SPECIAL ISSUE

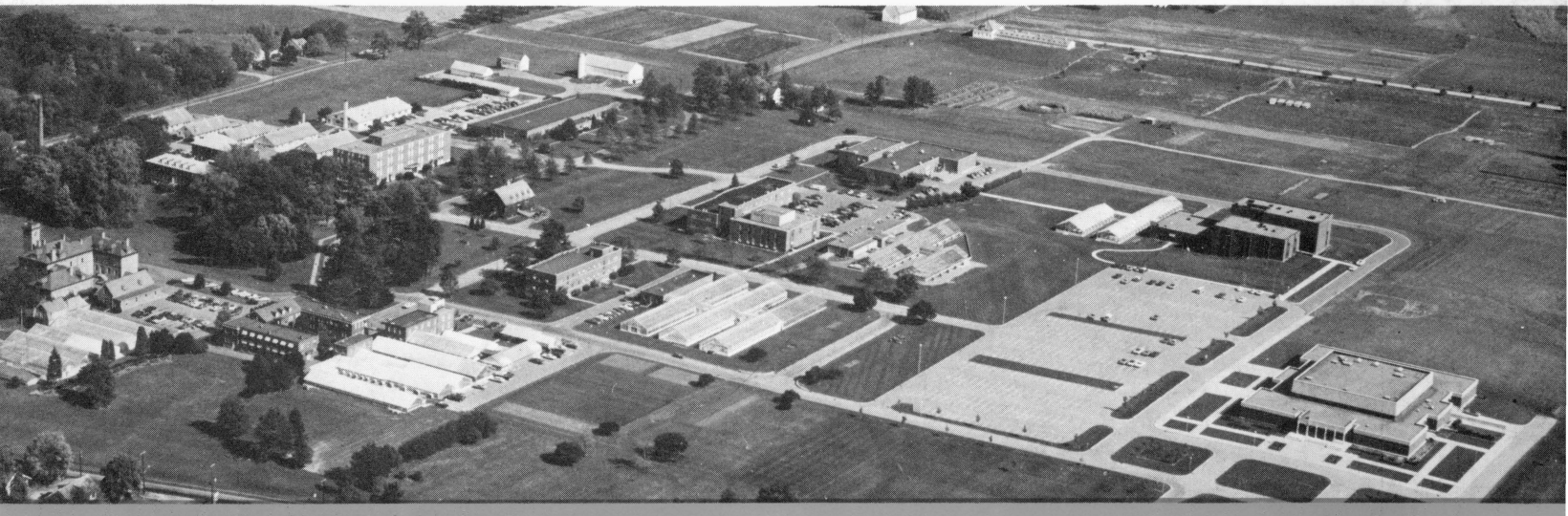
ohio report

JULY-AUGUST 1975

Research at OARDC 1882-1975

RESEARCH SHOWCASE-open house '75

AUGUST 7-12



OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

WOOSTER, OHIO

ohio report ON RESEARCH AND DEVELOPMENT IN AGRICULTURE, HOME ECONOMICS, AND NATURAL RESOURCES

Vol. 60, No. 4 JULY-AUGUST 1975

Special Issue: Agricultural Research in Ohio 1882-1975

The first state agricultural experiment station in the United States was established in Connecticut in 1875. As part of a nationwide centennial observance of that event, this issue of Ohio Report highlights Ohio research past and present, in words and pictures.

Eight years after Connecticut's facility began, the Ohio Agricultural Experiment Station (now OARDC) was established. During the ensuing nine decades, the Research Center has been a major contributor to the growth of Ohio agriculture.

Today, all the states have agricultural experiment stations. If Ohio's accomplishments, reviewed in this issue, are added to the work of all these other institutions, it becomes easy to understand why Americans are the world's best-fed people.

On the Cover: Corn shocks in foreground and the city of Wooster in the background surround the Administration Building and the old Dairy Barn, which was razed in 1965, in this early picture Charles E. Thorne, the Station's first director, stands in one of his early wheat plots. Down with the old and up with the new—OARDC Director Roy M. Kottman and then Associate Director William E. Krauss prepare for the Station's name change in 1965. Aerial photo of the Wooster campus today shows the results of the OARDC's unprecedented growth during the last 20 years.

Both sides of the medallion commemorating the centennial of state agricultural experiment stations were designed by Newell H. Hartrum, OARDC graphic artist.

Be a part of the centennial celebration and attend OARDC's Research Showcase —Open House '75. The Wooster campus will be open for your inspection from 1-8 p.m. on August 7-12.

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Editor: Keith H. Remy. **Editorial Assistant:** Eugene P. Hettel. **Artist:** Newell H. Hartrum. **Photographers:** Clarke L. Robey, Glenn L. Berkey. **Editorial Board:** Roy M. Kottman, Director; Clive W. Donoho, Jr., Associate Director; Richard R. Davis and Charles Johnston, Assistant Directors; Austin E. Showman, Agricultural Editor; Edward H. Roche, Associate Editor; Keith H. Remy, Assistant Editor.

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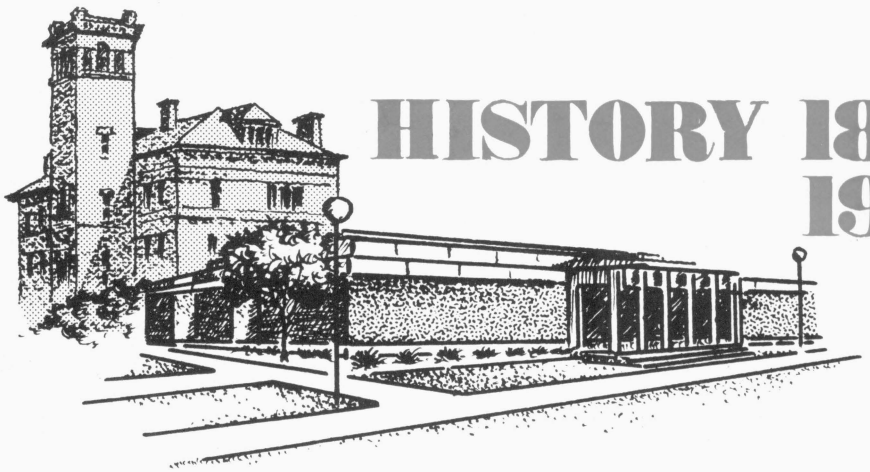


HISTORY 1882 1975

G. P. HETTEL and W. E. KRAUSS

If Charles E. Thorne could visit the Ohio Agricultural Research and Development Center today, he would be pleased at the progress made since 1887—the year he became the Station's first full-time director.

Just 5 years before, in 1882, the Ohio General Assembly enacted legislation establishing the Ohio Agricultural Experiment Station on 30 acres of land at The Ohio State University in Columbus. During those early years, two professors, W. R. Lazenby and N. S. Townshend, divided their time between the classroom and directing the work of the Station on a very limited budget.

In 1887, Congress passed the Hatch Act authorizing the establishment of an agricultural experiment station in each state and territory and appropriating $15,000 annually for support of the station. These new stations were to be departments of agricultural colleges, unless the states (such as Ohio) had previously established independent experiment stations. With the federal grant, it became possible to hire Charles E. Thorne as a full-time director.

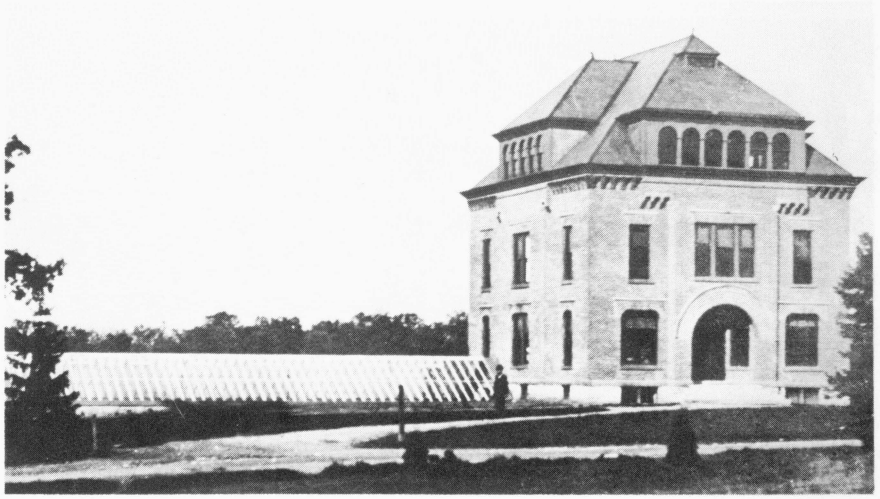
Under the Hatch Act reorganization, the University trustees turned over the tillable portion of the University's farm to the Station. Within 3 years, the City of Columbus had paved streets on two sides of the farm and had run two large sewers through it. The territory on all sides was rapidly being filled with houses. In addition, the land was not representative of Ohio soils in general and plots were often flooded out by the nearby Olentangy River.

