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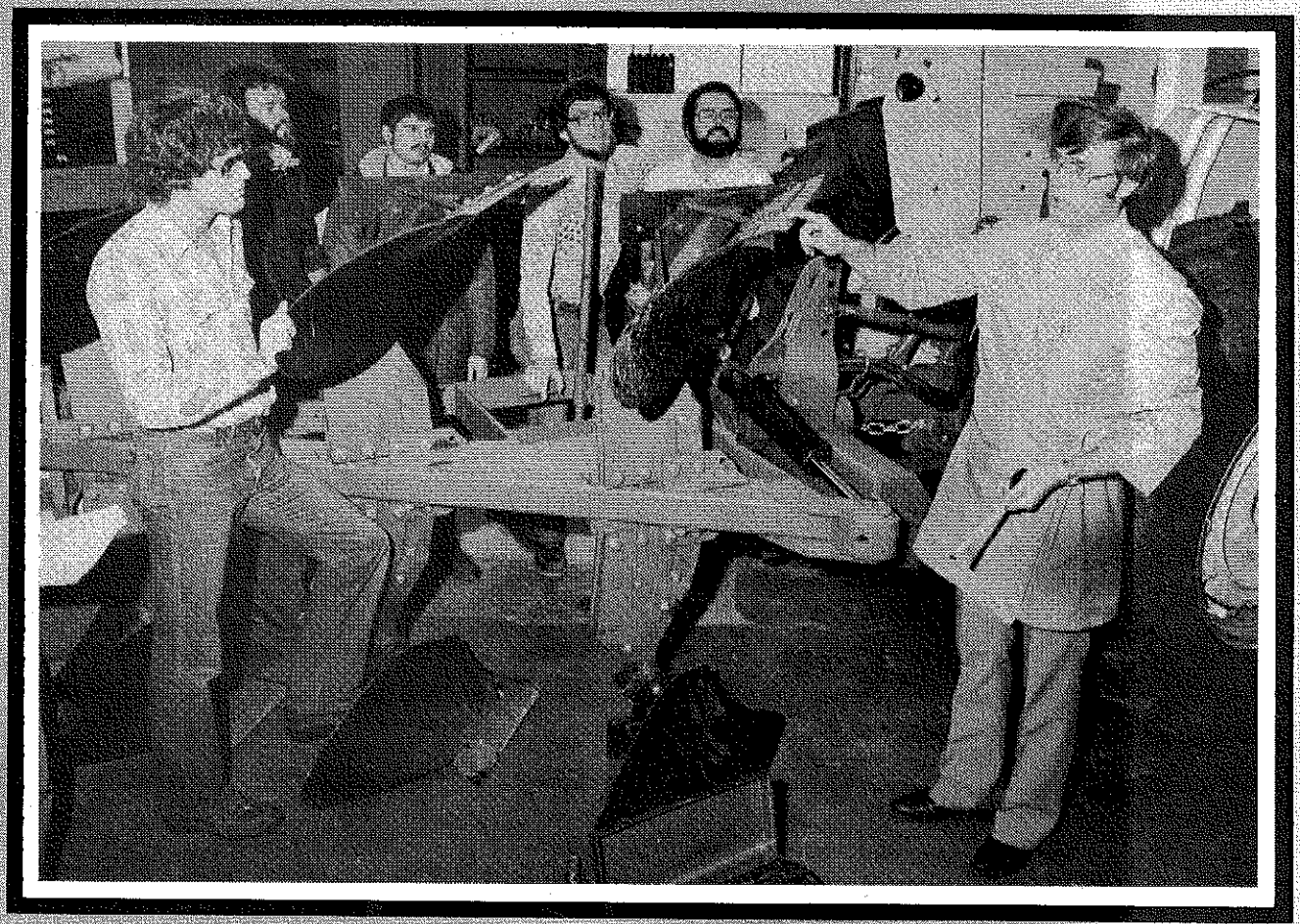

THEME: Energy Education

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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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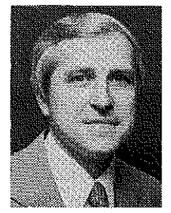
Developing Energy Consciousness



JASPER S. LEE, EDITOR
(The Editor also serves as Professor and Head, Department of Agricultural and Extension Education, Mississippi State University.)

Energy education is to educate people in the efficient use of all available energy. In common use, the words "energy" and "fuel" are unfortunately used interchangeably. The real problem we face is more of a fuel crisis than energy crisis. "Energy" refers to the ability to do work, while "fuel" is any substance that can be burned to produce heat or power. Scientists say that the amount of energy in the universe always remains the same. The amount of specific fuels does change. And this is precisely the problem we face today!

Several forms of energy are available: solar, chemical, electric, mechanical, and nuclear. Today's crisis is caused by changes in the availability of certain chemical forms known as fossil fuel. Of the fossil fuels, petroleum supplies 45 percent of the energy used in the world. Coal, another fossil fuel, furnishes 30 percent of the world's energy. Of course, the primary source of all energy has been and is the sun. It is almost impossible to accurately measure the amount of solar (sun) energy that is used.

As the available traditional sources of fuel are exhausted, alternatives must be sought. New sources of energy are needed while at the same time more efficient use must be made of the available fuels. Conservation practices must be developed and adopted.

Facilitating the adoption of new energy practices is a primary mission of vocational agriculture in energy education. The stress in programs should not be so much on energy education itself as it is on modifying existing practices in agricultural industry. An energy consciousness must be built into all instruction, whether it be livestock or crop production, agricultural mechanics, horticulture, forestry, or agribusiness.

Start Now

The theme of this issue of the MAGAZINE is "Energy Education." Joe Kirkland of the Florida Department of Education served as Theme Editor. His assistance is appreciated.

The Big "Sell"

Almost every day for the past few weeks newspapers have carried one or more articles about reducing Federal funding for various programs. These articles elaborate on the effects of funding cuts in all areas of society. The amount of cut in Federal funds is projected at 20 to 50 percent, or more, for many programs. Vocational education has been listed as one of these programs.

Is a cut in funding for vocational education justifiable? After all, isn't vocational education a valuable contributor to economic development? How can the economic well being of the United States be improved if funds for preparing people to be economically viable are reduced? If we want to improve the economic situation in the United States, reducing funding for vocational education doesn't make good sense. Inadequate funding will likely result in inferior programs. Reducing the aggregate educational capability of our people will reduce their economic productivity.

The Legislative Policy Seminar

A Legislative Policy Seminar sponsored by the American Vocational Association was held in Washington in March. A number of political and vocational education leaders attended and spoke. The speakers were disappointing, except for Gene Bottoms and Tony Carnovale.

AVA Executive Director Bottoms took a firm stand for at least continuing the current level of Federal funding for vocational education. He feels that vocational education has all ready had its cut since the level of funding has not been increased over the last decade when inflation is considered. The position Dr. Bottoms has taken is highly commendable when most other vocational educators speaking at the Seminar did not express enthusiasm for trying to increase or continue the present level of Federal funding.

Carnovale, an official in the Carter Administration, introduced the Seminar participants to the new language and mood of government officials in Washington. He used a number of terms which impact the so-called "battle of the budget." Psychoeconomics, reindustrialization, supply side economics, stimulative policies, and revitalization were among the new additions to the Washington vocabulary.

In analysis, the Seminar was very enlightening. It provided the opportunity to learn about plans of the new Republican Administration. It provided the opportunity to find out who among the group participating really supports vocational education and who doesn't. It provided the opportunity to learn the stance of the American Vocational Association.

The Point

It was disappointing to hear some of the speakers at the Seminar. Among these were prominent vocational educators. They attempted to "sell" us on accepting a cut. Some of the speakers, including some vocational educators, appeared to be politically involved with the Republican Administration to the extent that they would sacrifice voca-

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Editor's Page

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tional education in order for the Administration to achieve its budget-cutting goals. These vocational educators no longer represent professional vocational educators in the United States. We probably need to purge them as leaders who speak in our behalf. They now speak in behalf of the goals of a political party and not the American people.

Full (and increased) funding is needed for vocational education. Sure, some program redirection is needed. More stress is needed on preparing individuals for the middle of the job ladder. Stressing education for the disadvantaged and handicapped has been very marketable at the Federal level of government. We must continue to serve these individuals but not to the exclusion of individuals without these characteristics. Our finished "product" in vocational education is closely related to the quality of the students who enroll. It is very difficult to prepare disadvantaged individuals for the jobs in the middle of the ladder!

The stress needs to be on the development of needed employment competencies in the specific areas of vocational education, such as agriculture. Good education for the world of work is needed by all individuals, both advantaged and disadvantaged. The best way for the disadvantaged to overcome their handicapping conditions is through good education for work. And this is best achieved by emphasis on specific vocational areas!

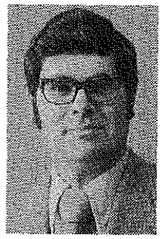
Vocational educators can not and should not meekly accept a cut in funding for vocational education. During economic adversity, good vocational education is needed more than ever. We need to take a strong stance to obtain the level of funding needed for quality vocational education. We must not "buy" the big "sell."

The Cover

Van Shelhamer, author of an article in this issue of the magazine, explains the importance of equipment adjustments and how they effect fuel consumption. (Photo courtesy of Van Shelhamer, Montana State University.)

THEME

Energy Education



By Joe R. Kirkland, Theme Editor

Editor's Note: Mr. Kirkland is State Program Director for Agribusiness and Natural Resources Education of the Vocational Division, Florida Department of Education, Tallahassee, Florida 32301.

Years of little concern about energy have given way to almost daily preoccupation about what the future holds. Headlines in newspapers and broadcasts on radio and television are filled each day with constant stories about imminent changes. Few reminders of the problem are needed, however, when we buy fuels, fertilizers, or chemicals. Where will it stop? What can we do?

There are presently few clear-cut answers to adequate, affordable energy sources. Some known answers will be extremely costly. Conservation will help. More must be done.

The articles included in the Magazine center around a variety of information dealing with the topic, energy education. The solutions to our energy crisis **must** be many. Everyone, by necessity, must share in finding **answers.**

Persons in agriculture have always played a vital role in solving crises faced by mankind. It seems to be an inherent characteristic of farmers, agricultural educators, and the agriculture community to seek "a better way". There is no doubt that we must work smarter and harder to find answers. Teachers of agriculture must include energy education in their instructional programs if we are to do our part in making it economically feasible for persons to remain in agriculture. Energy awareness, conservation of energy through new and improved techniques, cost analysis of sources of energy, development of new energy sources, and many other areas must be included in the instructional activities. Infusion of energy education into existing programs rather than developing a new energy course seems to be the best way to get at the problem.

FFA chapters can play a vital role in the energy problems ahead. Community involvement in energy activities through the Building Our American Communities program can pay big dividends. The proficiency awards also provide excellent opportunities for individual energy projects.

We must share with each other information about energy education. Our energy future must never be taken for granted again. I hope you find each of the articles interesting and useful.

