and usage by foreign purchasers.

A tour of a barley malt plant and brewery provided an opportunity to see Montana Barley being converted to a product for human consumption.

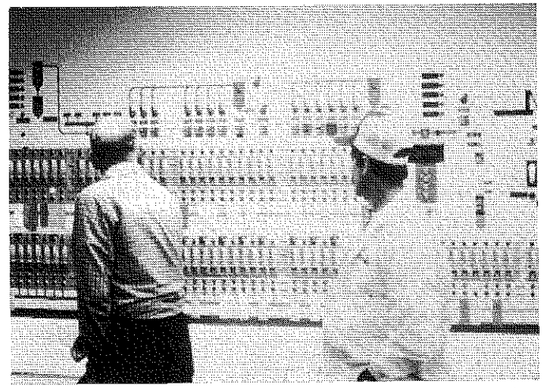
The group continued up the Pacific Northwest Coast to the Port of Seattle. The shipment of containerized agricultural products was observed and discussed and one of the largest grain terminals on the West Coast was toured. While enroute back to Montana, participants reviewed and discussed their learning experience with marketing specialists and received information about the funding, function, and operation of the Montana Wheat Research and Marketing Committee.

In order for the seminar to have a lasting educational impact on local teachers, students, producers, and the grain industry, an implementation plan was developed. Several participants were hired with funds from the grant to develop an instructional teaching unit and a slide series which would be distributed to every vocational agriculture teacher and county agent in Montana.

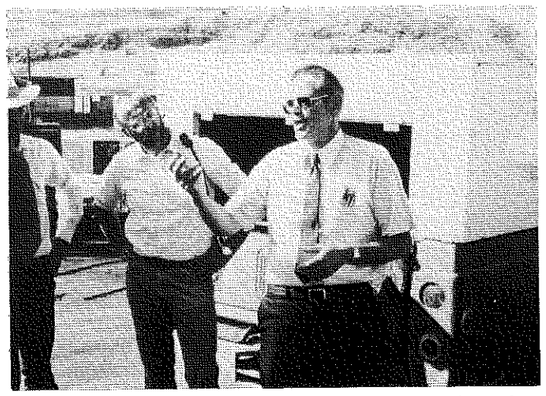
Summary

Specific educational goals were developed cooperatively by personnel from the funding agency, Cooperative Extension, teacher education, participants and industry. Specific lesson plans were developed and reviewed by those involved in the goal setting process. A teaching guide was developed and distributed and marked the completion of the inservice education project as it was originally funded.

If change agents are to be successful, participants must be revitalized via additional brief educational activities. Consequently, follow-up activities have been conducted during the annual spring Vocational Agriculture Update Conference and in the fall at FFA District Leadership schools. Future programs are also being explored. As a result of this successful program, a similar activity is being discussed which would follow feeder calves from Montana ranches to the feedlots and packing plants of the Midwest and to the meat markets of the country.



Application of modern technology was observed and studied when visiting a grain export terminal. (Photo courtesy of Van Shelhamer.)



On-site instruction by industry personnel provide a better understanding of the physical grain movement process. (Photo courtesy of Van Shelhamer.)

Coming in June —

Staying Current: Animal Agriculture

THEME

"Update — Integrate Your Program"

Do your daily lesson plans include the facts and figures of conservation tillage, of achieving corn yields of 150 bushels per acre, or of drying grain with solar dryers?

If your teaching plans do not combine the most modern and effective instruction methods with the most current technical skills, then you may not be preparing your students to meet the demands of modern agricultural theory and practice. Teaching methods and instructional materials must change to keep pace with rapid advances in agricultural technology. Today's agricultural producers must have access to and be able to apply current information about these new technologies. As a vocational agriculture instructor, you can help insure that your students have both the knowledge and skills necessary for productive farming in this new era. You will need to provide them with the most up-to-date facts and figures using the most effective instructional methods available.

The most competent agricultural instructors are those willing to commit themselves to a life-long learning spiral. Educators must keep the lines of communication open with industry — asking industry to identify the skills required by those ready to enter the work force. As the industry discards the skills and methods of the '60s and '70s and adopts new practices, vocational agriculture teachers must be prepared to replace obsolete technical skills with the current ones. Effective instructors will expand beyond their own specialty areas and become well-versed in the new technologies. Participation in professional activities such as technical workshops, industry field tests, agricultural field days, and open houses can help keep instructors up-to-date with the latest changes in the industry.

Effectively sharing new information with students requires periodic evaluation and revision of three key areas: available educational resources, curriculum content, and instructional methods.

Effective instructors are expanding their specialty areas and becoming well versed in new technologies.

By James Hilton and William Umbaugh

Dr. Hilton is an Associate Professor in the Department of Agricultural Engineering at The Pennsylvania State University, University Park, Pennsylvania 16802. Mr. Umbaugh is a Graduate Assistant in the Department of Agricultural and Extension Education at The Pennsylvania State University, University Park, Pennsylvania 16802.

Resources

Providing today's students with up-to-date information may require new instructional materials, equipment, facilities, and other resources. Agriculture instructors can take advantage of technical workshops organized by industry, the local Extension office, and the Department of Agricultural Education to help them update and expand the teaching resources available for classroom use. A teacher planning a sprayer lesson, for example, might obtain the following teaching aids:

Sprayer Instructional Materials

1. Operational manual
2. Commercial publications
3. John Deere F.O.S. (mowing & spraying)
*4. Sprayer transparency
*5. Sprayer skill sheets
*6. Filmstrip on modern agriculture spraying equipment
7. Movie on herbicides, fundamentals of proper application (Ciba Geigy).

*Note — These can be ordered through the American Vocational Instructional Materials Service, Athens, Georgia.

Curriculum

Curriculum content must also be periodically evaluated and revised. Vocational agriculture instructors can best meet students' needs by relating curriculum content to the current local agricultural situation; expanding and/or revising units; and offering complete programs such as agricultural production, agricultural mechanics, SOEP, and FFA.

The most effective instructors are those who willingly revise old lesson plans and develop new ones to reflect updated course content. Well-organized daily lesson plans are an invaluable teaching aid. They give instructors a sense of security by answering the question, "What am I teaching today?", thus reducing the strain of teaching. They can help give students a sense of goals and objectives and assist principals, supervisors, and others whose duties require them to evaluate instruction. Effective lesson plans for a 10-day sprayer unit, for example, might be similar to the plan outlined on the next page:

Sprayer Lesson Procedure

Day 1	Introduce lesson, hand out classroom exercises, instructional manuals and skill sheets.
Day 2	Students complete items 1-10 on student worksheets.
Day 3	Discuss classroom exercise using sprayer transparencies. Assign skill sheets 27-77 and 28-27 as outside of class assignment.
Day 4	Hand out laboratory exercise and operator's manuals for sprayer.
Day 5	Complete lab exercise in agricultural mechanics lab using actual sprayer.
Day 6	Show film, herbicides, fundamentals of proper application. Discuss film.
Day 7	Students complete item 11-17. Assign questions 18-24 on student worksheet.
Day 8	Discuss safety in using sprays and sprayers, application certification, and cleaning and storage of sprayer.
Day 9	Take field trip to a farm to calibrate an actual sprayer; make sure students have proper safety equipment for specific spraying job.
Day 10	Review field trip. Exam or other evaluation method over material covered in unit.

In addition to required class activities, instructors can also offer a range of approved optional activities which allow students flexibility and choice during an instructional unit. For instance, students might be asked to complete one or more activities from a selection like the following:

1. Conduct a survey of sprayers available in the community.
2. Calibrate a sprayer in the laboratory or at home.
3. Prepare a bulletin board about sprayers.
4. Complete off-season storage checklist for sprayers.

Instructional Methods

Innovative teachers are developing their lesson plans around activities which require students to perform tasks they are learning since nothing is more effective in the learning process than actually doing the real thing.

A recent study (Osborne, 1983) asked randomly selected Ohio production agriculture teachers to report their experiences in performing and teaching livestock skills pertaining to cattle, sheep, and swine production. Survey results revealed that teachers used discussion methods as opposed to demonstration and/or student practices in over 60% of their instructional activities. Furthermore, the study showed a relationship between the ability to teach technical skills and teacher-performance of the skills. That is, teachers who had performed a specific skill themselves tended to be more confident in their abilities to demonstrate the skill in a teaching setting; those who had performed the skill themselves also tended to teach the skills more often and to use methods involving skill demonstrations and/or student practice than did teachers who hadn't themselves performed the skill.

Since students are more likely to retain concepts learned during hands-on instruction, instructors should work to incorporate hands-on instruction in their lesson plans whenever possible. This does not mean abandoning lecture/discussion as a teaching method, but instead means combining formal instruction with laboratory exercises and demonstrations. A ratio of one hour of student preparation to two hours of laboratory exercise generally enhances student learning achievement.