New site purchased

For these reasons, the General Assembly authorized the purchase of another site. Warren, Clark, and Wayne Counties bid for the Station. Wayne County's $85,000 offer was the highest and so 470 acres of rich farmland were purchased just south of Wooster.

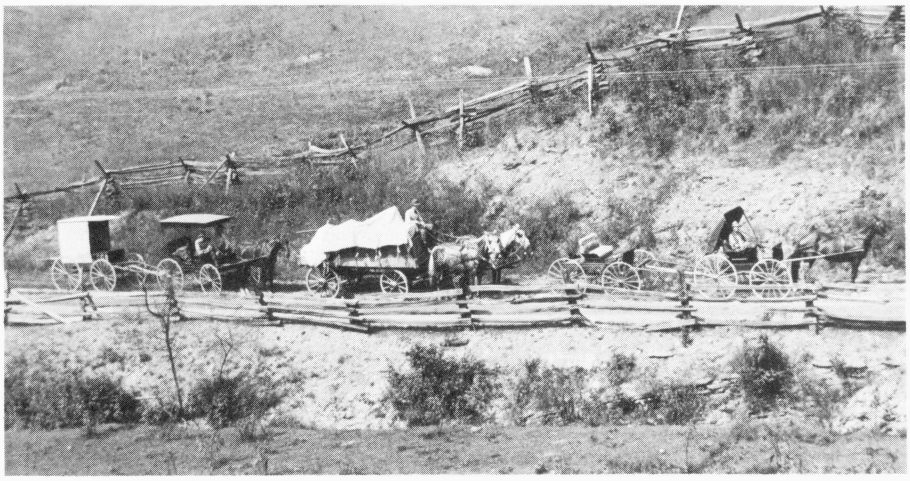
Wayne County had proposed to raise the money through real estate tax funds and a bond issue. However, the Ohio Supreme Court ruled is was unfair to tax local residents for a program which would benefit all Ohioans. So the $85,000 debt was assumed by the entire state and Wooster still became the home for agricultural research in the Buckeye State.

The Station headquarters were moved from Columbus to Wooster in September 1892. The construction of buildings at the new site was delayed because of the court litigations involving Wayne County's taxing plan to acquire the Station. However, during the next 5 years, several miles of substantial fence were built, 26 miles of drain tile were laid, orchards were planted, two buildings were erected from stone quarried on the

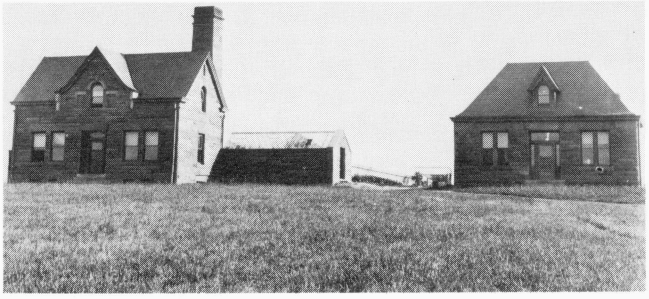


The Ohio Agricultural Experiment Station's first building was erected on The Ohio State University campus in 1888.

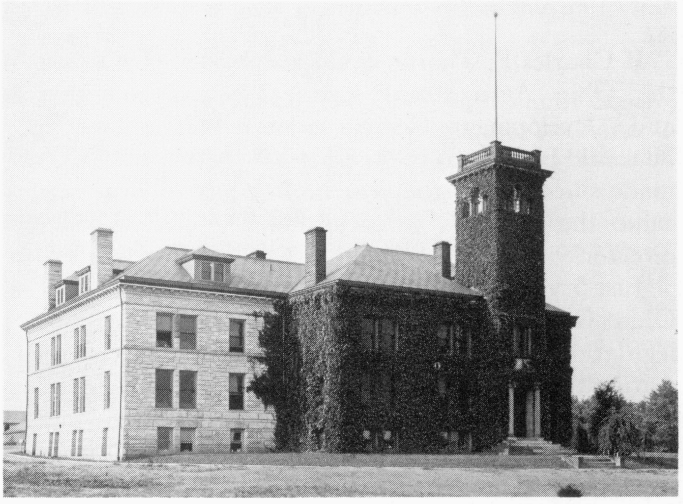
Gene Hettel is an editorial assistant, Department of Public Information, and William E. Krauss is associate director emeritus, Ohio Agricultural Research and Development Center.



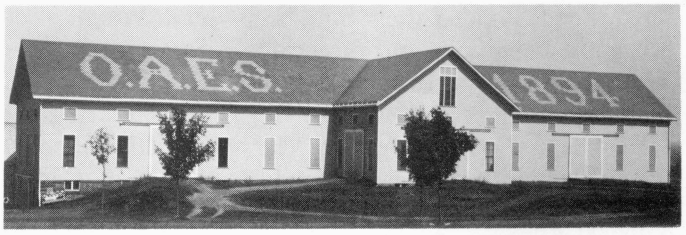
In September 1892, these wagons moved the Experiment Station headquarters from The Ohio State University campus to Wooster in Wayne County.



The buildings above were the first to be constructed at the Station. At left was the office building and boiler house with five greenhouses attached. The biological laboratory (right) was used for studies on insects and plant diseases and is believed to have been the first of its kind in the United States.



The Administration Building (right) was dedicated June 3, 1897. The picture shows the new east wing added in 1913.



The dairy barn (lower right), built in 1894 and razed 70 years later, was the largest and most modern in Ohio. Gerlaugh Hall is now on this site, housing the Departments of Animal Science, Dairy Science, and Poultry Science.

Director Charles E. Thorne, on horseback, explains ongoing research to visitors at Wheat Field Day in 1917. Since then, field days have remained popular, attracting thousands of people from around the state and nation.

People came in buggies and model T's for the 1917 Wheat Field Day (above) and in modern motorcars for the 1968 open house which attracted more than 40,000 visitors to the OARDC campus.

The Arboretum on the OAES campus was dedicated to the memory of Edmund Secrest in 1950. Many of the plantings in the Arboretum, started in 1908, were made by Secrest, the first state forester in Ohio. Pictured are Warner Pomerene (left above), chairman, Board of Control, Secrest's widow, Helen, and L. L. Rummell. Recent additions to the Arboretum include the Shade Tree Evaluation Plot (1965), the Rhododendron Display Garden (1966), and the Holly Display Garden (1972). In addition to testing varieties, these areas attract numerous visitors. Visitors also enjoy the 2.7-acre Garden of Roses of Legend and Romance (right above), which was dedicated in 1970.

farm, a large dairy barn was built, and the Administration Building was completed and dedicated. The infant experiment station was running smoothly by spring 1897.

Before his retirement in 1921, Dr. Thorne had set the agricultural program in Ohio on its upward climb. He and the fine staff he acquired made the name of the Ohio Agricultural Experiment Station known throughout the world.

Thorne became a national authority on soils, soil fertility, and treatment. He recognized the value of geological and soil surveys and encouraged their initiation. Director Thorne saw the variability of crop responses in different environments, and he began research and demonstration areas on private as well as district and county farms.

First field days

Thorne also instituted the Station's first field days to show farmers research results firsthand. In 1917, Wheat Field Days brought nearly 3,000 visitors in automobiles, buggies, and excursion trains. He also established the all-important dairying and animal departments and encouraged early forestry research in Ohio.