THEME

Demonstration Projects for Vocational Agriculture

Alternative Energy Sources for Agriculture

By Direlle Baird

Editor's Note: Dr. Baird is Associate Professor of Agricultural Engineering at the University of Florida, Gainesville.

Energy's importance to agriculture and to the food chain is universally accepted. Agriculture must go through transition to a new technology that uses less energy or at least uses energy more efficiently. There is controversy over how agricultural systems should be modified in response to limited supplies of higher priced energy. Many researchers are addressing this problem but significant contributions to new technology are not expected for several years. That leaves energy conservation and alternative energy sources as the immediate partial solutions to our problem. Most experts agree that we cannot conserve ourselves out of the problem nor can alternative energy sources replace our total demand for energy now met by non-renewable sources. However, they can buy us time and provide a vehicle for making the transition to a new technology.

I would like to briefly discuss some alternative sources of energy for agriculture and encourage the use of demonstration projects in vocational agriculture programs. The following alternative energy systems are well-suited for use in high school programs: solar water heating, solar greenhouse heating, solar crop drying, gasification (wood or crop residue), and methane generation.

Solar Water Heating

Solar water heating appears to be the most feasible use of solar energy at the present time. This application has several of the desirable characteristics of an ideal solar energy application: relatively low temperature, year around use, and a back-up (electric heating element) that is cheap and easy to install. Complete systems are commercially available at prices that prove to be economically feasible for most areas of the U.S. They can also be constructed by a contractor or possibly by the homeowner who has some mechanical skills. The 40% Federal Income Tax credit for homeowners (15% for business) and in some states, additional tax credits, make solar energy applications even more attractive. A typical family of four using 80 gallons of hot water per day would pay about $30 per month (7 c/kwh) to operate an electric water heater. A properly designed solar system can cut water heating costs from 50% to 80% (using an electric back-up) or 100% if the back-up is not used. A commercially available solar water heating system can be installed for $1500 to $2500. A mobile solar water heating demonstration system has been constructed at the University of Florida. Useful publications include "Buying Solar," "A Guide to Solar Water

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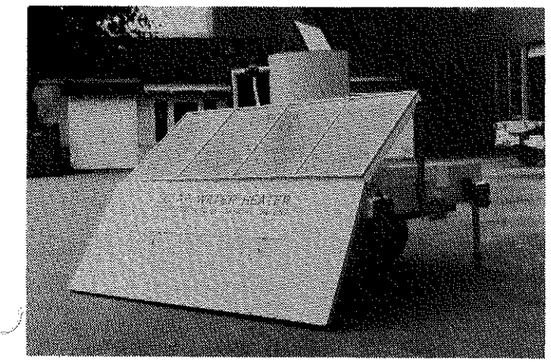
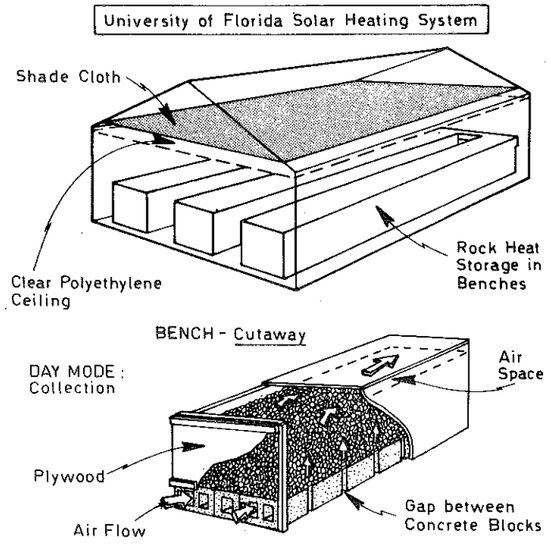


Mobile solar water heating system



Greenhouse solar heating system which uses the greenhouse itself as a solar collector. Rocks under the benches store heat.

Alternative Energy Sources for Agriculture

(Continued from Page 5)

Heating in Florida," and "Build Your Own Solar Water Heater." These should be helpful in constructing or purchasing a solar water heating system. (See end of article for more information on the publications.)

Solar Greenhouse Heating

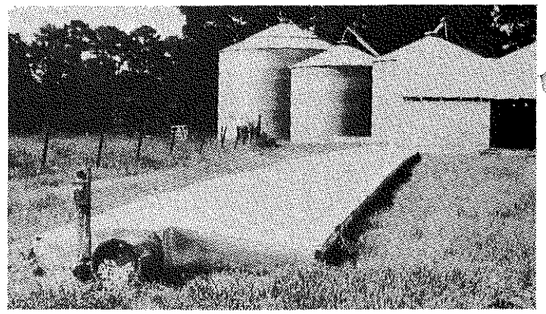
The greenhouse industry is critically dependent upon a reliable energy supply. Heating costs of $50,000 per acre of greenhouse floor are a common occurrence and represent an ever increasing amount of total production costs. Even though the energy for heating greenhouses and the associated cost appears to be excessive, greenhouses play an important role in our society by providing vegetable yields up to 10 times that of field production and provide food, transplants, and ornamentals during seasons when they cannot be produced locally outdoors. The use of greenhouse-residence combinations is also gaining interest. In this case, the greenhouse can provide a new dimension in living space as well as supplemental heat and space for producing plants, including food production.

The use of solar energy in greenhouse heating can help reduce the dependence on our diminishing fossil fuel supplies and could help save our greenhouse industry. There are many varied designs being tested for utilizing solar energy to heat greenhouses. There is probably justification for many different designs since the weather conditions and plant requirements vary drastically. Several solar heating systems are described in the University of Maryland publication, "Energy Conservation and Solar Heating for Greenhouses". A system has been developed at the University of Florida which utilizes the greenhouse itself as a solar collector. Rocks located under the plant-support benches store heat for night use. This system is primarily designed for southern climates and crops with a low light requirement, such as ornamental foliage. This design has the advantage of no external collectors (although they could be added if necessary) and very low maintenance costs. For northern climates, a system utilizing external collectors should be used.

Rutgers University has developed a system which utilizes water as the heat transfer fluid and storage medium. The collectors are constructed primarily from plastic and the heat storage is in the floor of the greenhouse. Both systems appear to be economically feasible for some applications. A vocational agriculture department should have the equipment and skills necessary for constructing either of these greenhouses at a relatively low cost.

Solar Crop Drying

Solar crop drying is a particularly attractive application of solar energy since the design and construction is much simpler than other solar energy systems. A solar crop dryer may be simply an air heater with no thermal storage and no additional heat exchangers. For example, in some applications of solar grain drying, the conventional drying or storage bins can be used. The solar component then consists of a solar air heater which could be integrated into the



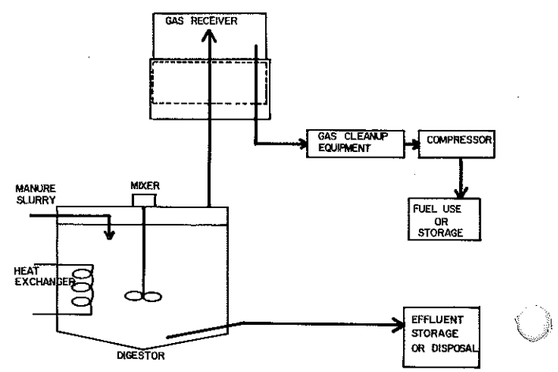
Solar crop dryer made of greenhouse-grade polyethylene on wood frame.

roof and walls of a farm building or could be constructed from inexpensive materials such as wood and plastic. A solar air heater can be constructed from greenhouse-grade polyethylene and a small amount of wood. The collector is inflated using a low-pressure blower. The cost of material for this solar collector is less than 50c per sq. ft. and the life of the collector would be several years if it was disassembled and stored after the drying season. Wooden locking strips are used to hold the plastic, when inflated, so that no nails or other fasteners are required to secure the plastic.

Total cost of drying with such a system is about the same as a conventional gas-fired system. However, farmers are slow to adopt solar energy systems since they require more management and are presently at a break even point with today's fuel prices. This is based on about 30 days of use per year. If the system could be used for drying other crops or for other low-temperature applications, the economics would obviously be much better. (Designs of plastic air heaters are in the publications, "Solar Grain Drying Under Hot and Humid Conditions" and "Low Temperature and Solar Grain Drying Handbook," as listed at the end of this article.)

Wood or Crop Residue Gasification

Gasification of wood and some crop residues is an alternate energy technology that should be given strong consideration. This is not a new technology because wood gas or

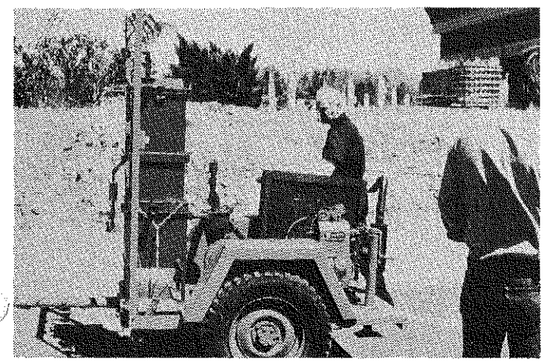


Basic components of a bio-gas generator.

coal gas has been used to power internal combustion engines since their invention. The low price and convenience of liquid fuels has displaced their use. The current price of fuels available to the farmer seems to indicate a possible return to the use of gasification. This is inspite of several disadvantages which include storage problems, low energy content per volume or weight, long start-up time (10-15 minutes), increased maintenance, reduction in power (about half the power unless engine is modified), and wood gas is dangerous since it contains about 20% carbon monoxide — an odorless, tasteless and very poisonous gas. It appears that the use of gasification in agriculture may be particularly attractive since wood or crop residues would be readily available and the disadvantages listed above might not be as significant as in other sectors of our economy. Agricultural applications which appear promising include operation of stationary engines for irrigation pumps, drying fans, refrigeration and air conditioning equipment, and gas for space heating and drying operations.

Downdraft wood gas generators which supply gas for internal combustion engines which in turn operate electric power generators are currently being studied. The system will produce electric power at a rate of about 4 kilowatts for 4 hours, on a fuel charge of 40 pounds of small wood blocks. This amounts to about 2½ pounds of wood per kilowatt hour. Heat from the burning of fuel in the combustion zone produces charcoal from the wood placed in the top of the chamber. In the reduction zone, which is in the bottom of the chamber, carbon in the hot charcoal combines chemically with carbon dioxide and water vapor to produce the fuel gases: carbon monoxide and hydrogen. The gas leaving the generator should be about 20% carbon monoxide, 20% hydrogen, 10% carbon dioxide, and 50% nitrogen plus traces of other gases and particulates. From the generator, the gas passes through a cyclone separator which removes approximately 75% of the particulate matter and then into a cooler and final cleaning unit.

Although, the design and construction of a wood gas generator can be rather complicated, several successful units have been built from readily available materials. Most vocational agriculture shops should be capable of producing a workable system with the information contained in publications such as "Generator Gas - The Swedish Experience from 1939-1945" and "How to Power a Gasoline Engine With Wood."



A mobile downdraft wood-gas electric generator.