Many teachers plan and teach agricultural mechanics as a unit of instruction independent of animal and plant science courses. But combining mechanics with other instructional areas can be a more productive approach. For example, units in sprayer calibration, safety, and maintenance can be taught as an independent unit in agricultural mechanics or incorporated into a unit on weed identification and control; insect identification and control; or row crop/vegetable production. Incorporation of agricultural mechanics units into production agriculture or horticulture instruction will add to the quality and depth of students' education. Of course, suggested traditional teaching plans can and should be manipulated to meet individual teaching situations to achieve the greatest benefits for students in any given vocational agriculture program.

Teachers who incorporate agricultural mechanics into other instruction units must, of course, plan properly for use and maintenance of equipment. Equipment sources and available times for use must be identified, and equipment must be stored in an easily accessible area. Equipment for a laboratory exercise on sprayers, for example, might include:

1. Sprayer, 6 to 8 rows, roller or centrifugal pump
2. Example nozzles of different sizes and types
3. Stopwatch
4. Quart jars
5. Tape measures, 6 and 50 foot tapes
6. Miscellaneous wrenches and tools

Conclusion

Today's best vocational agriculture instructors are busy people. They are busy updating their own knowledge of the changes in industry theory and practice. They are busy revising curriculum content to reflect these changes. And most of all, they are busy putting new knowledge into practice in the classroom — helping their students prepare for today's world of agricultural knowledge and skills.

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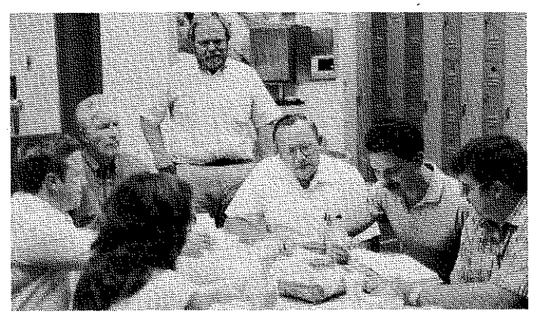


Futuristic teachers are updating their instructional materials, developing lesson plans, and relating to today's world of work.

THEME

Improving Range Grass Management Through Simulation

One-third of the total land area of the United States is grazing land. This is land on which forage is routinely harvested by grazing animals. When occasionally-grazed land is included, the fraction increases to one-half. It is our largest use of land. Public understanding of the value of this crop resource and of the principles involved in its wise management are essential.

Teaching high school students and adults how to manage the input variables that will help maximize profit from range grass production while maintaining the fragile environment on which the crop is produced is becoming extremely important. For too long, range grass as a crop has been taken for granted and has received less attention than other field crops.

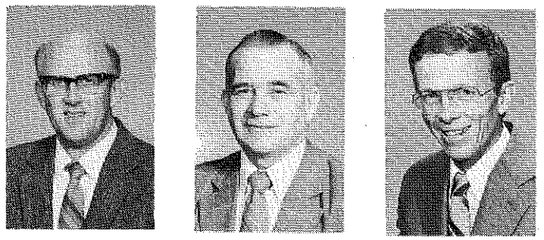
To bring about a more positive approach to teaching about improving range productivity, Montana State University's Natural Resources Educational Project has developed a program and material to help solve this problem. This project is an outreach activity of Montana State University. It is a cooperative effort of university science, engineering, education, agriculture, and Extension faculty, and technical and public affairs representatives of several federal and state natural resource agencies.

Simulation as a Teaching Technique

Computer simulation has earned an important role in research and educational development. Systems too expensive, dangerous, or difficult to investigate directly can be mathematically modeled and examined under a variety of conditions by computer simulation. The space shuttle, for example, was flown and landed thousands of times by computer simulation before its initial voyage.

Any computer simulation consists of five functional elements as illustrated in Figure 1. The system modeled is represented by the three upper blocks. Control variables include both "initial conditions" and operational variables that may be changed during the simulation. The central element in the simulation is the mathematical model or algorithm describing the behavior of the system modeled. This algorithm receives input from the control variable block, and computes the various parameters describing the system's conditions, use rates, management practices, cost per animal unit month, projected percent calf crop, and so forth.

This approach comprises a "single pass" simulation. One asks "what if" a certain set of conditions exist, sets the variables, runs the simulation, and observes the projected result. Based on the result of the simulation, variables are changed and the process is repeated.



By John Amend, Douglas Bishop & John Lacey

(Dr. Amend is a Professor of Chemistry, Dr. Bishop is a Professor of Agricultural and Industrial Education, and Dr. Lacey is a Montana Extension Range Specialist, all at Montana State University, Bozeman, Montana 59717.)

However, a judgment is introduced at this point. How closely do the projected system conditions match the set of "optimum" conditions determined prior to the simulation? A multiple-pass computer simulation uses software feedback to (a) compare the simulator output with the "optimum" conditions, (b) automatically adjust the control parameters for more favorable operation, and (c) re-run the simulation. By making a series of passes through the simulation program, the system condition indicators more and more closely approach the desired "optimum" conditions, and an optimum operating strategy is identified.

To use this strategy for education, the software feedback circuit is removed and the learner is placed in the computer's feedback loop. The student collects information from the system condition indicators, compares the current situation with the optimum, decides on changes that must be made in control variables, and acts to implement these decisions.

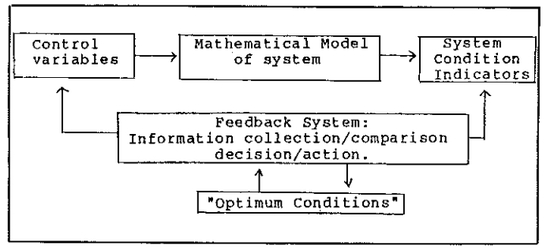


Fig. 1:
A simplified model for computer simulation.

Learning takes place as participants experiment with the control variables and observe their effect on the overall system. The simulator poses real problems for the students, acts according to their decisions, and forces them to live with the consequences of these decisions as the simulation continues.

The Grazing Land Simulator

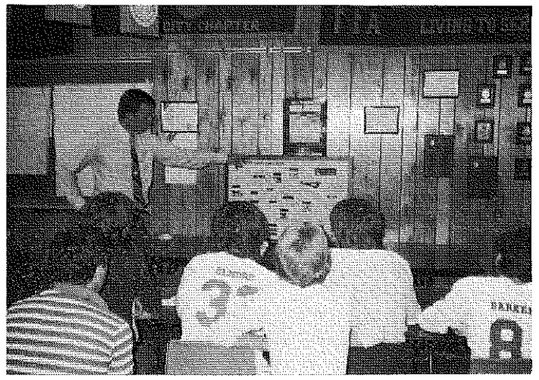
The simulator depicts the ecology of grazing lands. Each year it provides its operators with actual herbage growth data, based on precipitation and soil conditions for the region modeled. Livestock and wildlife consume the forage, while the human population demands food, fiber, and clean water from the grazing lands. Participants must develop and implement management strategies that will meet these needs while maintaining the productivity of the land. As time progresses, the economic and environmental consequence of these management strategies are projected by the simulator.

The front panel of Grazing Land Simulator depicts a ranch with three pastures. Size and range site (soil and climatic conditions) for each pasture are set at the beginning of the simulation. Displays show the number of wildlife and livestock grazing the pasture, percent use of forage, range trend, and vegetation rating. A color monitor plots forage production and utilization, and number of livestock and wildlife.

Forage growth is programmed from historical records for 10 representative years and for three different range sites in the region modeled. Various climate and soil conditions may be programmed by obtaining forage growth and precipitation records for the region of interest.

Grazing lands support both wildlife and livestock. The simulator also illustrates well the effect of climate and forage availability on wildlife reproduction, and involves students in the development and evaluation of wildlife management strategies.

A clock in the upper right hand corner of the panel shows the passage of time in months and years, and a display in the upper left hand corner shows instantaneous and cumulative annual precipitation. Quantity and quality of run-off is shown by a downstream display. Colored lamps display livestock and wildlife health and reproductive capability.



Vocational agriculture students are taught by the Extension Range Specialist to manage western rangeland on the simulator before they actually apply the practices to their home situations. (Photo courtesy of Doug Bishop.)

Grass management practices are implemented by livestock, forage management, and hay management groups using small control consoles. The economic and biological impact of these management decisions, cost per animal unit month, projected percent calf crop for the current and coming year, and cumulative profit and loss are displayed on indicators in the center and lower right of the panel.

The classroom model of the Grazing Land Simulator is approximately 18 x 24 inches in panel size, and is mounted in an aluminum suitcase for easy portability. The unit weighs about 31 pounds, including the control consoles which are stored inside the aluminum suitcase. Some teaching material is made available with the simulator.

Educational Effectiveness

Learning is often limited by the level of abstract reasoning required of the student. An experiment was conducted in Idaho in which groups of college students were classified in terms of their ability to deal with abstract concepts. Students with similar abstract reasoning skill scores were distributed evenly between two groups. Half participated in a slide-illustrated lecture concerning energy resources and exponential growth. The remaining students participated in an Energy-Environment simulator presentation. Later, both groups were given an examination to determine their understanding of energy related problems and concepts. Principles and concepts included in the examination were part of both presentations.

Students with high abstract reasoning ability scored equally well whether they participated in the simulator or slide-lecture presentation. However, students of the simulator group with less-well developed abstract reasoning ability (concrete learners) scored significantly better than their peers in the slide lecture group (Figure 2).