Under the Station's second director, C. G. Williams, the important Departments of Agricultural Engineering and Home Economics were established in 1926. Williams' specialty was breeding and culture of wheat, corn, and oats. He was responsible for early Ohio-developed soft red winter wheat varieties such as Trumbull, Gladden, Portage, and Thorne (named for the former director).

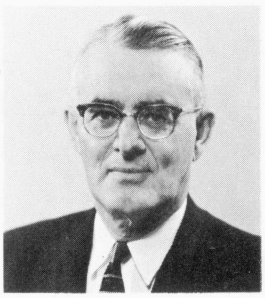
During the Station's semicentennial celebration in 1932, Director Williams estimated that the OAES encompassed 3,400 acres in all—one third at the Wooster headquarters and the balance distributed among 15 district and county farms. In addition, 58,000 acres of state forests and parks were administered through the Department of Forestry. The Station's

Experiment Station Directors

C. E. Thorne
1887-1921

C. G. Williams
1921-1937

Edmund Secrest
1937-1948



L. L. Rummell
1948-1960

R. M. Kottman
1960-

park and forest responsibilities were later relinquished to the Ohio Department of Natural Resources formed in 1949.

Trying financial period

In 1937, Edmund Secrest became OAES director and served 10 years during a trying financial period resulting from the depression. There were no funds available for capital improvements. Secrest is considered the father of forestry conservation in Ohio. He spent 31 years in various programs involving research, arboretums, nurseries, reforestation, fire control, and state parks as a state forester and head of the Station's Department of Forestry. Despite the tight money situation, the OAES continued to make breakthroughs in pest control, animal breeding and feeding, marketing of agricultural products, and human nutrition.

Leo L. Rummell assumed directorship in 1948. He had been an editor at the Station and with Ohio Farmer magazine, a member of the Board of Control, and a public relations counsel in the food industry. Under Rummell, the OAES began the period of its greatest expansion and became more closely allied with The Ohio State University. Rummell was the first to be named dean of the College of Agriculture at OSU as well as director of the Station.

Most buildings on the campus were repaired, some were enlarged. Three new buildings housing the Departments of Horticulture, Forestry, Agronomy, and Agricultural Engineering were built. New substations were established and others eliminated. The Department of Veterinary Science was established as research on diseases of animals and poultry expanded. The ongoing research became big business with a budget going well into millions of dollars.

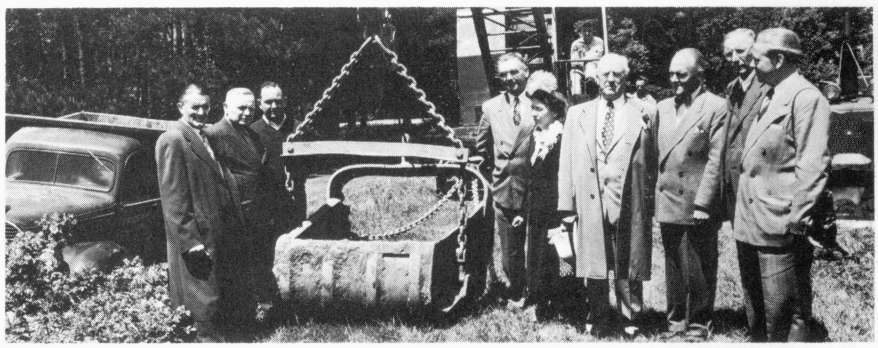
In 1960, Dr. Roy M. Kottman became the fifth OAES director and the seventh dean of the College of Agriculture and Home Economics. Dr. Kottman's basic field is genetics and animal breeding, but his wide experience has involved other fields of agricultural research and education.

Name change in 1965

In 1965, the Ohio Agricultural Experiment Station was renamed the Ohio Agricultural Research and Development Center to better reflect the institution's expanding role. Under Kottman's leadership, Center scientists have continued to produce important basic and applied research findings as well as focusing a considerable effort on new problems concerning environment and energy.

The facelifting of the Wooster campus continued with the addition of major buildings housing the Departments of Animal Science, Dairy Science, Poultry Science, and Plant Pathology; a complex containing a 1,000-seat auditorium, library, and statistics laboratory; grain storage and feed processing facilities; turkey research facilities; agronomy and forestry greenhouses and headhouses; and Research Operations service and storage facilities.

Today, the OARDC encompasses 7,200 acres at the Wooster headquarters, 11 outlying areas, and The Ohio State University. It has a professional staff of 400 scientists and technical assistants; and an annual operating budget of $12 million.



At the May 1949 groundbreaking for Gourley Hall, the new horticulture building, were: new OAES Director Leo L. Rummell (far left), retired Director Edmund Secrest (second from right), and Freeman S. Howlett, chairman of the Department of Horticulture (to the left of Secrest). This initiated a building boom at the Wooster campus extending into the 1970's.

PRODUCTION AGRICULTURE

Ohio agricultural industry converts the products of the fields and forests into food, clothing, and building materials. In this process, it creates an agribusiness complex—farming, manufacturing, distributing, processing, servicing, financing, and transporting.

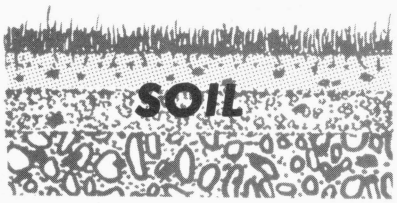
Ohio agriculture is highly diversified with a variety of major commodities produced in practically all regions of the state. Gross annual farm income from 100,000 family farms averages more than $2.4 billion, ranking the Buckeye State 14th among the 50 states. Ohio farmers' assets now total close to $11 billion and their new capital investment is estimated at $800 million a year.

The state ranks high in the production of a number of commodities. It ranks first in the production of greenhouse tomatoes and second in field tomatoes. It is sixth in the production of corn and seventh in soybeans. In the production of livestock and livestock products, Ohio farmers rank seventh in milk production, eighth in hog production, and in the top third for the production of cattle and calves.

Ohio farmers annually produce enough to provide every man, woman, and child in the state with 24 bushels of corn, 63 pounds of pork, 55 pounds of beef, 15 dozen eggs, 13 pounds of poultry, 10 pounds of apples, 3½ pounds of popcorn, 195 quarts of milk, 11 pounds of sugar, and much more.

Much of all this has been made possible through nearly a century of Ohio agricultural research. Dedicated scientists have been responsible for improveing soil productivity, developing new crop varieties, producing leaner and meatier beef and pork, and putting a stranglehold on pests.

Research in these areas has helped keep agriculture a healthy and vital part of the state's economy.

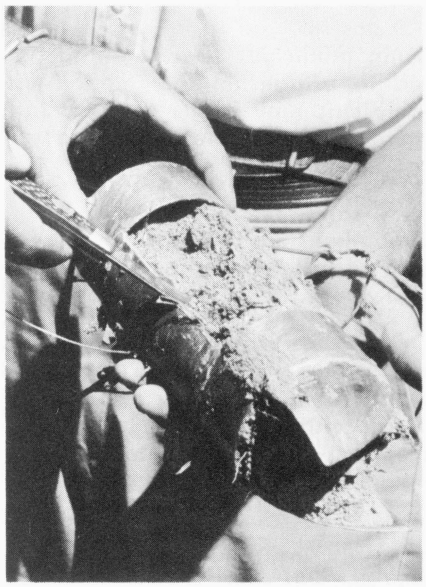


The Ohio Agricultural Experiment Station was among the first in the world to adopt a permanent, unified, statewide policy in soil studies. Outlying experimental farms were first established in 1892 to represent Ohio's various soil types, climate, and prevailing crops. Today, Ohio's major soil types are represented at 13 Research Center locations.

Five-year rotation plots of corn, wheat, oats, clover, and timothy, started in 1893, demonstrated the value of crop rotation, manure, and commercial fertilizers. Studies with lime at the Ohio Station were the first to show that lime counteracted the growing acidity of soil rather than supplying more calcium as was previously believed.

Soil conservation became a concern of Station scientists in the 1920's. By 1932, they were looking into soil erosion problems. As a result, Ohio farmers became familiar with such soil conserving methods as contouring, strip cropping, terracing, and mulching.