Methane Generation from Livestock Waste

The conversion of organic materials, such as animal wastes, to an easy to use form of energy can be accomplished by a number of methods. The process which appears to show the greatest immediate potential is anaerobic fermentation or digestion which converts organic materials to methane and other gases, called bio-gas. Sewage treatment plants constantly generate bio-gas from the sewage sludge as part of their treatment process. This concept has been extensively applied in Europe and India during energy shortages. This energy source shows considerable promise for some use in agriculture since it will help dispose of wastes while at the same time producing fuel that normally can be utilized on-site without the additional problems of storage and transportation. One of the major disadvantages of methane as compared to liquid fuels and LP gas is that it is impractical to transport in tanks, which eliminates its use as a motor vehicle fuel. For example 8 cubic feet of methane gas compressed to 300 psi would run an average tractor for only 6 minutes.

The main component of an anaerobic digester for bio-gas generation is a container to receive the liquid waste, which must be stirred and maintained at a constant temperature. Constant conditions of temperature, pH, and fresh organic matter promote maximum methane production. Usually the temperature is maintained at about 95° F. Higher temperature may be used if held constant. Each 20° F. rise will result in a doubling of the gas production, up to a maximum of 135° F. In addition to constant temperature conditions, there must be a balance between the numbers of acid-forming bacteria. If this balance is not maintained, the process stops. The balance is affected by temperature, loading rate, toxic elements, and pH.

Methane is drawn off the top of the digester and is commonly stored in a "floating cover" type vessel. Other devices such as regulators, pressure gauges, traps, scrubbers, and relief valves are normally used.

A very simple apparatus can be used to produce bio-gas. The amount of gas and the reliability desired have a great influence on cost and complexity of the system. A simple batch-loaded digester can be constructed from readily available materials, however, one should become familiar with the characteristics of anaerobic digestion before building a system.

Since methane is an explosive gas, extreme caution should be used when operating a methane producing system. Methane is lighter than air and may be trapped in the top of buildings presenting a very dangerous situation, therefore digesters should be operated outside of buildings.

Helpful Demonstrations

The alternative sources of energy described in this article have some promise. Their success depends upon improvements in them and the long-term trend of traditional energy sources.

Useful References on Alternative Energy Sources

Fluck, R.C., and C.D. Baird. **Agricultural Energetics.** AVI Publishing Co., Westport, Connecticut, 1980.

Buying Solar. Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. (FEA/G-76-154). A 71-page booklet for

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Alternative Energy Sources for Agriculture

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lay readers to help the individual make decisions related to solar space heating and cooling and domestic water heating. Price, $1.85.

A Guide to Solar Water Heating in Florida. Florida Solar Energy Center, Document Sales, 300 State Rd. 401, Cape Canaveral, FL 32920. Presents system sizing, components, plumbing details, freeze protection, buying tips, and economics. Price, $1.50.

Build Your Own Solar Water Heater. Environmental Information Center, 935 Orange Ave., Winter Park, FL 32789. Detailed directioning on constructing a solar domestic water heating system. Price, $2.50.

Ross, D.S. **et. al.** Energy Conservation and Solar Heating for Greenhouses. NRAES-3. Obtain from Agricultural Engineering Dept., Univ. of Maryland, College Park, Maryland 20742, 1978, Price, $1.50.

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Low Temperature & Solar Grain Drying Handbook. MWPS-22. Obtain from Agricultural Engineering Dept., Iowa State Univ., Ames, Iowa 50011. Price, 1980, $3.00.

Generator Gas - The Swedish Experience from 1939-1945. Translated by the Solar Energy Research Institute, 1536 Cole Blvd., Golden, Colorado, 80401, 1979. This is a very detailed discussion of the operation of internal combustion engines on generator gas.

Williams, R.O. and B. Horsfield. "Generation of Low-Btu Fuel Gas from Agricultural Residues and Experiments with a Laboratory Scale Gas Producer" 9th Annual Conference on Food, Fertilizer, and Agricultural Residues. Cornell Univ., Syracuse, N.Y. Apr. 1977.

Eoff, K.M. and D.M. Post. "How to Power a Gasoline Engine with Wood". FRC-15, Inst. of Food and Agr. Sciences, Univ. of Florida, Gainesville.

Methane Generator From Human, Animal, and Agricultural Wastes. National Academy of Sciences. Washington, D.C., 1977. Order free copy from: Commission on International Relations (JH 215) — National Academy of Sciences - National Research Council, 2101 Constitution Ave., Washington, D.C. 20418.

Fulhage, Charles, **et. al.** Generating Methane Gas From Manure. Science and Technology Guide, Univ. of Missouri, Columbia, Missouri, 65211, 1979.

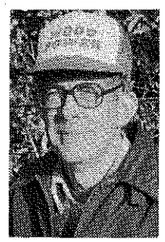
Hansen, R.W. Methane Generation from Livestock Waste. Great Plains Beef Cattle Handbook, L-1497. Texas Agr. Extension Service, Texas A & M Univ. System. College Station, Texas.

THEME

Fuel Shortage? Grow Your Own!

Farmers can grow, harvest, and process their own fuel and convert their gasoline and diesel engines to run on this fuel. The junior author of this article, a retired LaCrosse, Florida vocational agriculture teacher has built America's first woodburning tractor. The tractor has been running on a farm since June, 1980. Its use is proving that wood-power is one of the better alternative fuel sources available now for farmers.

In August, 1980, the authors conducted a demonstration of wood power technology for the Alachua County vocational agriculture teachers. Since this time, the wood-burning tractor has been demonstrated for several vocational agriculture classes.



By Ed Thompson and R.H. Hargrave

Editor's Note: Mr. Thompson is Vocational Agriculture Teacher in Gainesville, Florida. Mr. Hargrave is a retired Vocational Agriculture Teacher in LaCrosse, Florida.

Wood Power Potential

The concern about farm energy has many people in agriculture looking for alternative fuels. A further concern is the effect alternative fuels (including coal) will have on the environment as well as the pocketbook.

Wood power offers a clean burning fuel with a tremendous potential for renewable energy. Wood energy is one energy source that uses a product that is not also a food for humans or livestock. Many farmers could run one or two of their tractors on wood that is largely wasted at present.

The wood-power tractor uses fuel/wood from 1" to 2" limbs cut into 2" to 3" lengths. These limbs come from trees that have been cut for timber and firewood. Small cull trees from oak sapling stands and oaks that sprout along fence rows are also used. Many farmers could run one tractor on cull and waste wood from harvesting, thinning, and pruning operations. The preferred fuel wood is from Water Oak (Quercus niger) and Laurel Oak (Quercus laurifolia).

Another fact in favor of wood power is that farmers own and control this source of fuel! This is probably one reason that wood power has not been promoted vigorously by some governmental agencies and major fuel companies. Farmers and other private land owners own over half of all woodlands in the Southeastern U.S., and woodlands cover over half of the states of Florida, Georgia, North Carolina, South Carolina, Alabama, Mississippi, and Louisiana.

The annual regrowth from four acres of woodlands could run one 30 horsepower tractor forever if the tractor ran about 800 hours per year. It takes 22.5 pounds of air dry wood to equal one gallon of gasoline and 25 pounds to equal one gallon of diesel.

Wood harvest at present for the tractor is being done by chain saw and axe. Drying is done by putting the wood in feed bags in an old corn crib. Wood is also being dried in ten bushel bulk vegetable boxes stored under a shed. Fuel harvest machinery and drying for farms needs development.

Bob Hargrave, junior author, is shown fueling his wood-gas "gasogen" tractor.

Wood Power Technology

Wood power (wood gasification) is an old technology. During World War II, many American service men saw "gasogens" or "gen-gas" trucks, buses, cars, and tractors in operation around the world. These vehicles had been converted to run on the gases from wood or charcoal. Fuels included wood, peat, coconut husks, and many other combustible products. Considerable research and development in generator gas was conducted during the World War II era in Europe and Australia. One of the best research publications on wood gas is a translation of the Swedish book, "Generator-Gas, The Swedish Experience From 1939-1945." This book is available from National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. The cost was $18.00 in 1980. Anyone seriously considering construction of wood-burning engines should study this book. This book includes theory, chemistry, wood procurement, design of all components, installation, operation, safety and trouble-shooting. During the gen-gas era about 300,000 vehicles were run on wood and charcoal in Europe. When gasoline again became abundant and cheap, generator gas work was mostly forgotten.

During the 1973 energy crisis, many Americans remembered seeing gasogens in operation and interest in this source of energy was renewed. The junior author had seen wood-burning trucks in Germany during World War II. Information was located on using wood for wood alcohol or gasification. The search led through many old publications and through a few new articles about gasification. Don Post, Professor of Forestry at the University of Florida, was also very interested in wood power. During 1978, Professor Post started on the first wood-burning pick-up truck in Florida. Construction of the tractor gasogen was started in 1979. Since this time, Professor Post and associates at the University of Florida have built and run five different models of gasifiers. The wood-burning tractor was completed in June, 1980, and another one is now under construction.

Wood Gasification Energy

Proponents of wood energy have had considerable difficulty in getting help from governmental circles to conduct research and develop wood gasification. Some interest is now being expressed.

The potential for renewable energy for America from fields and woodlands is tremendous. Trees grown for energy will help clean our air. The by-products and emissions from wood gasification are cleaner than from coal and shale.

It still appears that wood energy development will be dependent on individual effort by those who believe in this source of renewable energy.

Florida has a favorable climate for rapid wood and woody crop energy production. The authors plan to continue active work in wood energy research and development.

BOOK REVIEW

Feeds and Feeding, by Arthur E. Cullison, Reston Publishing Company, Inc., 1979, Second Edition, 595 pp., $15.95.

The second edition of Feeds and Feeding was written primarily to update the NRC nutritive requirements and add new sections to make an improved, more complete text. Sixty-five chapters of feed information, in addition to study questions and problems, tables on nutrient requirements, feed composition, and a glossary of terms related to animal nutrition are included. The fundamentals of animal nutrition are discussed along with the more complicated areas of balancing and formulation of feed rations.

Each area of livestock is discussed: dairy, horses, sheep, swine, and beef. No information on poultry is given. Balancing rations and the feeding of animals in different ages and conditions are discussed. Metrics are used along with the English measures. Pastures and forages are explained along with their production. Chapters in "Feeding Animal Waste" and "Performance Stimulants" are particularly up to date.

The author, Arthur E. Cullison received his B.S., M.S., and Ph.D. from the University of Illinois. He is currently Professor of Animal Science at the University of Georgia. He has done much research concerning animal growth and nutrition which has been published in the Journal of Animal Science. These qualifications reveal his experience and knowledge in the area of animal nutrition.

Feeds and Feeding is written primarily for an undergraduate college course in animal nutrition. It is written above the level of high school students, except for selected chapters. It is an excellent reference book for vocational agriculture instructors and advanced vocational agriculture students.