The simulator presents concrete information to the students and requires concrete action from them. At the same time, however, it asks for synthesis and evaluation, the two highest levels of the thought process. By calling on educational skills already developed while requiring short-

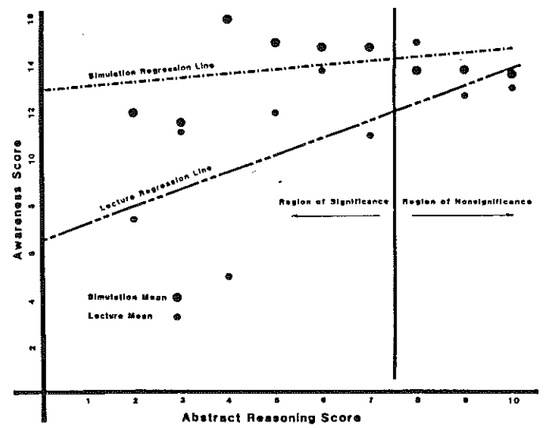


Fig. 2: Impact of Simulator on Learning

(Continued on page 12)

Improving Range Grass Management Through Simulation

(Continued from page 11)

term concept synthesis and evaluation, the simulator helps all students gain the conceptual understandings expected only from those who can reason at a more abstract level.

Only about half of the adult population ever develops strong abstract reasoning skills. Adult audiences as well as youth respond better to a presentation that involves participation and requires concrete as well as abstract reasoning.

Summary

The use of the simulator has proven to be an extremely effective way to help youth and adults understand range grass production and the management of rangeland. Participants are placed in management situations involving real problems and alternatives. They are not offered solutions, but are given an opportunity to experiment with different management strategies and to observe the consequences of their actions. After observing the results of their actions, participants discuss the strong and weak points of their management policy, press the reset button, and try again using other combinations of variables.

THEME

Staying Current: Marketing

By Pat Henderson

(Ms. Henderson is Vice President/Public Relations for the Minneapolis Grain Exchange, 150 Grain Exchange, Minneapolis, Minnesota 55415.)

When a young person seeks a career in agribusiness — whether it be in farming or in agricultural related services and products — he or she must examine the marketing chain for agricultural commodities.

One link in that marketing chain is the marketplace — the U.S. commodities markets and futures exchanges. The Minneapolis Grain Exchange is one of 12 futures exchanges in the U.S. The Minneapolis Grain Exchange trades cash grains such as spring wheat, durum wheat, barley, oats, and sunflower seeds. The Exchange also trades spring wheat options and spring wheat and white wheat futures.

All commodities exchanges encourage young people to visit and to learn about marketing. Each year the Minneapolis Exchange hosts crops judging contest winners from Minnesota, North Dakota, South Dakota, and Montana for a two-day expense paid trip to Minneapolis to study marketing. Winning teams of young people come from 4-H and FFA chapters in the four state area. Events in Minneapolis include a morning at the Exchange for the opening of the market and tours of the Minnesota Grain Inspections and Protein Labs. The trip usually includes visits to a brewery, a railroad switchyard, and a computerized terminal elevator. The young people also enjoy social events such as dinner theatres and/or football games while in the Twin Cities.

In addition to the above tour schedule, the students attend marketing meetings while at the Exchange. They hear traders discuss durum and spring wheat, barley, sunflowers, and oats merchandising. They also hear futures and options traders discuss the use of these marketing alternatives.

Marketing Awareness

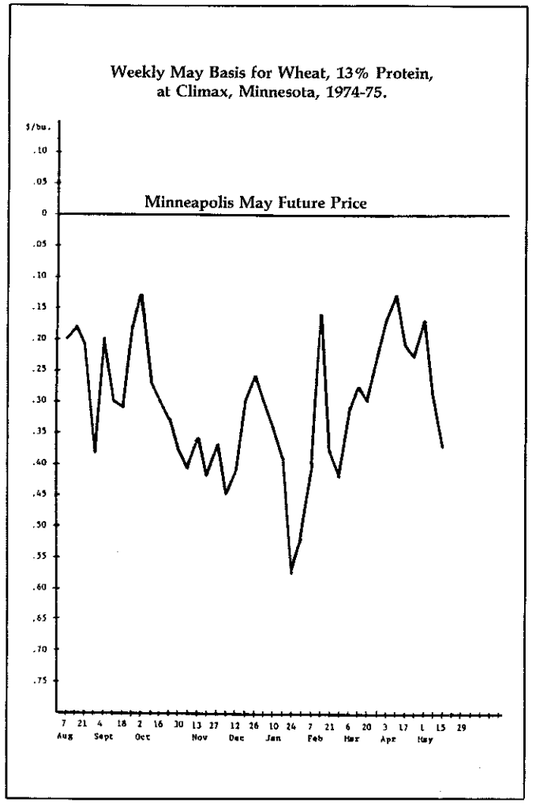
There is a need for awareness of marketing alternatives among young people planning careers in farming. In the past, farmers hauled grain to their nearest country elevator and took the price that the country elevator manager gave them. Today a young farmer explores all of his/her marketing alternatives. These alternatives may include calling several elevators for the best price, hauling grain to better markets, participation in government programs, storing grain, feeding grain to livestock, forward contracting, hedging, or using agricultural options.

One of the primary objectives in exploring marketing alternatives is to develop a marketing plan. Farmers in the past hauled grain to market when they saw neighbors hauling grain. Or, farmers waited to sell when the market was going up and missed the highs and sold on the downside. Development of a marketing plan encourages farmers to plan for the marketing year. The Exchange encourages farmers to develop a plan by targeting a date to market grain during certain segments of the marketing year. Some marketing advisors recommend that farmers plan to market a third of their crops at a time.

Marketing Plans

To begin to develop a marketing plan, young farmers can learn to chart their local basis. The basis is the difference between the local cash price paid at the country elevator and the futures price for that particular commodity at a commodities exchange which trades the futures. For example, if the Minneapolis spring wheat futures price on December 2 is $3.53 for December wheat and the local elevator is paying $3.03, the basis is $0.50 under the futures ($3.53 − 3.03 = .50). If young farmers train themselves to chart their local basis on a weekly schedule, for example, on Wednesdays, they soon begin to develop a basis history and can determine optimum seasonal times to market grain.

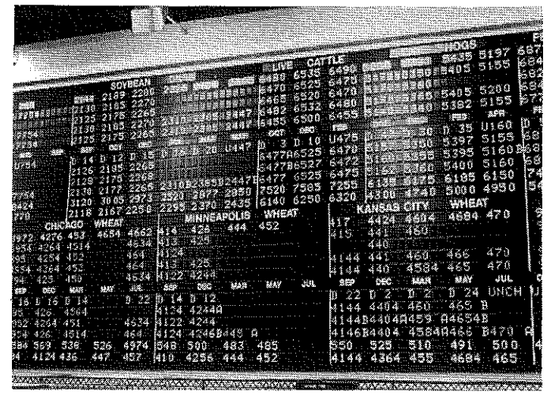
Another essential part of developing a marketing plan is to set realistic price objectives and maintain those objectives. In a typical marketing year, a farmer should be able to set a realistic price objective, figuring in the cost of production. The farmer then sells as the market approaches the price objective. A key to this is knowing the cost of production. A young farmer must train himself or herself to calculate cost of production figuring land and interest costs, costs of storing grain, planting costs, and a number of other costs which vary from farmer to farmer depending on the operation.



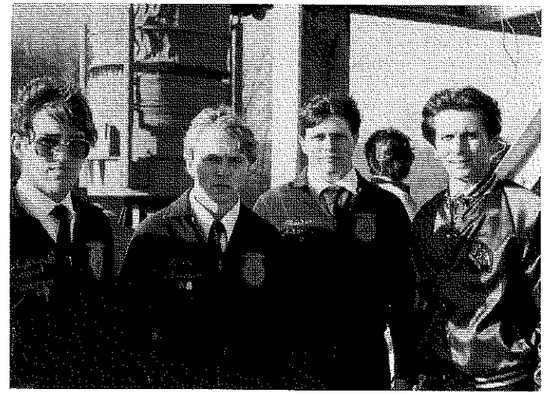
Reprinted from "Cash-Futures Price Relationships as Guides to Grain Marketing Decision-Making — Cash basis for Corn, Wheat and Soybeans in Minnesota," University of Minnesota Staff Paper Series, by Reynold Dahl and Patrick Henneberry, 9/76

There are resources available for young people to use in learning about marketing. The following publications are available from the Minneapolis Exchange in individual copies or in class sets of 25. Contact the author for more information.

- Understanding Commodities Futures Trading Brochure
- Spring Wheat Futures Brochure
- White Wheat Futures Brochure
- Trading and Tradition Brochure



The electronic board at the Minneapolis Grain Exchange (Photo courtesy of Pat Henderson.)



The 1985 Minnesota FFA crops judging contest winners from Greenbush, MN, at a river terminal. (Photo courtesy of Pat Henderson.)