In 1935, Soil Conservation Service soil surveys were initiated with Station cooperation to help Ohio farmers select uses suitable for the kinds of soil on their farms. To date, 37 counties have been com-



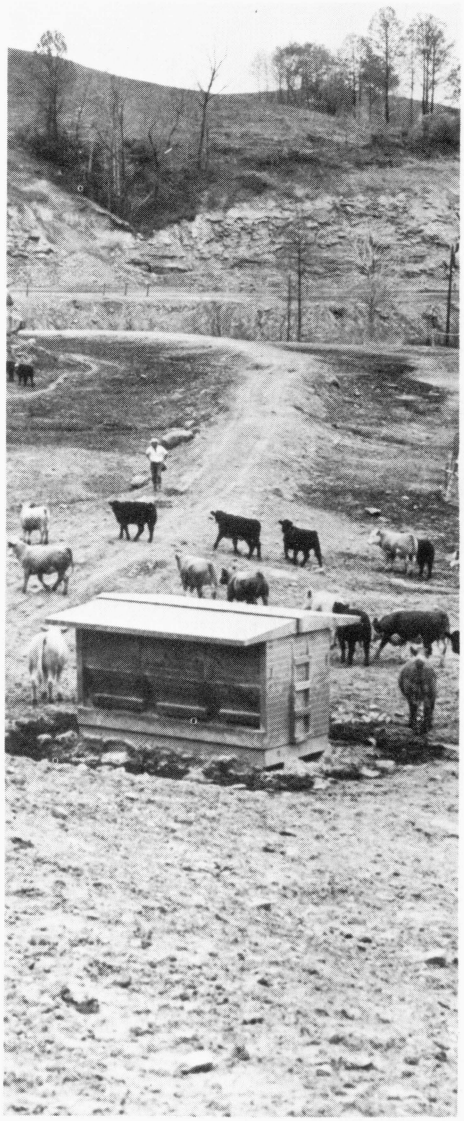
Scientists classify soil samples as part of the county-by-county SCS survey.

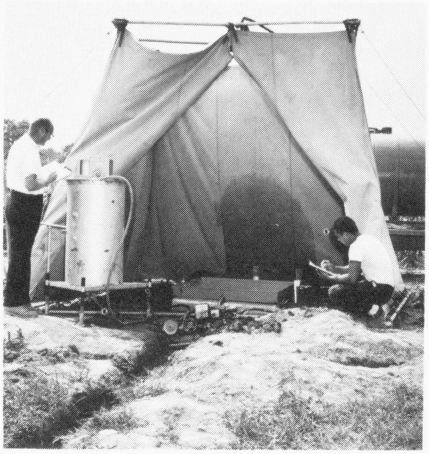
pleted and 18 more are being surveyed. In addition to aiding farmers, these surveys have become important in selecting sites for roads, ponds, buildings, and judging the suitability of land tracts for industry and recreation.

Facilities for soil conservation and hydrology studies were set up at Coshocton in 1935 by the Federal government. The Research Center has cooperated with the Agricultural Research Service in these studies at this North Appalachian Experimental Watershed and just recently assumed responsibility for the extensive field work involved.

Ohio researchers introduced the crop production techniques of no-tillage and double cropping into the state. No-tillage operations, which involve little or no working of the soil before planting, could bring into corn production more than 2 million acres now considered marginal because of erosion.

OARDC agronomists and foresters are investigating whether vegetation will grow on stripmine spoils treated with sewage sludge. If it works, both pollution and sedimentation from the spoils would be reduced, and a practical use found for urban wastes.



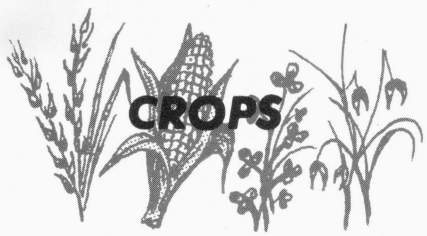


(Clockwise from top) Scientists are using municipal sewage sludge to aid in establishing vegetation on toxic stripmine spoils and making more land available for agricultural production.

Beef cattle feedlots on stripmines in southeastern Ohio are low in cost and add organic matter to the mineral spoils.

OARDC researchers believe that in most years, with proper management, Ohio farmers can increase their profits from the soil by double-cropping—planting no-tillage soybeans following small grain harvest.

A spray infiltrometer or artificial rainmaker is used to study erosion, soil crusting, and the effects of subsoiling and mulching on infiltration and sediment runoff.



Half of the total cash receipts generated annually by Ohio agriculture comes from the food grains, feed and oil crops, fruits, and vegetables grown in the state.

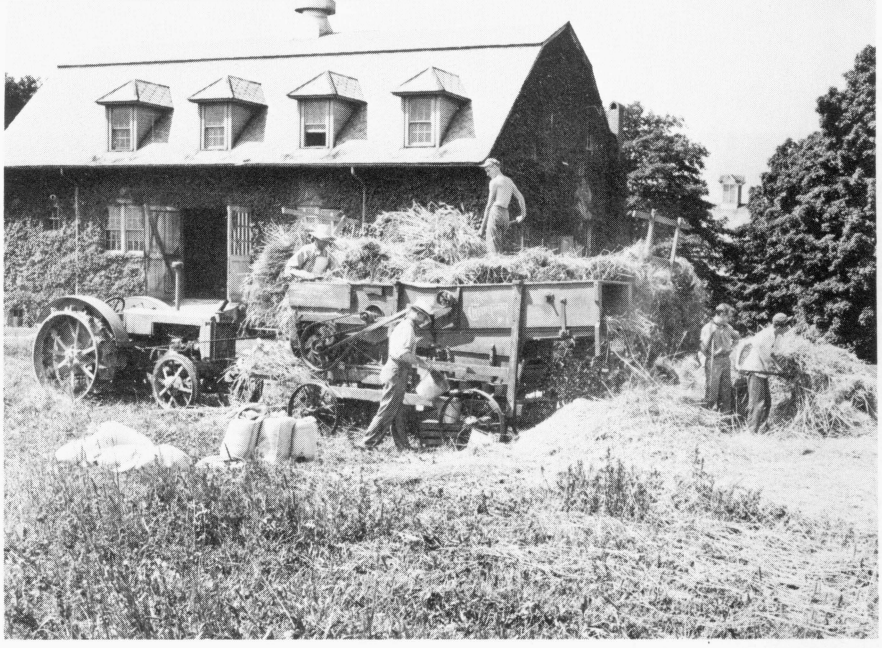
In 1973, soybeans became the largest single source of farm income. This crop was being grown experimentally in 1918, when it was produced primarily for hay. After introduction of the combine, soybeans were grown more extensively for grain. Their value was soon recognized as a protein feed and as a source of oil and industrial products.

Soybean yields of 40 to 50 bushels per acre are not uncommon in Ohio, yet the state average continues below 30 bushels per acre. Scientists are confident that new basic research on nitrogen fixation, light enrichment, and growth modeling with computers will at long last break the so-called yield barrier.

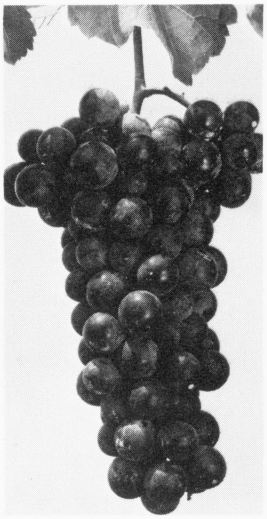
Back in horse and buggy days, a corn harvest of 28 bushels per acre was a bumper crop. Hybrid corn breeding started at the Research Center in 1924 in cooperation with USDA. By 1937, hybrids were becoming common among corn growers throughout the midwest. Today, average corn yield in Ohio is 90 bushels per acre and most of the hybrids planted in this state have resulted from combinations of inbred lines developed at the Research Center. Breeders are now concentrating on incorporating multiple disease and insect resistance into high-yielding lines.