Reid Ledbetter
North Iredell
High School
Olin, North Carolina

THEME

A Training Program:

Providing For Energy Efficiency In Homes And Small Buildings

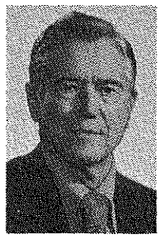
We are running out of fossil fuels. There must be new developments made in the use of alternate sources of energy. This takes time. Meanwhile, it is necessary that we conserve as much energy as possible — at least until new sources can be developed. One of the best places to save energy is in buildings. Approximately thirty-two (32) percent of energy consumed in the United States is used in heating, lighting, and cooling of buildings.

Without reducing our comfort and conveniences appreciably, certain measures may be taken that will save at least 2/3 of this amount, thus reducing the total consumption by 10 percent.

There are many steps involved in saving energy. Some are minor and seem unimportant. Yet all of them must be taken. Secondly, these steps must be taken by all people if the saving is to be significant. This is the 64-dollar question: How can the most people be informed and motivated to participate in this important venture?

There is no better place than in the classrooms and laboratories of our public schools, vocational-technical schools, and junior colleges. There is no substitute for formal training when coupled with hands-on experiences.

There was not available a satisfactory instructional training program for delivering these skills to students and this is why the American Association for Vocational Instructional Materials (AAVIM) in cooperation with the U.S. Department of Energy developed such a program with the title of PROVIDING FOR ENERGY EFFICIENCY IN HOMES AND SMALL BUILDINGS.



By W. Harold Parady and Howard Turner

Editor's Note: Dr. Parady is Executive Director and Mr. Turner is Coordinator and Editor, American Association for Vocational Instructional Materials (AAVIM) with offices in the Agricultural Engineering Center, University of Georgia, Athens, Georgia 30601.

Description of the Program

The project has resulted in a complete training program which consists of three manuals, a student workbook, a teacher guide, and two audiovisuals. The program is described as follows:

Part One: *Understanding and Practicing Energy Conservation* is an 88-page illustrated text explaining the energy dilemma, how energy is used in buildings, and suggestions for conserving energy in buildings.

Part Two: *Determining Amount of Energy Lost or Gained in a Building* is a simplified procedure for computing the amount of energy lost or gained in a building using the ASHRAE method. It contains 66 pages.

Part Three: *Determining Which Practices are Most Efficient and Installing Materials* gives detailed instructions on how to select and apply energy-saving techniques in buildings. There are 88 pages in this volume.

The *Student Workbook* includes questions related to the subject as discussed in the text. Also, laboratory exercises are suggested.

The *Teacher Guide* gives answers to the questions, objectives, tools and materials needed and teaching strategies for classroom and laboratory.

The *audiovisuals* are based upon two of the manuals: Part I, **Understanding and Practicing Energy Conservation in Buidlings,** and Part III, **Determining Which Practices Are Most Efficient and Installing Materials.** Part I consists of 124 slides and 3 cassettes. Part III has 145 slides and 3 cassettes. Both programs have audible and inaudible advance signals.

All five publications are 8½ x 11 inches and are well illustrated in black and white. Each of the three manuals may be used as separate texts. The audiovisuals parallel the two manuals as designated and they are produced in full color.

Single copies of the manual, teacher guide and student workbook are available from the U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830. The audiovisuals are available from AAVIM. Part One lists for $85 and Part Three, $98.

Using the Training Program

The training program is designed to educate secondary and post secondary level students and individuals in the importance of conserving energy. It also provides for developing skills needed in the application of energy-saving techniques that result in energy-efficient buildings. Upon successful completion of this course of instruction, a student will be able to perform at the job entry level.

Alternatives are provided in this program to allow for specific instruction in energy-saving methods and procedures, or for integration with construction courses. It may also be used for self-paced instruction.

When taught as a separate course, it can be used two ways: (1) for a workshop or seminar lasting 5 days or longer, and; (2) for a semester course in classroom instruction.

Table I. General Recommendations For Energy Efficiency in Residences (HUD, 1978)

Climate Winter Degree Days	Heating Fuel	R-Values Ceilings	Walls	Floors
Warm 0 - 1000	Electricity	11	11	11
	Fossil Fuel or Heat Pump	19	11	——
Moderate 1001 - 2500	Electricity	22	13	13
	Fossil Fuel or Heat Pump	19	11	——
Cold 4501 - 7000	Electricity	30	13	19
	Fossil Fuel or Heat Pump	30	13	13

Table II. Insulation Values

Thickness, 3½ inches	R-Value
Vermiculite or Perlite	2.1
Fiberglass	2.4
Mineral wool	2.4
Cellulose fiber	2.7
Polystyrene (white)	3.0
Urea-formaldehyde	3.1
Polyurethane	4.6

Examples of Contents

One of the jobs taught in the program is selecting and installing insulation. For example, recommendations are given for R-Values in cold, moderate and warm climates (Table I) and R-Values for different insulations are given (Table II). Illustrations show where the insulation should be installed (Figure 1) and how to do it (Figure 2).

Contents of Parts One, Two and Three

Contents of the training programs include the following:

Part One:

I. Understanding the Importance of Energy
   - A. What is Energy?
   - B. What are the Primary Known Sources of Energy?
   - C. What are the Major Uses of Energy?

II. Developing a Concern for Saving Energy
   - A. How Long Will the Present Supply of Fossil Fuel Last?
   - B. What are the Prospects for Alternate Sources of Energy?
   - C. What Effect May the Energy Situation Have on the Individual?

III. Understanding the Use of Energy in Buildings
   - A. How Energy is Used in Buildings
   - B. How Geographic Locations Affect Energy Use in Buildings
   - C. How Design and Construction Methods Affect Energy Use
   - D. General Recommendations for Energy Efficiency in Buildings

IV. Care and Maintenance of Energy-Efficient Buildings

V. Developing Energy-Saving Habits

Part Two:

- A. Terms Used to Measure Energy in Buildings
- B. Understanding Heat Losses and Gains in Buildings
- C. Estimating Heating Loads in Buildings
- D. Special Applications for Estimating Cooling Loads in Buildings
- E. Estimating Cooling Loads in Buildings
- F. Determining Cost Benefits of Using Energy-Saving Practices

Part Three:

I. Determining Which Practices are Most Efficient and Economical
   - A. What Site to Choose?
   - B. What Design to Use?
   - C. What Materials of Construction to Use?
   - D. What Type and How Much Insulation to Use?
   - E. What Type of Vapor Barrier to Use?
   - F. What Type and How Much Weatherstripping and Caulking to Use?
   - G. What Type of Windows to Use?
   - H. What Type of Doors to Use?
   - I. What Type of Heating Equipment to Use?
   - J. What Type of Air Conditioning to Use if Needed?

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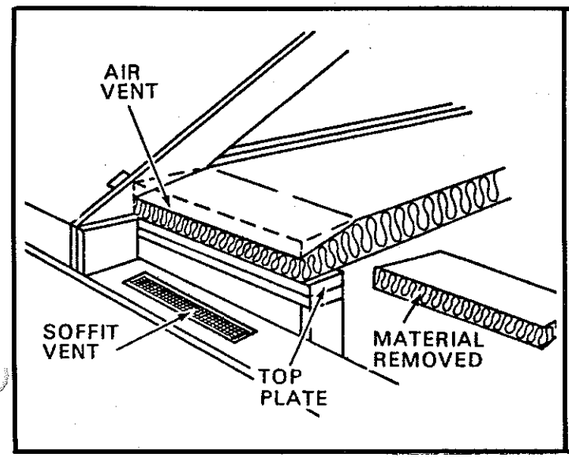
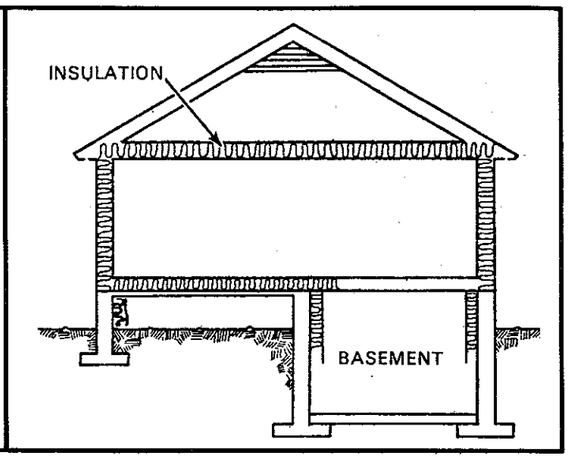




Providing For Energy Efficiency In Homes and Small Buildings

(Continued from Page 11)

K. What Type of Ventilation to Use?
L. What Type of Lighting to Use?
M. What Type of Water Heater to Use?
N. What Type of Plumbing to Use?

II. Installing Energy-Saving Materials
A. Installing Insulation
B. Installing Vapor Barriers
C. Installing Weatherstripping and Caulking
D. Installing Storm Windows and Doors

III. Improving Efficiency of Equipment
A. Improving Efficiency of Heating Systems
B. Improving Efficiency of Cooling Systems
C. Improving Efficiency of Ventilating Systems
D. Improving Efficiency of Lighting Systems
E. Improving Efficiency of Plumbing Systems
F. Improving Efficiency of Appliances and Equipment

THEME

Put Energy in the FFA Program of Work

Current energy problems in this country are hot topics in the agricultural community. Costs of fuel and other energy forms are of major concern to ranchers and farmers. An FFA program that will provide ideas to reduce the energy costs of farming will be most welcome in any agricultural community.

Program of Work Activities

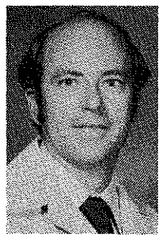
A major responsibility to insure that an energy conservation program will be successful is to initiate an awareness campaign. Energy conservation is not as simple a problem to solve as limiting our use of petroleum and "reducing our dependence on foreign oil." Some alternatives are as costly or even more expensive than the petroleum products that they replace. For example, gasahol, because of the cost of grain and the energy required to obtain the end product, may make the alternative fuel a higher cost than gasoline.

An awareness program may consist of several activities to better inform the public of energy costs and conservation methods. Several ideas for energy awareness activities are:

1. Conduct inspection surveys to identify sources of wasted energy on farms in homes.
2. Sponsor a community energy fair.
3. Set up demonstration farms to illustrate energy-saving practices.
4. Prepare a fact sheet that points out sound management practices which reduce energy costs.
5. Prepare a chart that compares and contrasts advantages, disadvantages, and costs of synthetic fuels with petroleum fuels.

Instructional Strategies

For an energy conservation awareness project to be effective, the vocational agriculture teacher will find a need to first instruct the students in solving energy problems. Information and problem-solving units of instruction may be added to the curriculum. However, an effective way to teach energy topics without expanding an already bulging curriculum is to incorporate energy conservation and management problems into existing units being taught. Enterprises which involve energy input in the production process provide opportunities to discuss and solve energy problems. Some examples are:



By Carl L. Reynolds
Editor's Note: Dr. Reynolds is Assistant Professor in the Department of Vocational Education at the University of Wyoming, Laramie, Wyoming 82071.

1. Planning housing for livestock.
2. Planning and designing the farmstead layout.
3. Selecting tillage practices for crops.
4. Selecting tractors and machinery.
5. Planning irrigation systems.
6. Servicing and maintaining tractors and machinery.
7. Improving the farm residence.
8. Selecting and installing electric motors.