Coming in May —

Staying Current in Forestry and Natural Resources

THEME

A Crop Production Clinic

By Bill Jimmerson

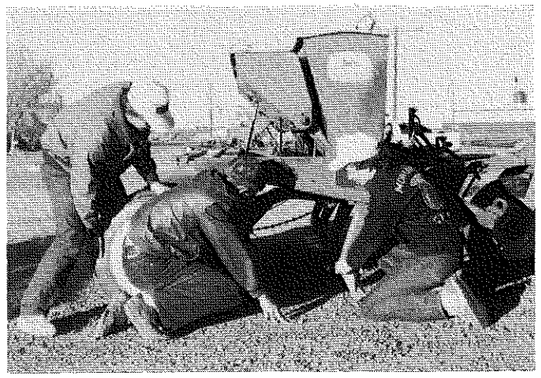
(Mr. Jimmerson is a Vocational Agriculture Instructor at Conrad High School, Conrad, Montana 59425.)

Producing food and fiber in the 1980s is the major role of those agriculturists who have that uncanny ability to stay up-to-date with technology. New developments have occurred in farm machinery sprayers, grain drills, tractors, and combines that have radically changed techniques which have been used in farming for many years. Soil preparation, planting, and harvesting have become scientific processes.

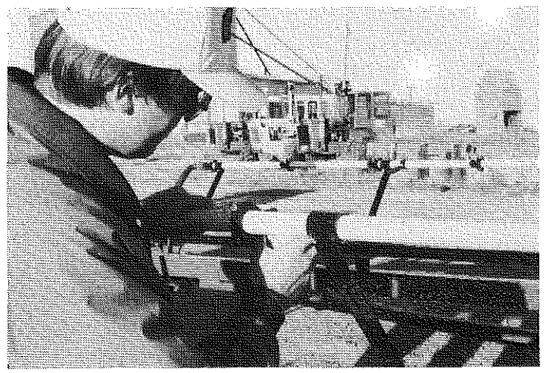
The rapid advancements in machinery used in crop production will require the use of many new and innovative teaching techniques to keep students and young farmers current in the use of this sophisticated equipment. As vocational agriculture instructors, we have generally done an excellent job in providing the necessary training in livestock production. For example, there are at least seven livestock contests and training events in which my FFA members could participate during this year. Until a year ago, there were only two contests in the area of crop production. The content of these crop contests consisted of some identification of crop plants and weeds, grading grain, soil analysis, and a machinery problem at the state level contest. Our traditional program offered very little for the student in need of technical training or machinery used in crop production. Through observation and inquiry, it was determined that as vocational agriculture instructors we often lack the technical ability or the time in our programs to provide the kind of training needed in crop production.

In reviewing the curriculum with the departmental advisory council, it became obvious that in order to provide adequate technical training in crop production, an alternative to traditional class presentation would have to be developed. A decision was reached to ask the leaders of the agribusiness community and FFA Alumni to cooperate in providing this service. And provide they did! The Alumni took the initiative and organized what will be an annual crop production clinic in conjunction with a contest to provide up-to-date training for not only the youth of the area, but also for vocational agriculture instructors and farmers who wished to attend.

The department in which I teach is located in the "Golden Triangle", wheat growing area around Conrad, Montana. It is a large area of our state which has very few barbed wire fences. Each farmer throughout the area may have as many as 200-600 horses. However, they are all under the hood of two or more large 4-wheel drive tractors. The town of Conrad has six machinery dealerships representing all major brands of farm equipment, two chemical-fertilizer businesses, and two facilities for loading unit grain trains. The type and amount of agriculture business in a town of 3,000 people indicates the importance of crop production in the area. The Pondera County FFA Alumni Chapter and advisory council consists of young farmers and agribusiness representatives of the community. The easiest way to get a new idea off the ground and build an educational activity is to request help of all the resources the community has to offer.



A local dealer loaned a drill to use for the crops seminar. Students determine the pounds of wheat that would be seeded per acre at different settings.



Measuring sprayer nozzle output in ounces per minute, converting it to gallons per acre, and determining the amount of chemical to add to the spray tank was taught using a sprayer from a local dealer.

The alumni had two specific goals in mind when they planned the clinic and contest. First, they wanted a "hands on" educational experience for each person attending the clinic, and second, they wanted a crops contest to be more exciting than the traditional contest where students identify some plants and seeds and textured soil samples. To add incentive, over $400 worth of prizes were donated by the agribusiness community as a way to encourage participation and cause the students to take their training seriously.

The Clinic

To help establish the clinic as an annual event, a decision was made to include only two items of equipment for training each year. The two machines selected for the first year included the grain drill and field sprayer. The combine, tractor, and other crop production equipment will be included in future years. Prior to the clinic, a pamphlet was developed for each participant giving up-to-date information on each piece of equipment. In addition, all calibration procedures and student worksheets to be used during the training sessions were prepared in advance.

The Alumni spent many hours planning the instructional content for each area; contacting agribusiness for donations of equipment, instructional help, and prizes; preparing contest procedures; and advertising the event.

During the clinic, students were divided into two groups and rotated after two hours of study and practice in each area. Actual instruction was provided by the alumni, myself, and one additional vocational agriculture instructor from the area. We were careful to provide adequate time for each student to have an active role in calibrating both the sprayer and drill. The student worksheets provided carefully worded step-by-step directions in the calibration procedure so the processes could be duplicated when needed. A computer sprayer calibration program used by our Extension Service allowed the students to use the same sprayer data they had calibrated to check their results. This follow-up provided very positive reinforcement when the computer duplicated the results they had calculated for themselves using hand calculators.

Following the clinic and prior to the afternoon contest, lunch was provided by our local FHA Chapter.

The Contest

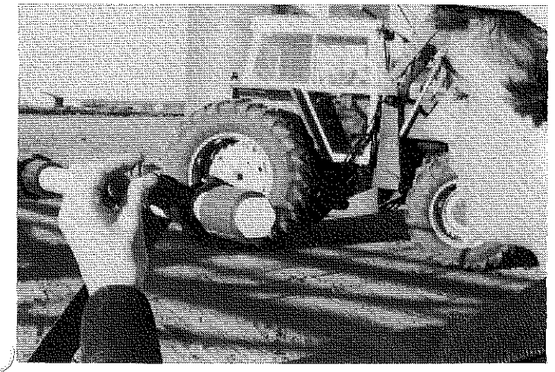
The single most important outcome of the clinic was the creation of greater student interest in studying crop production. The non-traditional components involved the identification of the crops grown in the areas while testing the students' knowledge of the agricultural industry. Using a multiple-choice format, a crop product was displayed and the students were asked to choose which crop on display was the major contributor to that food or feed product. An example might be a loaf of bread with samples of durum, white wheat, corn, and hard red wheat shown as seed marked A, B, C, D. To respond correctly, the student would have to be familiar with each crop and be able to identify it in order to choose the correct answer. Using examples of crop diseases, questions about crop production, and problem solving situations built around field sprayer and grain drill clinic information the students were challenged to think. We found the students enjoyed this format much better than simply identifying and grading samples of grain and seed.

Tour of Agribusinesses

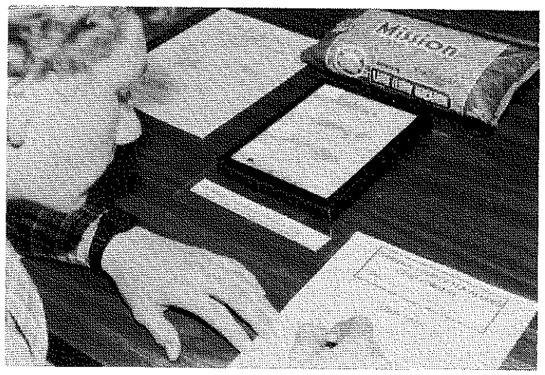
To complete the day, a tour of several implement dealers gave each student a chance to view the latest developments in the equipment studied during the clinic. Each agribusiness provided an overview of the newest technology used in the development of field sprayers and grain drills by their respective companies.

Summary

If we, as vocational educators, are to keep our programs viable in the area of crop and food production, we must not fall behind in providing the necessary instruction to our students. We must not be complacent and teach only what we feel comfortable doing. Calling on our local community resources to help with our programs is one positive way of developing a sound educational activity for our students. Perhaps the most important advantage of a program such as this is the public relations developed which is so vital to our programs in this era of educational accountability and excellence in education.



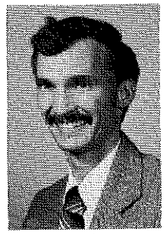
Selecting correct nozzle tip to produce proper output per acre was emphasized during the training program.



A "crop use" test was given during the contest. Students identified the crop in manufacturing 40 common food items.

THEME

Staying Current: Crop Production



By Lee Cole

(Dr. Cole is an Associate Professor in the Department of Agricultural Education at Oregon State University, Corvallis, Oregon 97331.)

It has been generally observed by many people that vocational agriculture teachers either don't teach crop production or crop production is of such minuscule portion in the vocational agriculture curriculum that its instruction is largely ineffective. This should not be the situation. In Oregon 16 of the 20 commodities which gross over $20 million dollars in sales per year are crops commodities. If one considers the number of job opportunities in production and agribusiness associated with a crops industry of large magnitude, then it would seem logical that a strong curricular emphasis on crop production and associated agribusiness opportunities could be justified.