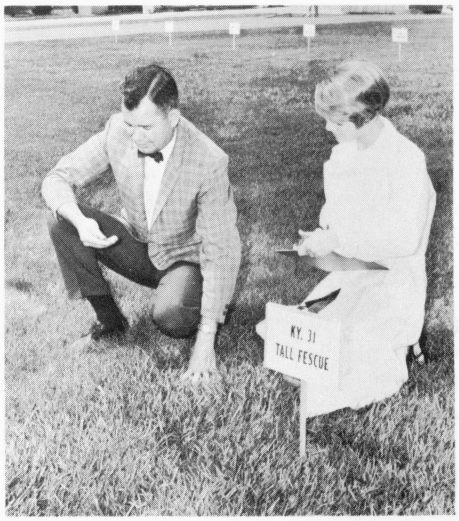
The development of superior soft red winter wheat varieties such as Seneca, Butler, Lucas, Fulton, Thorne, and Logan at OARDC has kept the state the nation's top producer of this type of wheat, which is used to make flour for cakes and cookies. A new high yielding wheat named Ruler, with increased disease resistance, has just joined the other Ohio-developed varieties. Seed for Ruler is now being increased and the new line yielded as much as 92 bushels per acre in 1974 tests (50 bushels more than the state average).

Ohio forestry researchers have worked to improve the state's forests for greater beauty and a well-managed, marketable timber crop. Other important facets of Ohio forestry research have included stripmine spoilbank reclamation in the southeastern counties, wood utilization, helping develop a $15 million Christmas tree industry in Ohio, improving quality and quantity of the state's maple syrup production, and studies involving nut trees and ornamentals.



Ohio has traditionally been a wheat, corn, and soybean producer. Top: Researchers thresh experimental wheat varieties (1920). Lower right: OARDC scientists have found that soybean plants receiving more light form more pods (and more beans) per plant. Lower left: Hybrid corn has been called the greatest single research contribution to increased food production in the United States.





Clockwise from upper left: In 1940, Ohio agronomists developed a legume-planting method called band seeding which led to the widespread expansion of alfalfa and soybean production throughout the Corn Belt.

New technology and new grape varieties, responsible for resurgence of the grape-wine industry, may soon bring $10-15 million of income into southern Ohio.

Lawn grass research has resulted in high quality and attractive turf at reasonable cost.

OARDC floriculturists have developed better shaped, more desirable sized plants with more blooms.

In the early 1960's, OARDC scientists conceived a micro-plot system to measure the effects of radioactive fallout on agronomic crops. Funded by the Atomic Energy Commission, it is the only installation of its kind in the world.

New hybrids of eastern white pine and other pines developed by OARDC foresters have more pest resistance and greater vigor for forest production.

Research has saved two Ohio horticultural crops from virtual extinction. The development of disease-resistant tomato varieties by OARDC plant pathologists (right) saved the greenhouse tomato industry from disaster, helping make Ohio the nation's leader in this field. About 95 percent of all greenhouse tomato varieties grown in the state are Ohio-developed. Research revived the state's declining apple industry. Fertilization and pest control programs established in the 1920's—and Ohio-developed varieties such as Franklin, Melrose, Ruby, Holiday, and Holly—are responsible for today's flourishing apple industry.

Crambe, an oilseed crop closely related to mustard, is just one of a number of new crops which is being evaluated for potential Ohio production.

OARDC agricultural engineers developed a mechanical harvester to eliminate the stoop portion of the harvest of greenhouse-grown leaf lettuce, a crop often grown in rotation with tomatoes.

The seedless cucumber, introduced to Ohio by OARDC horticulturists, may play a major role in increasing the acreage of the state's greenhouse vegetable industry.

Although early Ohio research emphasized soils and orchards, scientists recognized that livestock constituted a large source of income to Ohio farmers. Departments of dairying and animal industry were established by 1910.

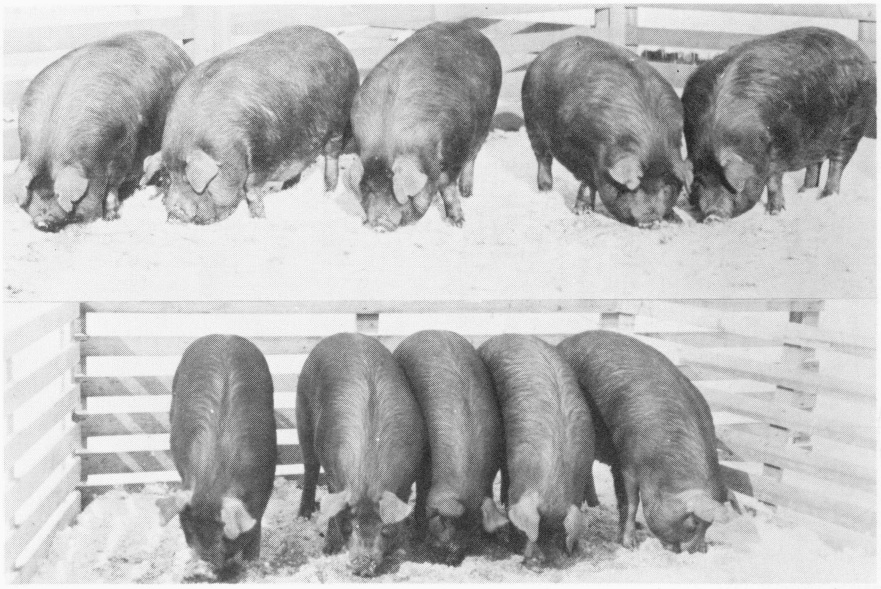
Early feeding trials concerned oats vs. corn for horses, silage for dairy cows, range vs. confinement for hens, and internal parasites of sheep. Through early work on minerals for dairy cows, the Ohio Station attained national prestige for animal nutrition research, a position it holds today.

The present extensive use of grass silage is a direct result of early work by Ohio scientists on preservatives and types of silos.

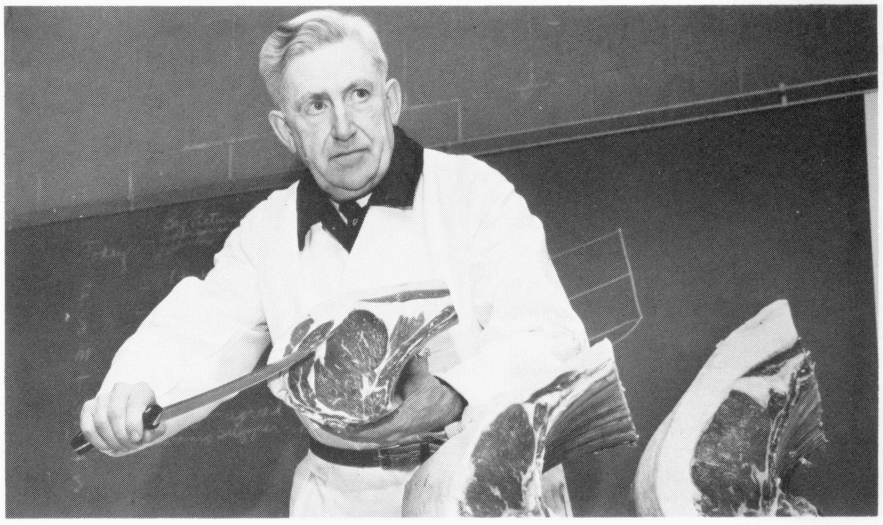
Animal scientists initiated development of the artificial rumen in the 1940's for use in nutrition research. It made use of laboratory flasks and the contents of sheep and cow stomachs to evaluate the changes in feeds brought about by digestion. Studies involving the artificial rumen have led to improved cattle nutrition and better utilization of feeds, especially poorer-quality roughages.

OARDC animal scientists have been working with genetic improvement of beef cattle to increase the efficiency of quality meat production. Breeding research has provided specific answers for Ohio production, since breeding results often differ between geographic areas because of local feed supplies, climate, and other factors.

OARDC poultry scientists have been leaders in developing improved rations for increasing hatchability and growth rate of chickens. They have also pioneered genetic improvement by artificial insemination, making OARDC world famous for its turkey research.