Ideas for Instruction

Vocational agriculture teachers have been teaching energy conservation principles for years. A strong management program includes the costs of fuels in production and ways of reducing these costs. Some examples of management decisions that influence energy consumption on the farm are:

1. Minimum tillage practices
2. Tractor maintenance and tuneup
3. Machinery selection
4. Insulation for farm buildings
5. Farmstead windbreaks
6. Use of herbicides and pesticides
7. Measuring the efficiency and use of irrigation pumps
8. Record keeping

Energy Management Ideas

Several simple practices can be used to effectively manage energy problems in farm production. One method is to maintain fuel consumption records on farm vehicles and self-propelled machinery, using the sample records shown in Figures 1 and 2.

Figure 1. Vehicle Fuel Use Record — Vehicle No. _____

DATE	ODOMETER READING	GALLONS FUEL	QUARTS OIL	MPG

Figure 2. Tractor/Self-Propelled Equipment Fuel Record — Model No.__

Date	Hour Meter When Filled	Gallons Fuel	Fuel Consumption Per Hour	Field Operation	Depth

Another practice is to utilize agriculture engineering extension staff to assist in determining irrigation pump efficiency. A sample irrigation pump efficiency record is shown in Figure 3.

Figure 3. Irrigation Efficiency Test Record

DATE	WATER FLOW GPM	LIFT	ENERGY USE PER HOUR	EFFICIENCY PERCENT

Other approved practices include:

1. Selecting fuel tractors and using the Nebraska tractor tests.
2. Attach hay conditioners to swathers to reduce the number of trips over the field.
3. Keep ensilage choppers well maintained and adjusted to reduce fuel costs.
4. Consider alternative fuels when costs are an advantage over conventional fuels.
5. Utilize wind and solar power for pumping water and keeping stock watering tanks thawed.

Include Energy Conservation Every Year

An FFA program of work can include energy conservation activities every year. Sound programs may include a variety of activities involving the acceptance of approved practices ranging from conventional procedures to some of the newer ones such as solar power and alternative fuels. The public relations benefits from a well-organized program should be far-reaching. But, most importantly, a successful program of work activity on energy conservation will develop from a sound instructional program that develops in students the ability to make sound management decisions.

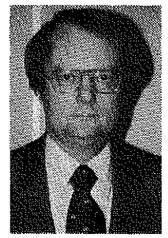
ARTICLE

Vo-Ag Students Use Sun Power

In a small rural area of northern Alabama, passive solar greenhouses are being used by vo-ag students as part of their supervised occupational experience, for home improvement projects, and for adult classes. In addition, they are helping to conserve energy. These multi-use structures have been an outgrowth of a project started by the vocational agriculture program at Section High School.

The first three greenhouses were constructed with funds and recycled materials gathered from throughout the community. Later, a grant from the Department of Energy provided funds for students to construct a 10′ x 60′ greenhouse attached to the vo-ag building. Interest in the project grew as people in the community learned of the success and benefits of the solar greenhouses. To date, 22 solar greenhouses have been constructed and placed in operation. Several of the greenhouses have been constructed as a community service by vo-ag students for families with low or fixed incomes.

The solar greenhouses being constructed in this community consist of



By Gordon D. Patterson and Jerry Holcomb
Editor's Note: Dr. Patterson is Assistant Professor of Vocational and Adult Education at Auburn University, Alabama 36849. Mr. Holcomb is Vocational Agribusiness Teacher at Section High School, Section, Alabama 35771.

lean-to type structures, 10 to 12 feet wide and up to 60 feet long. They are often attached to the south wall of a house or mobile home.

Constructing a Solar Greenhouse

Construction factors necessary for good greenhouse performance are: (1) unobstructed to the sun during the day, deciduous trees are an asset for summer shading and pose no problem for winter sun; (2) good ceiling, foundation, and west wall insulation; and (3) adequate drainage.

The attached greenhouse allows heat to be transferred into the house through openings (windows, doors or vents) to supplement the home heating system. The heat is also stored during daylight hours to provide night time heat for the greenhouse. Heat is "stored" in 55 gallon drums painted flat black, filled with water, and placed in the greenhouse. As the sun goes down and the air inside the greenhouse cools, heat is released from the drums and provides heat for the greenhouse. In addition to the drums, other solid objects in the greenhouse, such as concrete, limestone floors and walls store heat.

No mechanical device is used for the heating system; hence, the term "passive solar greenhouse." This system provides sufficient temperature to

(Continued on Page 14)

Vo-Ag Students Use Sun Power

(Continued from Page 13)

maintain the greenhouse for the growth of plants. For example, recent data indicate that the minimum temperature inside the greenhouse was 52 degrees when the outside temperature dipped to 25 degrees. This temperature differential could be improved by utilizing more heat storage drums or mass.

Conserving Energy

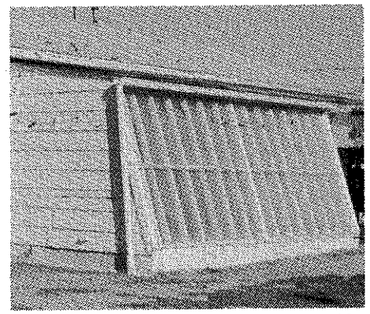
Heat from the solar greenhouse that supplements the home heating system has proven to conserve energy bills. In homes monitored during the first winter that the greenhouses were used, a savings of 17 to 25 percent was realized in home heating. A more substantial savings can be achieved as the home owners become more proficient in the use of passive solar greenhouses.

In addition to supplementing the home heating system, some of the home owners have added the capability to heat or pre-heat water used in the home. The "water heater" consists of a tank painted flat black and installed on top of the greenhouse in an insulated housing that can be closed as the sun goes down or simply a tank mounted inside the greenhouse with good exposure to the sun. This solar tank is plumbed into the conventional hot water system. Water in the solar tanks reaches 115 degrees on a sunny day, reducing the amount of energy required to heat water for the home.

Supervised Occupational Experience

Obviously, a greenhouse offers the opportunity for vo-ag students to add to their SOE programs. Owners of solar greenhouses have been enjoying fresh tomatoes, lettuce, broccoli, cucumbers, potatoes, various other leafy vegetables, and herbs during the winter months, and selling the surplus produce. The biggest cash crop for the owners of these relatively small greenhouses has been bedding and seedling plants for spring planting. In addition to the vegetables produced in the greenhouse attached to the Vo-Ag department, a small colony of bees has been added which not only polinates the plants but provides a crop of honey.

Among the subjects covered in adult classes have been solar greenhouse construction techniques, conserving energy with the solar greenhouse, managing the solar greenhouse, and organic gardening.



Lean-to passive solar greenhouse constructed by students.

Initial costs of the 21 solar greenhouses constructed for home use in the community have ranged from $203, utilizing recycled materials, to $1,600 for one using all new materials on the front of a brick home.

Interest Resulted in Other Solar uses

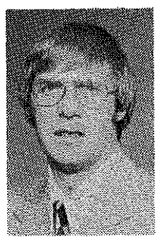
In addition to solar greenhouses, people in the community have begun to seek other ways of utilizing the sun's energy. Small window box solar collectors are being used to supplement the home heating system and with some modification are being used to dry fruits and vegetables.

ARTICLE

Avoid Information Overload:

Keep Energy Education in Proper Perspective

By Van Shelhamer
Editor's Note: Mr. Shelhamer is Instructor in Agricultural and Industrial Education at Montana State University, Bozeman, Montana 59717.



It is amazing how an FFA awards program and a challenge from the President of the United States altered the course content of many vocational agriculture programs. Vocational agriculture teachers have frantically searched for new information so their students could learn about energy conservation and receive recognition for energy conserving programs. While this happened, established course content and other activities sometimes went unattended. Rather than eliminate a part of an instructional program, many areas of instruction were undoubtedly covered much faster in order to make way for new energy related materials.

As a result of this and other energy-type programs, students may begin to suffer from "information overload." Information overload is the condition that begins to exist as more and more information is given to the student, resulting in less of the information being retained and applied. Students may lose interest and become uncertain about what they should know and do. Teachers are also affected as they begin to question what happened to the student and end up blaming them for their poor academic performance.

Energy education has a place in the vocational agriculture curriculum, but it must be kept in proper perspective. That place can only be determined after the teacher has sought answers to several questions:

1) Do I as a teacher want to take the time to keep up to date in the energy area?

2) What are the needs of my students and community?

3) How does my energy instruction duplicate or reinforce what the rest of the school is doing?

4) Will it be necessary to eliminate important concepts to make room for energy education?

5) Will elimination of the concepts affect employability of the students?

6) What important concepts have been eliminated by other teachers that now must be covered in vo-ag to meet the needs of students?

Only after these questions have been satisfactorily answered should you consider incorporating energy education into the vocational agriculture program.

With tillage absorbing more than one half of the energy expended annually on American farms, conservation of energy begins with proper adjustment of tillage equipment.

Energy Education in Vo-Ag

Energy education has a place in vocational agriculture if it is made a part of the existing instructional units and not made into an instructional unit by itself. An instructional unit on crop production could include the following information:

The energy required to produce fertilizers.

Why proper application of fertilizers conserves total energy use.

Energy requirements of different cropping systems.

The crops that will play an important role in the production of bio-fuels.

The effects of competition among manufacturers of bio-fuels for crops that are used for human food.

Why irrigation water use and conservation are energy saving techniques.

An instructional unit in animal science might include the following:

Feeding of bio-fuel wastes.

Methane production from animal wastes.

Space requirement for confined livestock.

How solar energy could be used for the space heating of livestock facilities.

Cost-effectiveness of a heat exchanger to pre-heat the water used in a dairy facility.

An instructional unit in agricultural mechanics could contain the following:

Fuel saved by an engine tune up.

Comparative fuel consumption among different pieces of farm machinery.

Effects of excessive speed.

Effects of building location and design on space heating requirements.

Insulation as an energy saver.

These are a few examples of how energy education could be incorporated in the present vocational agriculture program without requiring major curriculum changes.

Accepting the Challenge

When former President Jimmy Carter asked the FFA to "take the lead amongst all youth groups in the United States in our war for energy security" he was asking the local vo-ag teacher to become involved in energy education. I suggest that we accept that challenge only after considering all the consequences and keep it in proper perspective.

LETTERS

"Letters to the Editor" is a feature to encourage dialogue among readers of the **Magazine.** *Selected letters will be printed without comment or editing. Your letter will be welcomed! (Send letters to: Editor,* The Agricultural Education Magazine, *P.O. Drawer AV, Mississippi State, MS 39762.)*

Editor:

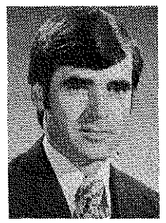
I am writing about an article I read in the January, 1981, issue of The Agricultural Education Magazine. Although the theme on "Time Management" was very interesting to me, I felt the article by William C. Tindall, Jr. was especially gratifying to read. What Mr. Tindall said about the utilization of time was very accurate. I, as a student, find Mr. Tindall's comments true. I must not abuse valuable time or else I will lose it and suffer the consequences.