A second and associated consideration would be that most students would benefit from some form of crop production background. Consider the student who wants to ranch. If that student gains knowledge in crop production to efficiently produce quality hay and/or grain, this person may stand a better chance of succeeding. The same may be true of livestock associated agribusiness employment opportunities.

Student Interest

Agricultural mechanics and livestock sciences are high natural interest areas for most high school students. Teachers enjoy teaching when students are interested in the subject matter taught. Crop production does not enjoy the same level of natural interest and motivation on the part of students or for that matter on the part of vocational agriculture teachers.

Therefore, it becomes essential for vocational agriculture teachers to directly tie crop production to those areas of the vocational agriculture curriculum in which the students have some level of natural interest. This procedure would help secure a transfer of interest and thus allow the teacher to get students more actively involved with a crop production curriculum.

An example of how this transfer of interest might be accomplished would be to incorporate the teaching of appropriate agricultural machinery preventive maintenance, adjustment/calibration, and operation into the crop production unit. A second example would be the teaching of quality hay production and/or grain production while teaching a livestock nutrition-ration formulation/feeds and feeding unit.

The key to success in the above examples will be the interest, enthusiasm, technical competence, and currency (up-to-date) of the vocational agriculture teacher. Thus, we get back to the importance of the topic for this article — "Staying Current: Crop Production".

Most readers of this article would concede that the teacher of vocational agriculture is the key and that the teacher's expertise in crop production is a critical input factor. The question at hand therefore is: What can be done to provide competence and bring up-to-date those critical crop production skills that a vocational agriculture teacher would need to teach an appropriate crop production curriculum?

Organizing Inservice

The first thing which should be said is that teacher educators should organize courses the way they tell their vocational agriculture teachers to organize courses. For crop production inservice courses, the instruction should be mixed with appropriate instruction in other agricultural taxonomies such as agricultural mechanics and livestock science to gain the interest of those participating. This mixing of taxonomies is important not only because it helps gain interest, but it is also "real world." Rarely will a producer be able to work only with a particular crop. The production of that crop will require the producer to work with soils considerations, chemicals, machinery, crop quality, management and marketing concepts and in some cases, livestock consumption of the crop. Be encouraged to mix the instruction of agriculture in the same fashion as might be found in the "real world."

Teachers receive seeding and fertilizer information and specification on special no-till drill which weighs 16 tons. (Photo courtesy of Lee Cole.)

What types of formatting might inservice instruction take to help vocational agriculture teachers stay current in crop production? There are a number of formats which can be used and each will have unique advantages. One important consideration for all formats, however, is to keep the duration of the instruction to a minimum. For formal instruction, courses which are one to two weeks in length allow for bringing vocational agriculture teachers up-to-date while giving the teachers time back in their local programs to maintain their students' SOEP supervision.

Following are ideas on inservice with each format's unique characteristics identified. Be encouraged to explore several of the options to add competence through a variety of inservice formats.

Instructional Formats

If in-depth instruction is necessary, it would be important to organize a formal course or series of courses to provide the extent of information required. It goes almost without saying that the instructors who teach such a course or series of courses must be carefully selected for their enthusiasm, knowledge, skill expertise, and currency. These courses should not exceed two weeks of intensive instruction.

Vocational agriculture teacher summer conferences provide an excellent setting for less formal "up-date" sessions. These sessions assume some expertise by the participants and simply provide a vehicle for updating skills and knowledge. Oregon vocational agriculture teachers have elected to utilize current producers for inservice in this format. Producers selected for this inservice instruction should be on the cutting edge of new technologies. They should be those individuals who are trying new crop varieties and pesticides and are often those who institute machinery adaptations. These people can provide information on what works and what doesn't work in the production (verses the research) situation.

Consider, for example, the information presented in 1985 at the Oregon Vocational Agriculture Teachers Summer Conference. A workshop was conducted on no-till farming practices. In the machinery area, the combine modifications required for spreading the straw evenly were detailed as well as considering the type of drill, its calibration, and drilling practices. In the agronomic and livestock sciences, soil structure and erosion protection were viewed as was the application of the no-till principle to irrigated pasture, dryland pasture, range, irrigated wheat, and dryland wheat.

The summer conference setting would also provide an opportunity for brief practical research reports on current crop production experiments. For example, some of the problems associated with cool evenings and the production of soybeans are being examined in Oregon. These interesting little tidbits of information can help spice up a vocational agriculture lesson.

There are also several forms of informal instruction that vocational agriculture teachers should be encouraged to pursue. Some of these include peer instruction from fellow vocational agriculture teachers, state department of education non-credit workshops, work experience activities with local producers, and/or agribusiness organizations, various commodity and professional newsletters and research reports, county Extension service bulletins and economic data sheets, Extension Service and Soil Conservation Service staff consulting, and microcomputer and newspaper data and pricing services.

While the above list of informal instruction modes does not pretend to be exhaustive, it does provide an idea of several methods by which vocational agriculture teachers may gain information, skill, and experience in the crop production area. No single method is going to provide all of the information the vocational agriculture teacher needs. A teacher should consider a combination of sources and methods for keeping current.

Other Approaches

A method which has great potential but infrequently used is the peer instructor exchange of ideas and information method. Generally, vocational agriculture teachers have not been observed spending much time helping each other develop technical competence. This peer assistance concept is an interesting phenomenon which has its opposing extremes. Microcomputer skill development has seen teachers help each other sacrificially, yet help provided in technical agriculture areas in which an FFA contest exists has generally not been as readily forthcoming. Vocational agriculture teachers must transcend the boundaries of "felt fever" and help each other grow professionally, thus, allowing for teacher development in critical areas of program improvement.

The area of cooperative work experience for teachers needs to be explored. Teacher education staffs should encourage, through credit arrangements, the expansion of teacher expertise in the crop production area. The concept of cooperative work experience for teachers has received positive acclaim in Oregon to the extent that university graduate credit may be arranged.

Local school administrators and school boards should be encouraged to allow work experience for their vocational agriculture teachers without reducing the teachers' salary. If the cooperative work experience agreement is carefully drawn with specific activities designed to add "real world" experience, then this arrangement will be extremely beneficial to both the vocational agriculture teachers and their

(Continued on page 18)

Teachers inspect irrigated hay and pasture field soil conditions of field drilled as no-till. (Photo courtesy of Lee Cole.)

THEME

Staying Cur...

It has been generally obs... vocational agriculture te... duction or crop pro... the vocational... largely ... Or... ...e ...ws- ...ide a ... usable research. ...ndation for ...at interesting ...spur enthusiasm an... little ... for a cr...

Summary

...here are a number of ways to stay current ...uction. First, the vocational agriculture ...realize the importance of the crop production ...to the overall program. Then, the teacher will ...ated to gain the necessary expertise to make the ...tion interesting and relevant to the students. This ...rtise may be gained through formal coursework, ...mmer conference workshops, and informal instructional ...ettings such as peer instruction, cooperative work experience, and non-credit workshops.

Gaining the expertise and thus staying current is a question of identifying the problem and working toward its solution utilizing several of the various methods prescribed in this article. Solving the other part of the problem — increasing teacher and student interest and enthusiasm for crop production instruction may be the biggest obstacle to overcome because of the individual variations required to interest someone in a topic. The goal, however, is worthy of the effort.

THEME

Summer Training For Adults In ICPM

A major task confronting Montana grain producers is to determine how to utilize available moisture while minimizing insect, weed, and disease related damage without disturbing or polluting the environment. This field is now recognized as Integrated Pest Management (IPM) and will become increasingly important with the demand to produce more per acre by decreasing crop yield losses from pests. Producers are being encouraged not to spray needlessly or excessively, use the most effective material at the lowest rate and at the right time, and where possible, to solve problems in an integrated manner.

For example, effective weed control, which is part of seedbed preparation, may destroy the overwintering habitat of a serious insect pest, thus, minimizing damage from both pests during the growing season. A little extra effort at each stage of small grain production may eliminate the need for special pest control operations while taking soil moisture conditions into account. In Montana, there is a continuing challenge to determine how various activities can be better linked to achieve the most efficient production system.


By John R. Baringer & Douglas Bishop

(Mr. Baringer is a Pondera County Extension Agent, Conrad, Montana 59425. Dr. Bishop is a Professor of Agricultural and Industrial Education at Montana State University, Bozeman, Montana 59717.)

Montana's Approach to IPM

The Montana Cooperative Extension Service began conducting IPM programs in 1980. The early work in IPM was designed to establish a data base concerning pest and crop management problems associated with producing small grains.

Unlike many IPM programs which concentrate on a single pest problem or are concerned only with improved timing of pesticide applications, the Montana Small Grain IPM program is based on total crop and pest management. For this reason it is now referred to as Integrated Crop and Pest Management (ICPM). Sound management concepts that are appropriate for Montana conditions are used to help improve production efficiency. It is the goal of the ICPM program to help small grain producers increase productivity with minimal additional cost to the operator.