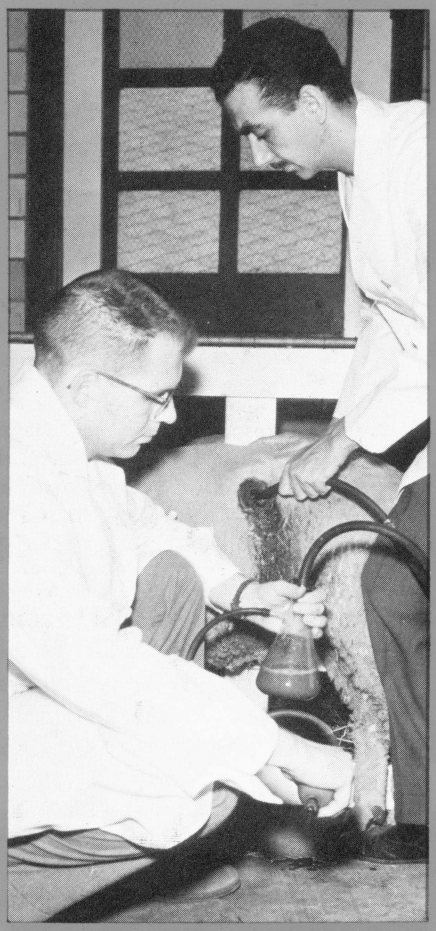


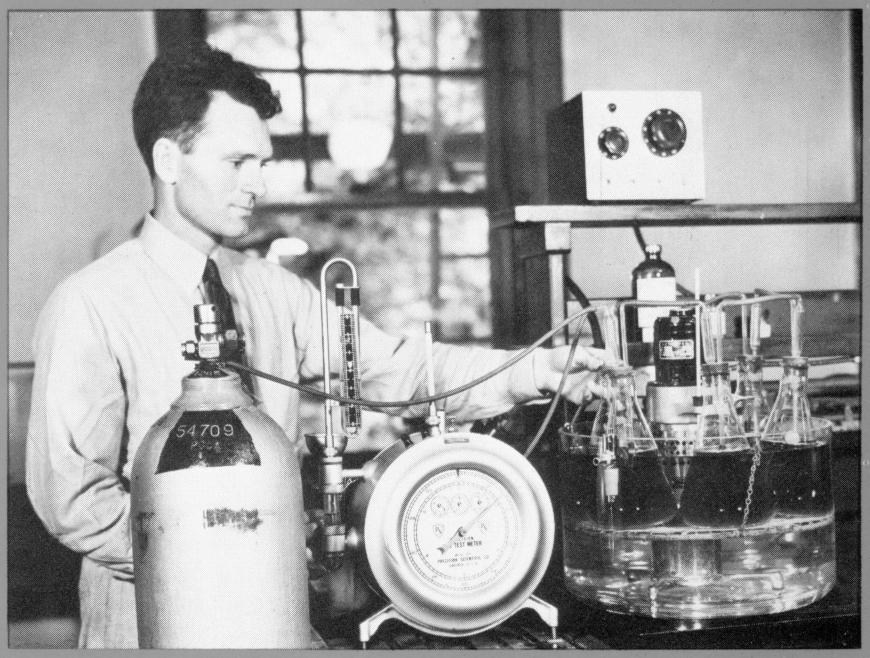
Genetic and nutrition research resulted in the development of leaner hogs which produce the meatier pork preferred by consumers. Thick blankets of fat, apparent in the hogs of the upper portion of the picture, have long been a thing of the past. Below, a scientist shows a lean cut of meat—a result of Ohio research.



In 1970, Ohio dairy scientists successfully tested a procedure enabling dairy cows to give milk without motherhood. By injecting natural hormones into problem breeders, they were able to induce lactation in many animals.

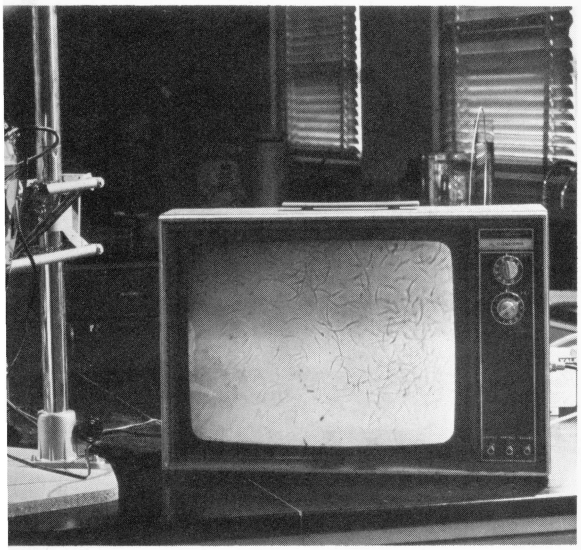
Agricultural engineers and animal scientists worked together to design and build a confinement sheep barn—the first of its kind in the country. Researchers are now evaluating the barn's automated manure handling and laborsaving feeding techniques and measuring performance of sheep and lambs.



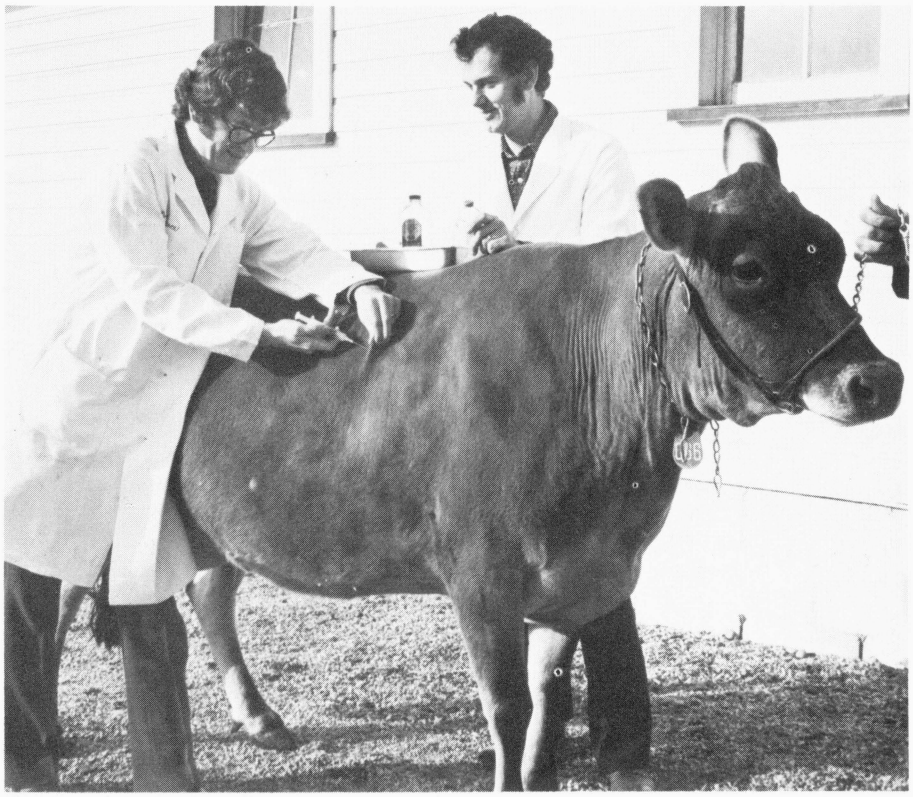


Fistulated sheep (left) and cattle (right) provide rumen bacteria for evaluating changes brought about in feeds by fermentation in the artificial rumen (above).