Mr. Tindall's article also mentioned religion. I found the article stimulating when I read how religion and religious activities can still play an active part in the life of a teacher. Being a student and looking forward to teaching and being involved in a church, the Tindall article gave me more hope in reaching my goals.

Sincerely,
Clinton Zellmer
Agricultural Education Student
University of Illinois-Urbana

ARTICLE

State-Level Structure For Administering Agricultural Education



By Kirby Barrick, Jr., and J. Robert Warmbrod

Editor's Note: Doctors Barrick and Warmbrod are in the Department of Agricultural Education at The Ohio State University, Columbus, Ohio 43210. Dr. Barrick is Assistant Professor, while Dr. Warmbrod is Professor and Chairman.

The administration of agricultural education programs from the state level has become a growing concern of agricultural educators for a number of years. Recently, the trend seems to have been away from specialist supervisors for vocational agriculture within the state department of education and more toward generalists.

Two main thoughts appear to be commonly accepted by teachers and supervisors of vocational agriculture across the nation. First, it has been generally agreed that state-level supervisors of vocational agriculture are becoming generalists, with responsibilities for areas other than agricultural education. Secondly, the status of vocational education, including agricultural education, has diminished within the state education agency.

The Study

As part of a recent study,* the administrative structure for vocational education for the 50 states was investigated. One of the purposes of the study was to determine the characteristics of state-level administrative structure for vocational education within state departments of education. An instrument was designed to collect information from the head state supervisor of agricultural education in each state regarding state-level administrative structure and how state supervisors of vocational agriculture work with local teachers and local programs of vocational agriculture. From the data, three criteria were identified to be used in categorizing states on the basis of state-level administrative structure for agricultural education.

Responsibilities of State Supervisors. The responsibilities of state supervisors of vocational agriculture was one criterion used to categorize states. From the data it was determined that in 30 states, state supervisors of vocational agriculture have responsibilities only in vocational agriculture. In the remaining 20 states, state supervisors have additional responsibilities. These additional responsibilities include such things as evaluation of all vocational programs, career education, vocational curriculum development, and local plans. Supervisors of vocational education programs in these 20 states appear to be generalists by job description.

Location of Agricultural Education. A second criterion that was identified to categorize states was the location of agricultural education in the state education agency hierarchy. Specifically, the study investigated the position of the head state supervisor of vocational agriculture and the chief person responsible for vocational education. In 19 states, the head supervisor for vocational agriculture reports directly to the state director of vocational education or an equal title.

In the remaining 31 states, the head state supervisor reports to someone other than the state director of vocational education. The head state supervisor in those 31 states reports to an instructional services director, program operations chief, deputy vocational director, vocational instruction coordinator, or similar title. The title of the position immediately above the head state supervisor of vocational agriculture varies considerably. In most instances, however, the position is either in secondary education or is at least one level below the state director of vocational education.

Number of Teachers. The number of vocational agriculture teachers in the state was a third criterion used to categorize states. Three groups were developed: less than 100 teachers, 100 to 400 teachers, and over 400 teachers. Based on this criterion, there are 18 states in the less-than-100 group, 22 states in the middle group, and 10 states in the large-state group.

The information regarding size of state was used in connection with the other two variables to determine any patterns. Table 1 identifies the number of states grouped by responsibilities of state supervisors, location of agricultural education in the state education agency, and number of teachers in the state.

Conclusions

State-level administrative structure does not seem to vary substantially among states with less than 100 vocational agriculture teachers. In one-half of those states, state supervisors of vocational agriculture have no responsibilities in addition to vocational agriculture, and one-half of the states do have state supervisors working in additional areas. In the 18 states with less than 100 teachers, 10 head state supervisors report directly to the state director of vocational education and in eight states the head state supervisor does not report directly to the state director of vocational education.

The middle-size states (100 to 400 teachers) reported little difference in responsibilities of state supervisors. In 12 states there are no additional responsibilities and in 10 states there are additional responsibilities for state supervisors of vocational agriculture. In two-thirds of the states the head state supervisor does not report directly to the state director of vocational education. In the remaining one-third the head state supervisor reports directly to the state director of vocational education.

In the large states (over 400 teachers), supervisors in only one of the ten states have responsibilities in addition to vocational agriculture. In eight of the 10 states, the head state supervisor reports to someone other than the state director of vocational education.

Table 1

Number of States Grouped by Responsibilities of State Supervisors, Location of Agricultural Education in the State Agency, and Number of Vocational Agriculture Teachers

Number of Vocational Agriculture Teachers	State Supervisors Have Other Responsibilities		State Supervisors Have No Other Responsibilities	
	Head Supervisor Does Not Report Directly to Vocational Director	Head Supervisor Reports Directly to Vocational Director	Head Supervisor Does Not Report Directly to Vocational Director	Head Supervisor Reports Directly to Vocational Director
Over 400	1	—	7	2
100-400	8	2	7	5
Less than 100	7	2	1	8
Total	16	4	15	15

Implications

Several implications are indicated. First, it appears that the larger states, those where there are more than 400 teachers, may not need to add other duties to the vocational agriculture responsibilities of state supervisors because of the number of teachers and programs to be served. States with fewer than 400 teachers may be adding additional responsibilities in order to justify state personnel.

For small states there appears to be a relationship between responsibilities of state supervisors and the location of vocational agriculture in the state agency. Where state supervisors have no other responsibilities, the head state supervisor generally reports directly to the state director of vocational education. In small states where state supervisors have responsibilities in addition to vocational agriculture, the head state supervisor does not report directly to the state director of vocational education.

Unanswered Questions

As the data are analyzed, several questions arise. Why are state education agencies organized the way they are? Does organization of the state agency reflect a philosophy of education or economic influence? What implications does state-level administrative structure have for the role of state supervision of vocational agriculture?

*Barrick, Jr., R. Kirby. "The Relationship Between State-Level Administrative Structure and the Role of State Supervisors of Vocational Agriculture." Unpublished Ph.D. Dissertation, The Ohio State University, 1980.

ARTICLE

Ag Educators, It's 1981: Do You Know Where Your Industry Is?

By Myron A. Eighmy

Editor's Note: Mr. Eighmy is Farm Management and Agribusiness Instructor at the University of Minnesota Technical College, Waseca, Minnesota 56903.

The days of the agricultural educator are filled with classroom teaching, on the job visitations of students, administrative paperwork, chapter activities, and professional meetings. We often get so busy with the job that we are unable to take time to take a good hard look at what we are teaching, why we are teaching, and whom we are serving.

Stop! Think for a minute! Ask yourself these questions:

1. Am I teaching the same things I was teaching 5 or 10 years ago?
2. Have I allowed time to upgrade my technical knowledge of agriculture?
3. Has agribusiness and farming in my area changed faster than my teaching in the past 5 years?

Now, consider this: If you were to have a fire in your office and all of your textbooks and curriculum guides were destroyed and you couldn't replace them, what would you teach? Where would you get new teaching materials? Who would be your most valuable source of up-to-date agricultural know-how? Do you know what your graduates will need to know?

If you haven't done so lately, now is the time to visit a farmer, an agribanker, and an agribusiness firm manager to ask them what they think needs to be taught to today's youth who desire a future in agriculture. You are certain to find that these professionals will point out the need for teaching the student capital management skills along with basic technical agriculture knowledge. But, they will stress that these need to be taught from the proper perspective. They need to be taught in relation to current economic and world conditions.

Breaking Out

What you have taught in the past may not meet the needs of your students today and in the future. How can you determine if your curriculum is in tune with the needs of students and industry?

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Ag Educators, It's 1981: Do You Know Where Your Industry Is?

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First, break out of the rut! Don't rely solely on summer agricultural teachers conferences or University night classes to keep you informed about what is happening in farming and industry. Most conference programs are professionally beneficial, but usually the time allocated for in-service instruction is too little-too late. Go where the action is! Attend crop and field days sponsored by local agribusiness firms. Look around and, more importantly, **listen** to the topics of conversation among the farmers and agribusiness people. They are often voicing the major management concerns that are foremost on their minds. As you look around, keep a keen eye open to identify new technological advances that may also have an impact on what you should be teaching. If you do listen carefully and keep a keen eye open, you should become aware of what people in industry think is important to them and their employees.

Read agricultural periodicals. Farm magazines are a major source of information for farm managers and agribusinessmen. They summarize recent university research and government regulation policies.

According to a study done by Gary L. Vasin, Extension Editor at Kansas State University, one-fourth of all news copy in nationally circulated magazines and one-fifth of the copy in state and regional farm magazines, comes from land grant university sources.[1]

Look at the advertisements in these periodicals. The chemicals, seeds, and the other products are the best that research and technology have to offer. These are the inputs from which farmers and agribusiness must choose. Don't ignore or underemphasize the impact of politics on local agriculture. Ag educators usually do not have a strong political science background, but then, neither do the farmers and business people who see their businesses and lives affected daily by political decisions.

Keep in Touch with Today

Finally, evaluate your curriculum content. Are you teaching what industry thinks you should teach or what someone else thinks you should teach? Determine how the things that are important for students to know can be effectively taught. Determine what needs to be deleted from your curriculum. Use your advisory committee of farmers and agribusinessmen as a resource for curriculum development. During committee meetings, take time to review the present curriculum and ask for ideas and innovations that you can use in your courses.

You may wish to select a portion of your curriculum to review each meeting as a regular agenda item. Discuss curriculum priorities as well. Perhaps you take nine weeks to teach students how to write numbers in an account book, only to find that you have run out of time when you should be teaching how the records can be used for day-to-day business analysis and planning. Maybe you spend more time talking about last year's farm records analysis than about business alternatives.

Beware of teaching "basics" that may have no place in your students future. Are you sure that it is important for a student who will be operating a $90,000 combine to know the nomenclature of a jack plane rather than the nomenclature of a combine? In short, perhaps you are teaching some wrong things for your area of the state or too much trivial busy-work. You decide!

Set Priorities

Another thing you must not overlook is setting priorities for yourself. Take courses that will have a meaningful impact on you and your instructional program. Don't take courses that are easy credits just to get the credits. Look for courses and workshops centered around current topics such as farm fuels and energy use, government programs and policies, computers and electronic management tools, and farm and business planning. Associate yourself with positive forward-thinking professionals in business and education. Avoid those who constantly preach doom and gloom or promote outdated curriculum.

Pace of Change

In 1968, Clarence E. Bundy noted that American agricultural technology doubles each ten years and that many practices and machinery are obsolete in five years.[2] If this is true, curriculum materials written five and ten years ago were directed at many practices and machinery that may have reached obsolescence.

The pace of change in agriculture is faster than ever before. Ag educators must recognize this and react to the changes by evaluating and updating curriculum. Priorities for instruction and in-service training must be established. Leaning on past curriculum and programs may not be the way to best serve students and the community's needs.

Subject matter must be taught in the context of current agricultural economics and political conditions. We need to be certain that we continually work to be in tune with the needs of industry, and that our colleges and universities are providing future teachers with the skills and knowledge needed to meet the needs of agricultural education, or we will most certainly fail in our efforts to have excellent and meaningful programs.