Early research in Montana revealed that only 42% of the fields monitored efficiently converted the available moisture into grain. Over 30% of the fields observed produced as much as 20 bushels per acre less grain than was possible with the moisture that was available. Poor variety selection, inadequate soil fertility, plant diseases, insect damage, and weed competition were all identified as factors contributing toward poor water use and reduced production efficiency. (See Table 1)

TABLE 1. Percent of Surveyed Fields in Which Yield-Limiting Factors Were Identified.

	Percent (%) of Fields with Significant Loss					
	Barley		*Spring Wheat*		*Winter Wheat*	
	1981	*1982*	*1981*	*1982*	*1981*	*1982*
**Crop Management*	30	13	50	11	46	33
***Climatic Conditions*	10	0	0	10	31	0
Weed Competition or Herbicide Injury	10	0	67	22	15	11
Insect	10	0	17	0	0	0
Diseases	20	13	50	0	46	0

**Variety selection; fertility*

***Poor precipitation distribution; frost; heavy, late spring snows; ice, etc.*

Training Program Needed

Small grain production has become a highly technical enterprise. Various aspects of fertility, chemical application, cropping systems, equipment advances as well as marketing must be taken into consideration. Often the application of new technology to improve crop production efficiency is based on the premise that producers have a thorough understanding of the basics of crop production. However, some producers have either never had the opportunity or possibly never felt the need to learn plant basics. In some cases sons or sons-in-law have moved back to the farm and their training and work experience has not been directly related to small grain production. Often they know something works, but they don't know why things work. With new crop production technology, understanding why a change takes place can be extremely important.

In December, 1984, John Baringer, Extension Agent in Pondera County, Montana, proposed a program which would provide selected producers hands-on training in applying the basic principles of the ICPM concept. The key purpose of the program was to teach producers what was going on in the field as well as why things were happening. It was not the intent of the program to provide recommendations. Rather, cereal plant development and the factors affecting production were the main thrust.

The training program was designed to provide actual field experience in learning about (a) root structure and development, (b) early stages of plant growth and why plants react differently at different stages of growth, (c) identification of weeds, (d) insect identification and development, (e) disease identification and management, and (f) the proper use of equipment to encourage efficient crop growth.

Training Procedure

Four groups of producers with 8 to 10 persons per group were established. Groups were formed in several different counties in the northern portion of Montana. As the resource person, Baringer planned to spend one day a week with each group during the period from April 29 through July 25. The county agent within the counties in which the groups were formed participated in the training activities.

Each group met weekly at one of the cooperator's farms for a 1 to 1½ hour session. Whatever conditions that were present on that particular farm that day were used as the resource base. Weekly meetings included such things as weed identification and control, crop fertility problems, plant disease diagnosis, crop staging, correct timing for pesticide application, and various other aspects of crop production. Each day, 2 to 4 farm visits of 1½ to 2 hours each were additionally conducted with individual cooperators in the various groups. This way each cooperator's farm would be visited every three weeks. Each producer was also offered at least three farm visits during the growing season and hosted the group in his area at least once.

To help cover the cost of the program, each cooperating farm was charged $50 to offset part of the cost of the program. Charging a fee seemed to provide a stronger commitment to the program. An orientation session was held with each established group to review various aspects of the proposed program and ask for final commitment to the program. Cooperators were contacted by the county agent in each county in which the program was conducted.

Scouting for Problems

Scouting in the field was one of the more enjoyable activities of the training program. During the busy summer growing season, it provided the producers an opportunity to view what was happening to the crops in the field.

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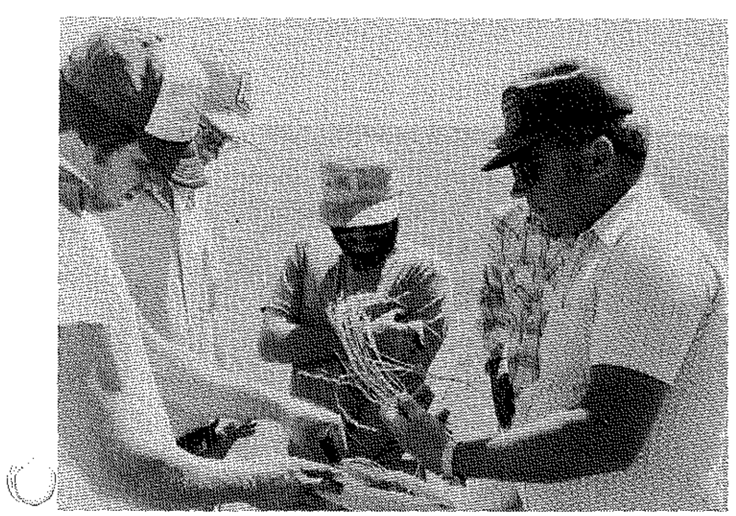
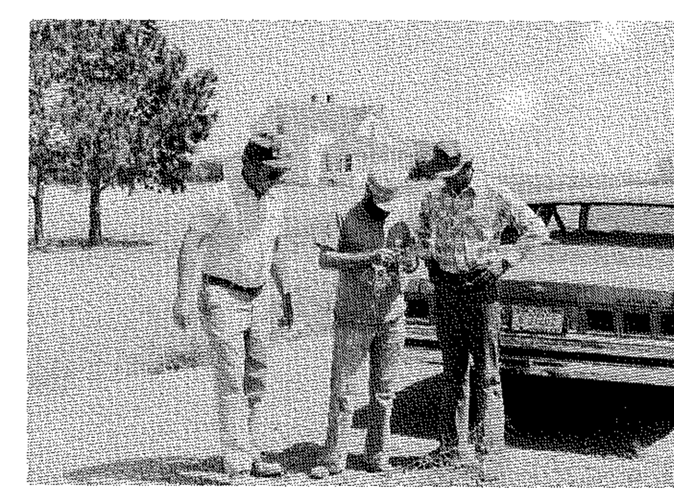


Weed identification is an important part of the summer ICPM program. (Photo courtesy of Doug Bishop.)



Producers are given assistance in identifying insects and insect damage during a field inspection visit. (Photo courtesy of Doug Bishop.)

Summer Training For Adults In ICPM

(Continued from page 19)

The fear of not knowing what to look for shouldn't be the reason for not scouting fields for crop and pest problems. In most cases the producer probably has a pretty good idea what to expect. The same weeds one had the previous year will probably be back. If producers find something they aren't sure about, there are plenty of resources available to help identify the problem. Much information is available from neighbors, agribusinesses, the Extension agents as well as Montana State University and the Experiment station.

Walking the fields is by far the best approach to field scouting. If producers used three-wheelers, they were encouraged to go slow and plan to stop to do some serious analysis. Looking out the window of a pickup at 45 m.p.h. was discouraging as it seriously limited one's ability to see the details in the growing crop. Problems that can be spotted from the pickup window have usually gone too far to be corrected economically anyway.

Because scouting depends mostly upon one's sense of sight, the producers were taught to develop their observational skills. Scouting was related to a camera and taking a picture. The first picture at each site is a wide angle scenery picture, viewing the entire field, noting specific areas for further checking at a later time. It also helps one to have an impression of the entire field. "Getting the big picture" should be done at each sample site because sun angles and terrain can make obvious what may have been hidden at an earlier site. The first look often gives the producer the first indication of mechanical problems such as fertilizer skips, windrow effects, tillage variations, etc. If one sees straight lines of variation, it usually means some kind of mechanical variation.

The next picture is like a family picture where the producer focuses on an area 6 to 15 feet in front of himself or herself. This picture allows one to see individual plants and how they relate to the rest of the immediate area. Color, invader plants, variation of height, dying or stunted plants or skips in the row are what the producer was told to observe.

The final picture is the close-up view. This may be a picture of a single plant, but it's usually best to start with plants in an area about 1 yard square. This is when one finds out what is going on in the field in detail. Visual appearance of plants is the first concern and then the underground facts. Growers were told to use a digging tool to lift the plant so the main roots were intact with the plant. In this way, plants could be carefully examined. Field scouting is a valuable process since it provides producers the opportunity to find potential problems and also the opportunity to see their accomplishments.

Other Activities

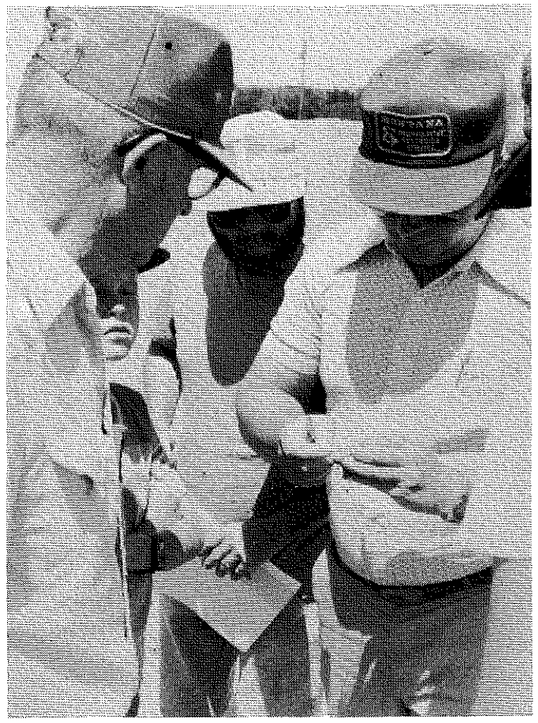
In addition to field scouting and pest observation, farmers participating in this summer's training program set up nitrogen test plots, checked soil moisture and temperature, monitored root and leaf development, studied growth stages of grain crops, studied chemical injury, compared cropping practices, analyzed and sized seed, and made yield estimates.