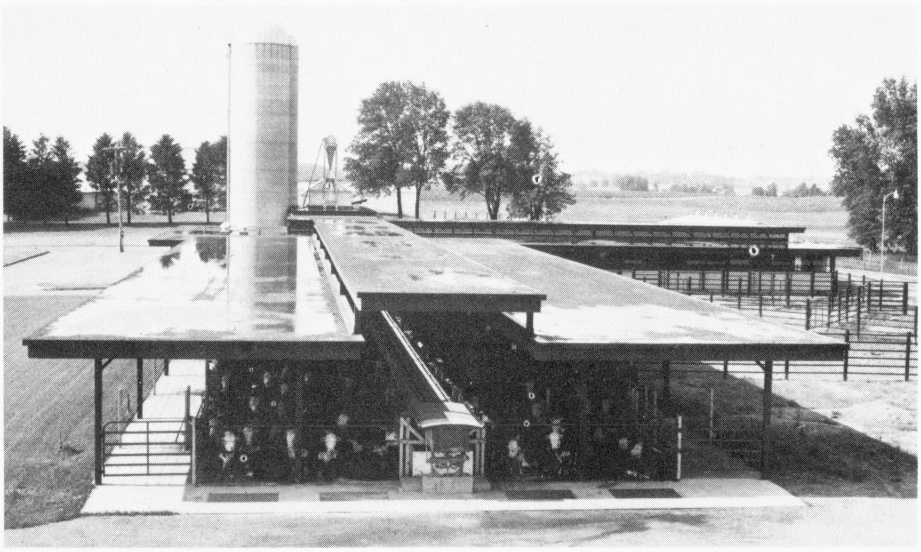
Closed circuit television (below) is teamed with a light microscope to observe and evaluate turkey spermatozoa. Such studies have enabled scientists to develop ways to extend storage life of turkey semen up to 2 or 3 hours for artificial insemination upon which the turkey industry depends.



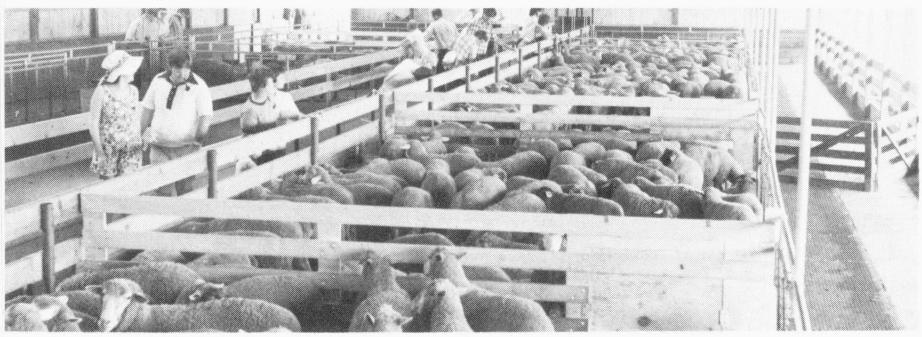
OARDC animal scientists have crossed French-originated Charolais bulls (above) with popular Hereford and Angus breeds to come up with cross-bred animals which produce quality meat more efficiently.

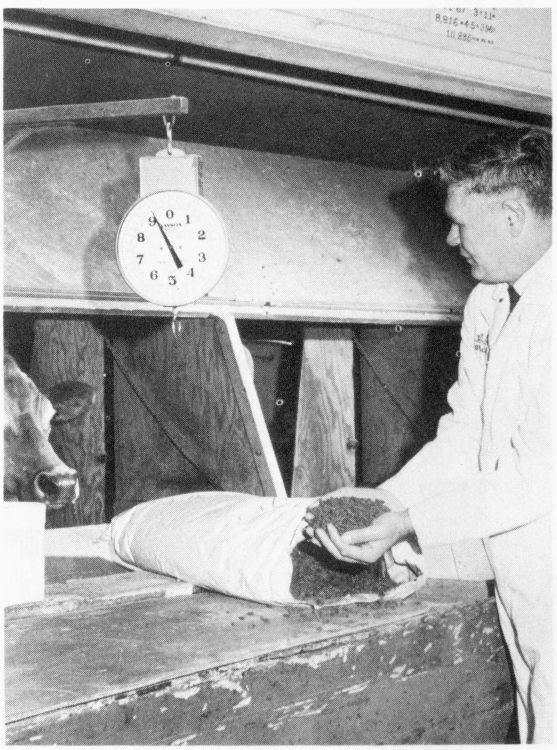


Inducing lactation in high milk producing dairy cows unable to have calves will save them from the slaughterhouse and may also enable heifers to help pay their feed bill by producing calves before they go into full milk production.

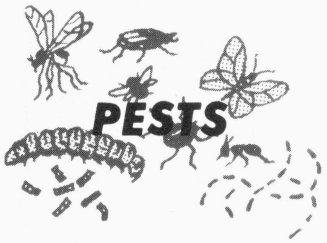


The automated beef cattle feeding unit (above) and the confinement sheep barn (below) are two unique research facilities at OARDC. The beef unit design features facilitate cattle handling and provide accurate controlled feeding.





A pelleted form of alfalfa and urea (Dehy-100) was developed by OARDC dairy scientists to raise the amount of nonprotein nitrogen (urea) which can be economically and safely fed to high producing cows to meet their protein needs.



Losses to insects, diseases, and weeds pose a serious threat to a state's agricultural production. In spite of tremendous strides in control of these pests, there is still a great waste of agricultural resources because of them. OARDC scientists have been on the front lines of the war against pests for nearly a century, and they are continuing the battle with new strategies for effective control and prevention measures.

Insects continue to be a major pest. OARDC scientists were the first to attack these creatures with insecticides from airplanes. Many effective pesticides have been developed, but after decades of research, the scientists have become convinced that only combined effects of cultural, chemical, and biological control measures can safely and successfully keep these major pests in check.

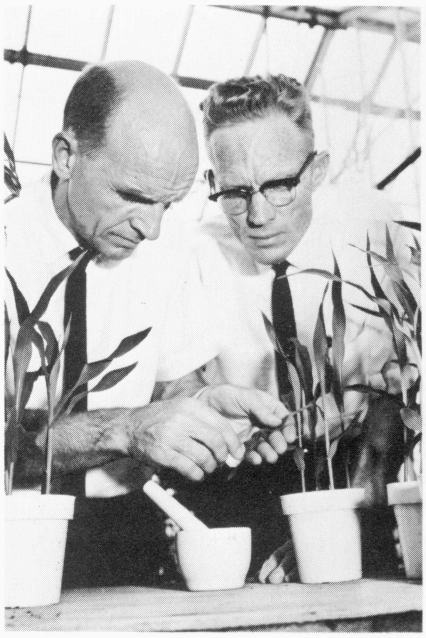
OARDC scientists have been on the forefront in combatting animal diseases. They were the first to show that high doses of vitamin D can reduce incidence of milk fever in dairy cows. They have also developed a better understanding of the causes of such diseases as mastitis and bloat in dairy cows as well as baby pig diarrhea, hog cholera, transmissible gastroenteritis (TGE) in swine, shipping fever in cattle, baby lamb pneumonia, and respiratory diseases of turkeys.

Research emphasis in the fight against livestock and poultry diseases has shifted strongly towards prevention. Studies are aimed at developing effective herd health programs utilizing preventive drugs and vaccination.

OARDC has become internationally known for plant virus research. Extensive virology studies were triggered by the discovery of maize dwarf mosaic virus in Ohio cornfields in the early 1960's. Ohio scientists have identified several MDMV strains as well as other corn viruses and they have been developing corn lines resistant to these viruses. Two such inbred lines were released in March 1974.

Because of Ohio's leadership in corn virus research, the OARDC library has become a collection center for world literature on this subject.

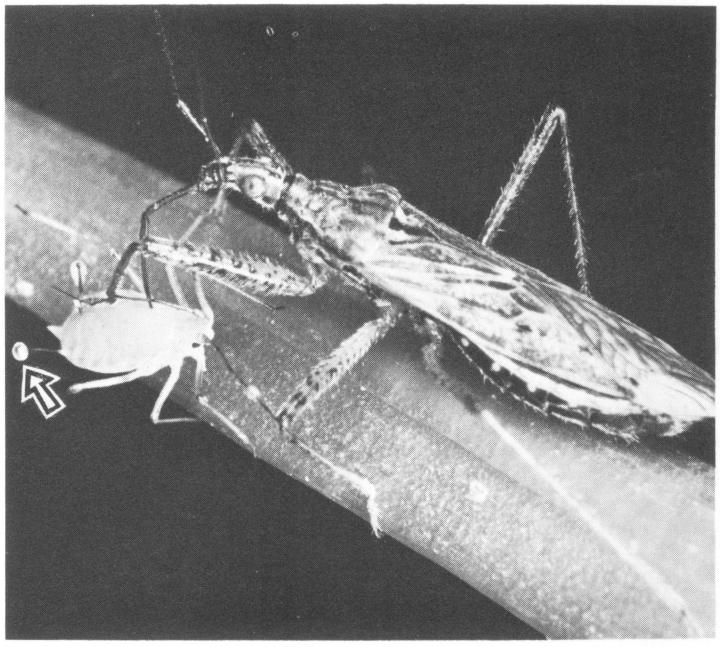
Effective methods of cultural and chemical weed control in field crops, fruits, vegetables, and home lawns have been developed. Ohio scientists have tested new herbicides and combinations of herbicides on different soil types and under various environmental conditions.