Put yourself in this position. You are a student who wants a career in agriculture more than anything else. You will have to compete with America's best to get the job you want. What would you need to learn to enable you to successfully step into modern agriculture? It's 1981 — do you know where your industry is?

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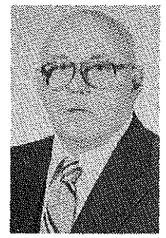
Constructing a Weld Tester

By FORREST BEAR
Editor's Note: Dr. Bear is Professor in the Department of Agricultural Engineering at the University of Minnesota, St. Paul, Minnesota 55108.



Students first learn welding fundamentals and then make sample welds. To complete the educational process, the student should test the samples. A weld may have a satisfactory appearance but might not be strong enough to make the welded section as strong as the other parts.

A three ton hydraulic jack will make a 180 degree bend on 2 butt welded ¼" x 2" x 4" test plates. Thicker plates would require pressures greater than safe loading for a three ton jack.

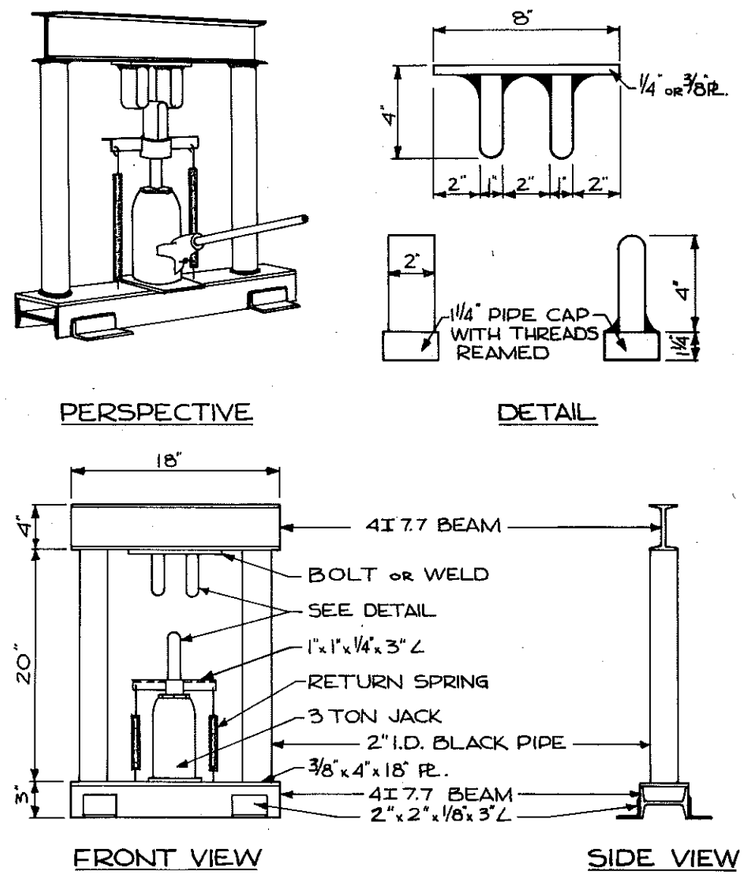
The dies for the tester can be made from solid stock or laminated from a combination of smaller members. Use a hard surfacing eletrode to build up the ends and then grind the desired shape.

When a test plate is being bent, there is considerable force and will spread the two upper dies apart, therefore, it is necessary to make heavy fillet welds by using striger beads.

A 1-¼" black iron pipe cap will usually fit over the swivel plate on most three ton jacks. A safety screen could also be fabricated for the test joint area.

Bill of Material

2 - 2" x 20" I.D. black iron pipe
2 - 4 I 7.7 - 18" beams
4 - 2" x 2" x 1/8" x 3" H.R. angle iron
1 - 4" x 8" x 1/4" plate (top dies)
1 - 1¼" black iron pipe cap, threads, reamed
3 - 1" x 2" x 4" H.R. mild steel (could be laminated)
2 - 1" x 1" x 1/4" x 3" angle iron (support for return springs)
2 - return springs



ARTICLE

Special Needs People In My Classroom: Students, Teacher, or Both?

By Karl O. Polson

Editor's Note: Mr. Polson taught vocational agriculture in New Hampshire. He is currently a graduate student at Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061.

A major thrust of education in recent years has been in the direction of disadvantaged and handicapped students and well it should be. Agricultural educators have traditionally been among the leaders in recognizing good ideas whose times have come. The renewed emphasis being placed on special needs education is no exception. However, in the rush to be among the leaders we may sometimes lose sight of where we have been and where we are going. A pause for reflection is sometimes in order.

Reflections

The value in this exercise is as much for myself as it is for anyone else. You see, I am a vocational agriculture teacher. Not a great one perhaps, maybe not even a really good one, but certainly not a bad one. I have been teaching for several years and I really enjoy my job. I put a lot of work and effort into it and sometimes lately, I have thought maybe I am working too hard for what I am getting done.

Lately I have begun to realize that I have a whole lot of unanswered questions, questions which bother me. Some of them never occurred to me before. I guess they should have but I was too busy to think about them. My problem? Oh! The special needs kids in my classes, of course. The questions? Here is a whole list.

Who, in my vocational agriculture classes, has special needs today? What am I going to do about them? What can I do to help them? What resources have I got access to that can be effective? When and where do I begin?

Does any of this sound familiar to you? If so, welcome to the club. It is a big group and we have some fine company. Lots of good vocational agriculture teachers have shared this same kind of an experience. Teach for several years, begin to think you have a large number of answers, then suddenly — you realize that you didn't even have the right questions. What do you do? Well, you have just taken step number one. That last question was one of the right ones. Let's see if we can find some answers.

When and Where Do We Start?

The first part of this question is easy to answer. When is now! In fact, when you ask the question you provide the answer by starting the process. Don't delay any longer.

Where to start may be a little harder but, while we have our momentum building, how about finding out where we are and whom we are with. Who are the special needs people in your vocational agriculture class today? Perhaps the first person that should be identified is you, the teacher. The old double entendre about being a disadvantaged and handicapped teacher is really very often quite accurate.

Have you spent much of your life listening to your father, roaring drunk, tear the house up? Have you gone to school without breakfast because there wasn't any? Have you often had trouble studying at night because there wasn't any light or a quiet place? Did your folks often say, "Put that darned old book away and do something useful for a change"? If you can't provide a positive answer to several of these and other similar questions, you may be disadvantaged!

Have you spent a large portion of your life without being able to see or to hear, or maybe to walk? What about eye/hand coordination, have you ever had long term problems with it? Do you have a speech impairment which interferes seriously with your ability to make yourself understood? Do you have missing or immobilized limbs? If you cannot answer one or more of these questions positively, you may be handicapped!

"Disadvantaged? Handicapped? Me? No Way!"

Perhaps, yet, if we have not experienced the problems first-hand our perspective about them and their effects is almost certainly different than the perspective of those who have. Of course, the doctor does not need to contract a disease in order to be able to treat or cure it. However, recognizing the symptoms and knowing the cure are valuable in prescribing the cure. If the teacher cannot understand, or at least recognize, the problem he or she is facing, certainly he or she is disadvantaged and/or handicapped in dealing with it effectively.

While we may not have to personally experience the problems which create a condition of disadvantage or handicap, we must be willing to recognize them and their effects on people if we are to deal effectively with special needs students. This may mean that an adjustment of some of our attitudes about social values and standards is in order. Not change, simply adjustment. Acceptance of one simple precept is necessary. Our standards, priorities, and values are not the only ones that exist nor are they necessarily the right ones. Standards, priorities, and values are right and proper only insofar as they are useful in dealing or coping with a situation.

In many, if not most, cases, the different standards, priorities, and values of our special needs students are highly effective in helping them deal with their everyday situation. These standards, priorities, and values may be necessary for survival in the sub-

culture of which our special needs students are a part. It is not necessary for us to adopt them as our own. But, we need to recognize their validity for others and to try to understand how these standards, priorities, and values may affect a person's performance outside of his or her sub-culture.

Johnny's bad language in class may offend us yet be perfectly appropriate to his home environment. He may well not know any other way to communicate. We may not like this fact, and may indeed not accept it, but we must deal with it. The situation can be improved, but expelling Johnny from the classroom will probably not do it. It solves our immediate problem but leaves his untouched.

Most of us will never be experts at dealing with special needs students, but all of us can and must try to learn some effective strategies. Some of us may never learn to deal effectively with special needs students. That does not excuse us from trying. The job may seem insurmountable. So does the prospect of eating an elephant. However, if we eat it one bite at a time, it disappears. Like eating an elephant, if we work patiently and diligently with special needs students, the results are often amazing. We may begin at a disadvantage in working with special needs students but we do not have to remain at a disadvantage.

Who Is the Special Needs Student?

Many criteria exist for the identification of the special needs student. Many labels have also been used in identifying the student. Let's try to keep our criteria simple for once and not label our students either. Remember, the student is "special" only by our standards, not his or hers.

There is only one really useful criterion by which to determine if a student in our vocational agriculture classes is a special needs student: can (and does) the student achieve at a satisfactory level with the instruction we normally provide for everybody in the class? If the answer is no, the student has a special need of some type. Other criteria may also be applied under specific circumstances. However, as a teacher, if students in my class appear unable to achieve satisfactorily, I want to know why and what they need to help them. Not only the students have special needs, I do as well. Apply as strict criteria as necessary under your program requirements, but keep achievement as the determining factor.

An exception occurs to this criterion. The student that achieves beyond the norm for the class may well be a special needs student also. Altogether too often they are forgotten and their needs go unmet. Be aware of their presence and address their needs also.

Extraordinary Methods

Now that we have identified our special needs students, what kinds of extraordinary methods do we have to use to teach them? We haven't been trained for this kind of teaching and don't know what to do.

Relax a bit, more often than not there is no need for extraordinary methods of any kind. Instead, take a look at everyday teaching techniques used and see what minor changes can be made to help students. Remember, all of our students can learn. All of them can learn essentially the same way and the same things. However, all future learning is based on what we now know and what we have experienced.

People tend to learn what they perceive as important. A child from a home where there are no books, magazines, or newspapers and where the parents cannot, or do not, read is less likely to have well developed reading skills than a child from a home where there is a modest library and the parents read a great deal. Certainly this does not mean that the child from the less advantaged background cannot or will not learn. Motivation is likely to be quite different, however.

Techniques of teaching usually need relatively minor adjustments. Be more careful to include the quiet student in questioning. Be alert to signs of interest or boredom. Do not call attention to the problems of a special needs student needlessly. Present every available opportunity for successful participation to the special needs students. Reward successful participation carefully, compliment it when it occurs. Treat every student equally fair and spread opportunity around rather than confine it to a select few. Encourage your special needs students to contribute to the class. Any special skills they have may be a good place to start. In short, make your classroom a place where students want to be.