Hands on activities included:

a. using a moisture soil probe,
b. studying the development of wild oats,
c. looking for insects and determining their populations,
d. identifying the life stages of the sawfly,
e. observing vertebrate pests and the damage they cause,
f. looking for and identifying beneficial insects,
g. sharing innovative practices,
h. utilizing IPM scouting handbook, and
i. studying the effect of mechanical and environmental related stress.

Producer Reactions

Will producers participate in a summer training program which requires regular participation in group and individual activities during the busy growing season? The answer is yes, provided the program gives them a worthwhile experience. Farmers praised the program with compliments such as, "The hands on experience was great, sessions were to the point and practical; we had a chance to compare with other farmers and then discuss the alternatives; I now understand some of the basics of crop production and feel better prepared to meet new problems." Another farmer told the resource person, "I realize more all the time that there is more to being a good farmer than riding a tractor." Finally, another cooperator said, "I'm sure that most of us tend to think about the same way. We try to plant our crop with the greatest care and we're particular about the way it is harvested. During the rest of the summer, though, we waste more time worrying about the weeds in our summerfallow which doesn't produce any income rather than thinking about what is happening in our valuable crop."



On-site inspection for wire-worm damage in winter wheat. (Photo courtesy of Doug Bishop.)

Another question to ask is, "Are there any lasting beneficial results from such a training program?" In a follow-up study of the program, Dr. Debbie Inglis, State Extension ICPM Coordinator, found among other things that: "Sixty-seven percent of the respondents at the end of the course planned to scout 76-100% of their small grain acreage for pests, whereas only 6% said at the beginning of the course that they scouted this much of their acreage. Most of the respondents said that either they, a family member, or a farm employee scouted their fields for pests although 9% said at the end of the program that they would hire a private consultant. Most of the respondents planned by the end of the course to scout their fields more frequently. Some (+32%) planned to scout their fields once a week and some (+16%) planned on once every two weeks."

"Many of the respondents felt at the beginning of the program that their skills in pest identification were not adequate. At the end of the program, though, more (+50%, +45%, +87%, +33%) felt that their skills in weed, plant disease, insect and small vertebrate identification, respectively, were adequate."

Summary

Summer ICPM training programs for adults offer a wonderful opportunity to help local producers improve their crop producing skills. In-field training has many advantages over the winter group meetings and there are numerous advantages for producers to observe what their neighbors are doing and why they are doing it. However, such a program would be easier for dryland producers to participate in than irrigated producers because the demand for time is great during the growing season.

It is important to go back to the basics in a program to prepare producers to utilize ICPM. Newer producers often have never had an opportunity to learn crop stages and the pests in their field. Experienced producers often are in the same situation as new producers and a refresher is needed to update or gain new knowledge. Targeted audiences for this type program should be younger producers, but there is also a great potential with this type program for agribusiness, Extension agents, and vocational agriculture teachers. The program provides a tremendous learning experience for both the participant and the resource person; however, anyone conducting such a program must have a solid background in agronomy and know the area well.

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Juhnke, M.L. & Baldridge, D.E. (1984) Crop Management Handbook for Wheat and Barley Production in Montana, (Bulletin 1291), Cooperative Extension Service, Montana.

Inglis, D. (1985, Fall Issue) Integrated Crop and Pest Management Update, Montana Cooperative Extension Service, Vol. 1 (2).

ARTICLE

Updating Crop Production Curriculum in Africa: A Model to Bring Educators and Practitioners Together

By Stan B. Kamara & C. William Garner

(Dr. Kamara is a lecturer from Sierra Leone and resides at 59 West Milton Avenue, Rahway, New Jersey 07065, Dr. Garner is an Associate Professor with the Graduate School of Education at Rutgers University, New Brunswick, New Jersey 08903.)

Sierra Leone, a small country of approximately 28,000 square miles, is located in West Africa. It has a population of about four million and a tropical climate characterized by a marketed rainy season lasting from May until November followed by a distinct dry period from December to April. The country has had food problems in recent years, a condition which calls attention to the need for well-trained researchers and agricultural extension personnel.

The Situation

So often one can hear employers and practitioners complain that what is needed most or what is most important is not what vocational educators deem important. At the same time, vocational teachers claim that employers do not appreciate what they are teaching. To further complicate matters, state officials and university theorists too often feel that what is being taught does not look to the future. Agreement about the content to be included in a curriculum may be too much to ask. However, an awareness of the perceptions of all parties involved must exist.

One occupational area in which all participants know an understanding of each other's perception is important is agriculture. The importance agriculturalists ascribe to their extension work provides testimony to their efforts to keep lines of communication open. This extension system has

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Updating Crop Production Curriculum in Africa: A Model to Bring Educators and Practitioners Together

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been set up in developing countries where proper practices are critical if these countries hope to increase their agricultural production.

Sierra Leone is an example of a country where an awareness of the information about raising crops is needed to increase production. As a result, a doctoral dissertation study was conducted to determine what differences existed among the perceptions of the leaders, educators, and practitioners in agriculture with respect to the content to be included in the curriculum. Which competencies would they feel were most important to be taught?

This investigation required that the data be collected on site in Africa through funding provided by the Adaptive Crop Research and Extension Project. Several thousand miles were traveled over a six week period to administer the questionnaires to a broad sample of farmers and educators throughout the country. The model used to examine the differences is recommended for consideration in all vocational areas.

Agricultural Extension in Sierra Leone

Educators, planners, and leaders must provide appropriate farming competencies in their agricultural education and extension training programs. The Sierra Leone farmer is a vital part of that country's agricultural stability and strength and, therefore, merits appropriate attention in the quest for solutions to some of the problems adversely affecting optimum farm productivity.

Agricultural extension instructors in Sierra Leone execute specific responsibilities that sustain a close relationship with the Ministry of Agriculture and Forestry, and support the agricultural industry by boosting farm production. However, agricultural extension instructors in Sierra Leone have been criticized as being more academic than practical. Therefore, the purpose of this study was to determine which plant science competencies were relevant for a two-year plant science curriculum to prepare agricultural extension instructors in Sierra Leone.

The Model

To obtain an accurate representation of the important plant science competencies for the curriculum, five categories of agricultural professionals in Sierra Leone were identified and surveyed. They were grouped as follows:

1. Agricultural Instructor: An agricultural extension worker who has completed the two-year certificate in agriculture training from Njala University College.
2. Agro-Technician: An agricultural extension worker who has completed a six-month induction training period at one of the induction centers in Sierra Leone.
3. Students: People currently enrolled at the Certificate Training Center at Njala University College and taking two-year coursework.
4. Farmers: Growers who earn a living by farming or who operate or manage a farm.
5. Senior Officers: The professional staff of the Ministry of Agriculture and Forestry (from the rank of agricultural officer and above) and the staff of Njala University College.

Based on a review of literature, discussions with experienced professionals in tropical agriculture, and job descriptions, a list of plant science competencies for three major crops grown in Sierra Leone was generated, stratified into competency clusters, and validated. A four-point scale was used to measure the importance of selected plant science competencies as perceived by the five groups noted above.

The number of people surveyed from each group was as follows: 118 agricultural instructors, 113 agro-technicians, 102 students, 122 farmers, and 54 senior officers. The number of competencies for each crop included 65 for ground nuts, 67 for wetland rice, and 54 for cassava.

Findings

Mean ratings for farmers and those of students, agro-technicians, agricultural instructors, and senior officers were significantly different for the three crops. The similarity of the ratings for students, agro-technicians, agricultural instructors, and senior officers may be explained by the interaction that exists between these four groups. Because senior officers teach agro-technicians, who eventually enter into the two-year agricultural training program and become agricultural instructors, it is possible that the values of the senior officers influenced the perceptions of the students, agro-technicians, and agricultural instructors.

In addition, students, agro-technicians, and agricultural instructors receive a more academic level of education plus they have related field experiences. Farmers, on the other hand, establish a knowledge base from their experiences and on-the-job training. Thus, the differences may be the result of the farmer perceiving the competencies from a more practical point of view while the students, agro-technicians, agricultural instructors and senior officers reacted to the competencies from a more academic position.

Conclusions and Remaining Questions

The expected differences between practitioners and educators were found. These differences of opinion about what is most important for a farmer to know and do demonstrates a gap than can hamper progress. Obviously, a lack of an awareness of the differences in perceptions can lead to confusion.

If farmers do not agree with the educators and leaders, will change take place? If farmers do not agree with the educators, is the curriculum not correct? Because farmers teach their children to farm, what will they teach them and what will not be passed on to them?

As the results of this study are examined by the agricultural leaders in Sierra Leone, they must think ahead to curriculum decisions. What competencies should be taught and in what order? Should the curriculum be broadened and/or extended? Is a unit in the curriculum to change attitudes needed (i.e., safety)?

Even though the study provided more questions than answers, officials in Sierra Leone are ahead of many other vocational educators in the world. They are aware that specific differences exist between educators and farmers.

BOOK REVIEWS

MECHANICS IN AGRICULTURE WORKBOOK (1 & 2), by Lloyd J. Phipps. Danville, Illinois: The Interstate Printers & Publishers, Inc., Copyright 1983, Section 1 - 200 pages & Section 2 - 184 pages, List price $4.95 ea. (less educational discounts).

These two workbooks are very well organized. They are both paperbound 8½" x 11" and 3-hole drilled for a standard 3-ring notebook. Both books follow the text of Lloyd J. Phipps' 3rd edition of MECHANICS IN AGRICULTURE. The workbooks can be a tremendous aid to any high school mechanics class. I highly recommend these two workbooks to anyone using Lloyd J. Phipps' text.

Both workbooks are divided into chapter topics that follow the chapters in Phipps' MECHANICS IN AGRICULTURE textbook. They include questions that are pertinent to the topics of each chapter of the text for the student to answer and leave plenty of room for the student to write the answers directly in the workbook. At the end of each unit or chapter there is a set of suggested activities that could be used as part of a lesson plan or assigned to students as a graded assignment or adapted to lessons in mechanics.

Workbook 1 deals with the first half of Phipps' textbook, and workbook 2 deals with the second half. Workbook 1 (or section 1) includes an introduction and covers the topics of Shop Tools and Equipment, Agricultural Woodworking and Carpentry, Painting and Glazing, Welding, Hot and Cold Metal Work, Sheetmetal Work, and Rope and Leather Work.

Workbook 2 includes Agricultural Power Fundamentals, Trucks and Tractors, Transmission of Power, Field Machinery, Agricultural Buildings, Concrete Work, Rural Conveniences and Sanitation, and Fencing Section 2 also includes units on Rural Electrification, Soil and Water Management, and the Metric System.

I highly recommend the use of these workbooks. I am sure you will find them a definite aid in the classroom as well as in the laboratory.

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AN APPLE FOR THE TEACHER — FUNDAMENTALS OF INSTRUCTIONAL COMPUTING by George H. Culp and Herbert Nickles, Monterey, California: Brooks/Cole Publishing Company, 1983, 239 pages.

This book is designed for teachers who would like to know the fundamentals of the BASIC programming language and how to apply them in designing and developing instructional computing programs. The text is divided into two parts and consists of nine chapters plus two appendices. In Part 1, the first five chapters cover BASIC programming language statements and commands common to five areas of instructional computing: problem solving, drill and practice, tutorial dialog, simulation and gaming, and testing. Chapter 6 gives a short example and model programs in each of the five areas of instructional computing. Actual computer program listings are given. Chapter 7 discusses and demonstrates the use of graphics as an instructional technique.

In Part 2, Chapters 8 and 9 explain the specific steps needed to design and develop instructional computing programs. The appendices include general instructions for using a microcomputer; instructions for loading, editing, and saving programs; answers to questions and problems in the chapters; and an annotated bibliography of journals and publications which address instructional computing.

Twenty-six programs are written for Apple II users, but with some editing most of the programs could be made compatible with other computers using BASIC programming language. A diskette containing all of the programs, plus solution programs to selected problems is available from the authors for a $10 fee to cover costs, postage, and handling.

This book would make an excellent reference for any teacher who would like to begin designing and developing his/her instructional computing programs. It is well organized, easy to understand, and very complete.

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CAPITAL INVESTMENT ANALYSIS: USING DISCOUNTED CASH FLOWS, by George L. Casler, Bruce L. Anderson and Richard D. Aplin. New York: John Wiley & Sons, Inc., 1984, Third Edition, 144 pp., $19.95.

This book focuses on capital investment decisions which may involve large sums of money in expenditures for land, equipment, buildings, and other assets. Since these decisions influence the long-run fexibility and earning power of the business, it is imperative that they be based on reliable forecasting and evaluation procedures.

The book contains 14 chapters. The major areas covered include capital investment decisions, commonly used measures of investment worth, time value of money, present value of a future sum of money, evaluating capital investments in terms of cash flows, discounted cash flow measures of investment worth, adjusting cash flows for income taxes, the cost of capital, special problems in projecting cash flows and in analyzing investments, handling uncertainty, handling inflation, aquiring assets with financial lease vs. purchase and loan, and capital rationing.

Two widely used measures of investment worth, the payback and simple rate of return methods, are discussed and it is noted that both suffer from the weakness of failing to reflect the time value of money. The book focuses on two measures of investment worth that do reflect the time value of money: the net present value method and the internal rate of return method. The authors stress that these two approaches, correctly applied, can provide an excellent basis for applying judgment in making capital investment decisions.

This publication is designed as a basic text for courses in advanced farm management or financial management. It would be useful as a reference for agricultural teachers at the high school and junior college levels.

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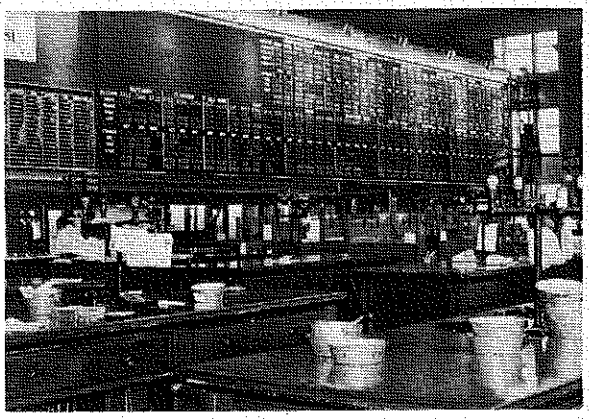
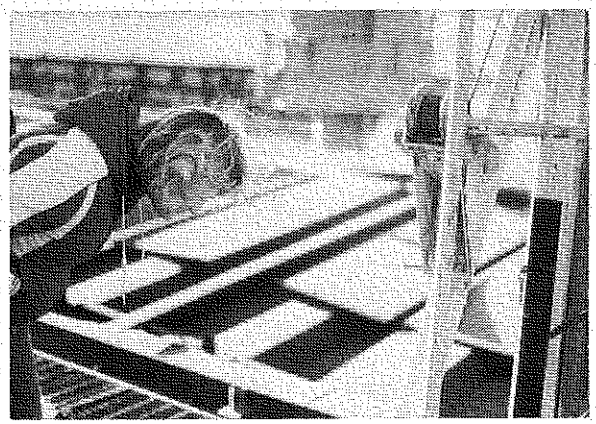
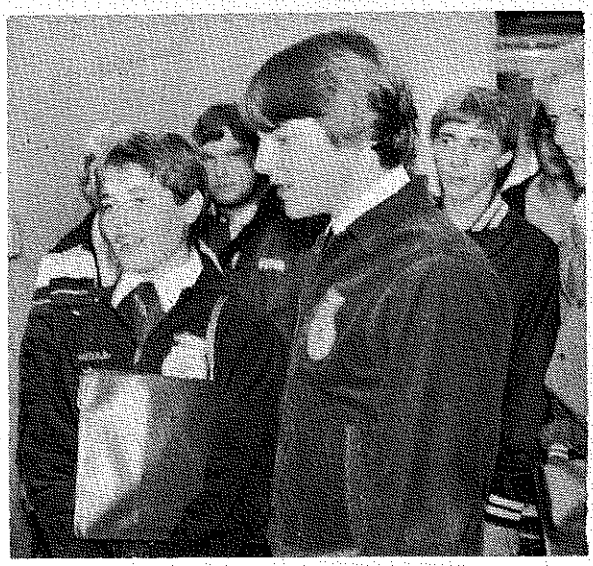
The Marketing of Grain



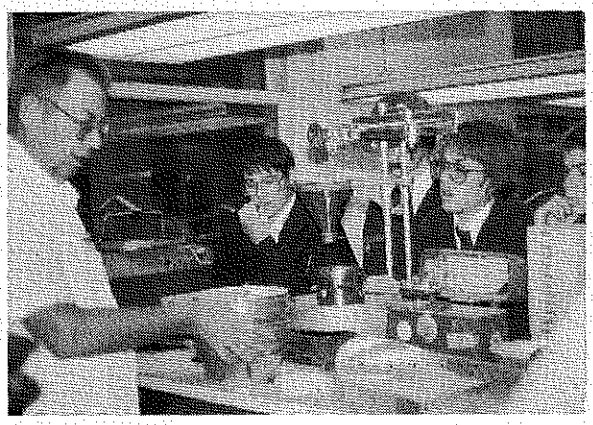
Cash grain tables and electronic board — Minneapolis Grain Exchange.



A Youth Crops Tour participant observes barge loading at a river terminal.



Youth Crops Tour participants ask questions of Exchange members while on tour.



Youth Crops Tour participants visit Minneapolis State Grain Inspection Dept.

(Photos Courtesy of Pat Henderson, Minneapolis Grain Exchange.)