Treat all students as individuals and show them that you respect them as persons. Demonstrate a sincere concern and do not try to fool the students. Set standards of performance and maintain them. Note that performance is intended to be the key word. If you expect a certain level of performance from one student, expect the same level from all others as well.

Remember, we are supposed to be preparing students to enter the world of agricultural work. Performance standards applied on a job site are not generally lowered because a worker has a special need. Neither should they be lowered for that reason in our vocational agriculture classes. However, remember the student must have a fair chance to succeed. This may mean we should place greater emphasis on hands-on or psychomotor skills than on cognitive skills in many, even most situations. The ability to perform a job or task is usually much more valuable in the job market than the ability to describe how to perform it. With this type of program emphasis, many more special needs students can achieve in vocational agriculture classes. However, we must not forget our responsibilities as teachers to encourage the development of cognitive skills and abilities also. The three R's are still necessary for survival in this world.

Extraordinary methods? I think not. Good teachers have used them for many years. Vocational agriculture teachers have been especially good at them.

Special Resources Available

FFA has a very important role to play for us in working with special needs students. It is especially important to integrate these students into the FFA program. Opportunities for successful experiences, needed badly by many of these students, abound in the FFA. Involve them, even arrange transportation and alternative ways to pay dues if necessary. But work to get them involved.

A supervised occupational experience program is another resource of vocational agriculture which provides a great source of motivation for students. Special needs students are no exception. This component often makes a difference between whether a student becomes a graduate or a dropout.

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Special Needs People In My Classroom: Students, Teacher, or Both?

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Money is one thing that most students perceive as important. Tie earnings, school credits, meaningful job training, and possibly released time from school together in one package and it is tough to beat. Supervised occupational experience programs can do this for us!

The most important resource, however, is you and me. If we want to be successful at working with special needs students we can be. There is no single formula for success for all teachers. We must each develop our own. Caring, mixed with generous portions of understanding and patience and stirred with good teaching will spell success.

In the final analysis, we must each decide for ourselves who the special people in our classrooms are. It may well be us. Our success in dealing with our individual situations will depend largely on our insight into them and our ability to martial our resources to address them. Special training and techniques are not as likely to determine success or failure in working with special needs students as are the personal qualities and commitment each of us brings to the task.

ARTICLE

Ag Ed Advisory Committee Meets

By Gerald R. Fuller

Editor's Note: Dr. Fuller is Professor and Chairperson of the Department of Vocational Education and Technology at the University of Vermont, Burlington, Vermont 05405. He also serves as Secretary of the National Agricultural Education Advisory Committee.

The National Agricultural Education Advisory Council met March 6, 1981, in the Conference Room of the National Grange Building, Washington, D.C. There were sixteen members and ex-officio members of the Council present, plus ten guests. The agenda included a report by Dr. J. Robert Warmbrod on the primary issues identified at the National Agricultural Education Seminar in July, 1980, a review of actions planned by the profession and, recommendations from the Council as to the importance and appropriateness of the issues as well as the realism of the actions.

The Council reviewed the thirty-two issues identified and prioritized during the National Seminar under the topics of:

I. Agricultural Education as a Part of the Public School System.

II. The Development of Professional Teachers of Agriculture.

III. Adult Education as a Part of Agricultural Education.

The report of the Agricultural Education Division National Seminar Follow-up Committee was discussed. It was the consensus of the Council that the eight projects recommended by the Seminar Follow-up Committee should be implemented by the Agricultural Education Division. The projects are:

1. Develop and validate a mission statement for agricultural education in the United States.

2. Development and adaptation of working models for adult education in agricultural education.

3. Update the position and role of the vocational agriculture teacher in the secondary schools.

4. Develop a plan for implementation of the "standards" which were developed in 1978.

5. Investigate and prepare a plan for postsecondary teachers and programs to become an integral and recognized dimension of the agricultural education profession.

6. Organize a system for utilization of agricultural business, industry, and labor in agricultural education program development and implementation.

7. Update the preparation, supervision, and inservice education for teachers of agriculture to meet their needs in a changing societal and educational environment.

8. Develop models for dissemination of agricultural education concerns and information to state and federal legislators.

The Council discussed the mission of agricultural education in some depth. There was consensus among Council members that agricultural education has always included in its mission the "Aquisition of knowledge and skill in agriculture for:

avocational or general education purposes,

orientation to and exploration of occupations requiring knowledge and skill in agriculture,

preparation for advanced study of agriculture,

preparation for employment or self-employment in occupations requiring knowledge and skill in agriculture, and

upgrading and retraining of persons employed or self-employed in occupations requiring knowledge and skill in agriculture."

During the discussion, Council members suggested that the primary emphasis of agricultural education should be on items 4 and 5 with supplemental emphasis placed on items 1, 2 and 3. It was brought out that goals of a program may be "vocational" but goals of a student may not be "vocational." It was suggested that a high quality agricultural education program may serve students who have a variety of goals. The teacher should know the goals of each student and should help each student grow regardless of whether or not the student's goal is "vocational."

A more detailed report of the Advisory Council meeting and the discussions which took place will be contained in the minutes of the meeting. The minutes will be distributed to the head state supervisor and head teacher educator for agricultural education in each state and to the presidents of state vocational agriculture teachers associations.

FFA PAGE

BOAC Programs at Work

More than 1,300 U.S. communities received millions of dollars of community development aid this past year through projects carried out by the Future Farmers of America. Three examples of Building Our American Communities (BOAC) programs are described here.

By Karen C. Bachmann

Editor's Note: Ms. Bachmann is in Corporate Public Relations, R.J. Reynolds Industries, Inc., Winston-Salem, North Carolina 27102.

Restocking Pheasants

As part of a national effort to revitalize small and rural communities, young people of tiny Fort Jones, California, population 516, are working to "save the pheasants" in their town.

The pheasants used to live off grain grown by farmers in the Fort Jones area. But times changed, and as farmers switched crops to meet market demands, the bird population dwindled.

Today, 14 high school students, members of the local chapter of the Future Farmers of America, are raising pheasants to restock the area as part of the FFA's Building Our American Communities project.

More than 40 FFA chapters — an estimated 2,000 students — are conducting BOAC projects in California this year. BOAC is a national FFA community development program established ten years ago. Projects in California range from park development to downtown revitalization to improving services for the elderly.

Dennis Clark, the Fort Jones FFA advisor, said of the local project, "People like wildlife here and pheasants are really pretty birds."

Raising the birds could have presented a number of obstacles, including finding money to support them. "But we had no trouble at all," Clark said.

Working with other members of the community, a BOAC project requirement, Clark said the project drew a variety of local support. "The local Fish and Game Commission helped fund a pen for the birds with money they had collected from fines. Farmers donated food. We received donations from people who don't even like to hunt."

Clark said FFA members will release the birds in the spring, a non-hunting season, "when man will be one less predator they'll have to face." Food shouldn't be a problem, he said. Many farmers are growing grain crops again.

Revitalizing a Town

In Morrow Bay, California, population 8,000, vocational agriculture instructor Mel Souza said his BOAC project, which won a national gold emblem award in 1979 from the FFA, has more than doubled in size this year because of support from nearby civic groups.

FFA members helped revitalize the town's business areas by building planter boxes and planting flowers. This year, they are also helping to develop a nearby state park by upgrading hiking trails for joggers and putting up exercise stations.

"We're considered a rural town, primarily a fishing community with some tourist trade," Souza said. "But we've gotten key community groups interested in what we're doing, and the project has snowballed. It felt great to win the gold, but more important, the project has really added to our community."

BOAC projects are carried out by thousands of FFA members in 50 states. Nationally, projects range from improving high schools to crime prevention to park improvement, all in an effort to make small and rural communities better places in which to live.

Constructing a Classroom

When the school board of Franklin, La., last year couldn't afford a new, $32,000 classroom, the board looked to an unusual source for the support it needed.

High school students from the local Future Farmers of America chapter built the classroom, saving the school board $26,000. Then the students went on to complete a $25,000 school baseball field for $10,000, and saved another $15,000.

This year hundreds of miles away from Franklin in Randolph, N.Y., FFA members from Randolph Center School are developing a nature pond for the Randolph Children's Home.

As rural America faces an explosive rate of growth, at least one answer to the subsequent demand for new services is being discovered in its own backyard.

Since 1971 FFA members have participated in Building Our American Communities (BOAC) projects implemented in high schools across the nation as a way of solving some of the problems rural and small communities face.

With 500,000 members and 8,500 chapters, the FFA is developing an eager community development army that last year alone completed 1,300 local projects.

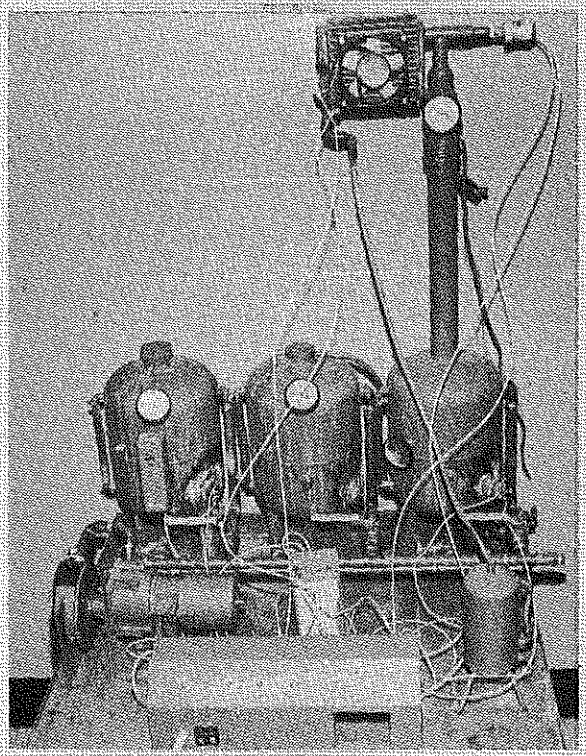
Ted Amick, national BOAC program coordinator, described how the program works. "We ask FFA chapters to identify community problems and resources, work with other community groups and seek solutions to these problems."

Indeed, if BOAC is one answer to the needs of growing rural and small communities, it comes just in time. Preliminary census counts indicate a substantial growth in small towns and rural areas, on the edges of metropolitan areas as well as isolated places far from cities.

Each November, 150 FFA chapters receive national BOAC awards at the FFA convention, the largest high school convention in the country. Of those, four are selected as regional winners. One of the four will be selected national winner at the convention.

Stories in Pictures

Alfred J. Mannebach (second from left), Associate Professor at The University of Connecticut, is shown during a visit to headquarters of the Cooperative Extension Service, Rio de Janeiro, Brazil. Severino de Melo Araujo (left) is a doctoral student working under Dr. Mannebach's direction.



Many changes are taking place in the use and development of fuels for farming. A model alcohol plant (shown here) can be useful in teaching farm fuel production. (Photograph courtesy Myron A. Eighmy, University of Minnesota-Waseca.)

Moisture testing is an important crop management practice. Electronic moisture testers enable students to quickly determine moisture contest of feeds and grains. (Photograph courtesy of Bruce McKee and Sharon Andrews, University of Minnesota-Waseca.)