Ohio has become a leader in corn virus research since the discovery of maize dwarf mosaic virus in 1962.

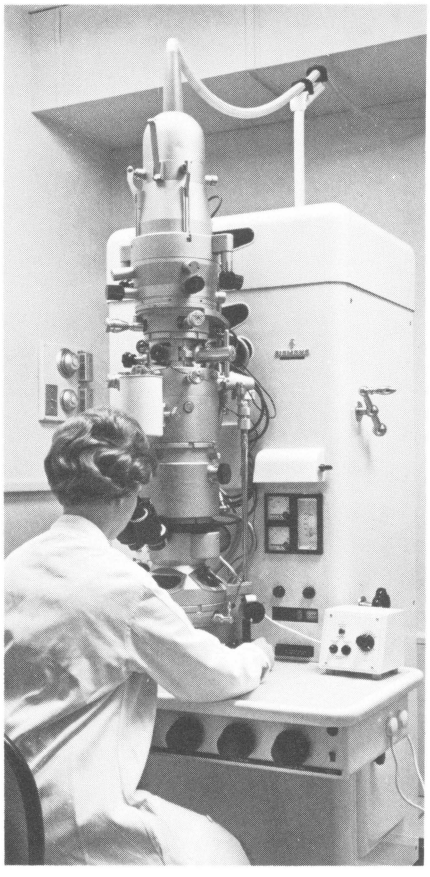
Agronomists have studied the growth habits and life cycles of specific weeds and the influence of environmental factors, growth regulators, and herbicides on weeds' physiological processes and growth habits. Weed control is critical for no-tillage crop production and studies have shown the correct mixture of herbicides needed to control the wide spectrum of vegetation present at planting time.

Ohio entomologists in 1920 were the first to use the airplane against insect pests. The plane threw out a dense cloud of poison dust, killing almost all of the destructive Sphinx caterpillars present in a grove of Catalpa trees.



Natural control of insects has involved using pheromones, chemical substances produced by the insects for attracting mates and warning others of their species of impending dangers. At left, a scientist uses trap baited with synthetic pheromone to catch male insects. At right, an aphid being attacked by a large predatory insect excretes an alarm pheromone (arrow). Chemically synthesizing this pheromone may enable man to trick some insects into leaving feeding sites on plants.

OARDC researchers constantly test and evaluate the effectiveness of herbicides—here in a strawberry patch. Similar studies are made with other crops.



The electron microscope, capable of magnifying thousands of times, is used extensively by plant pathologists and veterinarians for studying plant and animal viruses.

Field studies enable entomologists to evaluate effectiveness of chemicals for corn rootworm control and to determine susceptibility of different corn lines to soil insects.

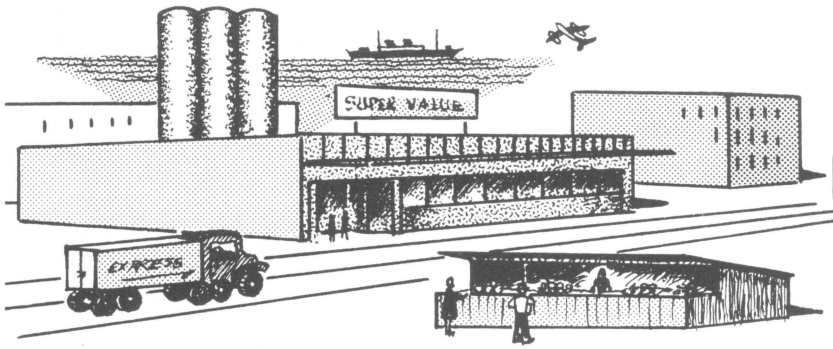
Clockwise from upper left: OARDC veterinary scientists are seeking an effective vaccine to prevent TGE, a troublesome and costly virus which strikes newborn baby pigs.

Ohio veterinary scientists pioneered the use of the sterile isolator which provides a germ-free environment for its occupants, allowing for close study of animal diseases.

Effectiveness of vaccine for shipping fever in cattle is tested in an isolation unit.

Center scientists developed a technique now widely used commercially for dipping hatching eggs in antibiotic solution to control airsacculitis, an important turkey disease.

Field studies of the biology of the redwinged blackbird are seeking practical methods of reducing crop damage from this destructive pest.



MARKETING

Crop and livestock production is just one phase of agriculture. Marketing, which includes the transporting, processing, wholesaling, and retailing of grains, fruits, vegetables, and meats, is an integral part of Ohio's agricultural industry.

Modern Ohio agriculture is characterized by its tremendous capacity and ability to produce in abundance. As production increases, the problems of marketing and distribution are multiplied. This is where OARDC's marketing research comes in.

One research goal has been to improve pricing efficiency so consumer demand can be transmitted through the marketing system to stimulate production response. Another is to improve efficiency so marketing functions can be performed at lower cost.

Research has helped lead to improved retail store management through application of better decision-making techniques, particularly in the meat and produce departments. Use of computers to test different marketing techniques has proved practical in reducing marketing costs and providing fresher, higher quality products to Ohio consumers.

Researchers have studied how to select and develop managerial talent for the food industry. This has resulted in improved procedures for management development.

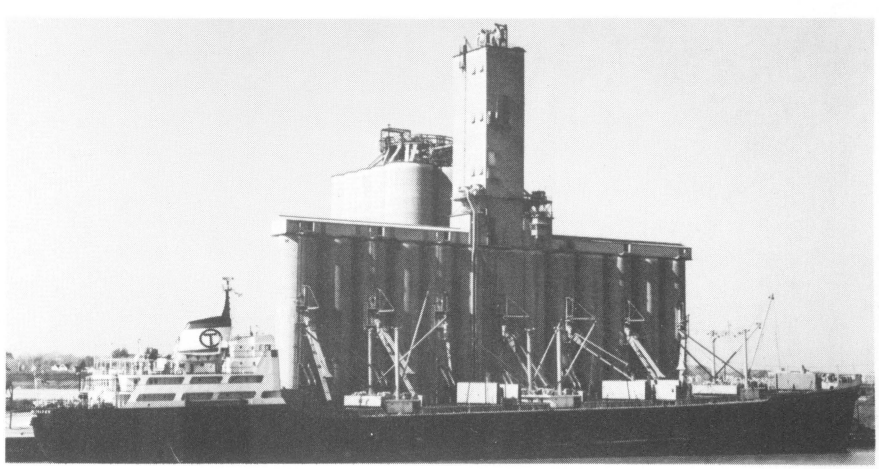
Nearly half of Ohio's farm income is derived from sales of livestock and livestock products, and marketing research in this area is especially significant. Past studies have reviewed the nature and extent of Ohio's meatpacking industry, what states and areas slaughter livestock come from, where the markets are, and the general competitive situation.

Using computers, researchers can forecast prices for wholesale beef, fat cattle, and feeder cattle from 1 month to 1 year in advance.

Research in grain, feed, and farm supply marketing has concerned factors associated with product identification, profitability, market potential, capital requirements, competition, and operating efficiency of grain and feed firms. Agricultural economists have developed models for the optimum size, type, and location of country elevators and farm supply centers to serve Ohio farmers most efficiently.

Through the years, Research Center economists have aided both producers and consumers by conducting numerous food cost and marketing studies, particularly with fresh fruits and vegetables, milk, poultry and eggs, pork, and beef. Ohio marketing specialists pioneered work in the prepackaging of fruits and vegetables and also paved the way for today's booming roadside market business in the state.

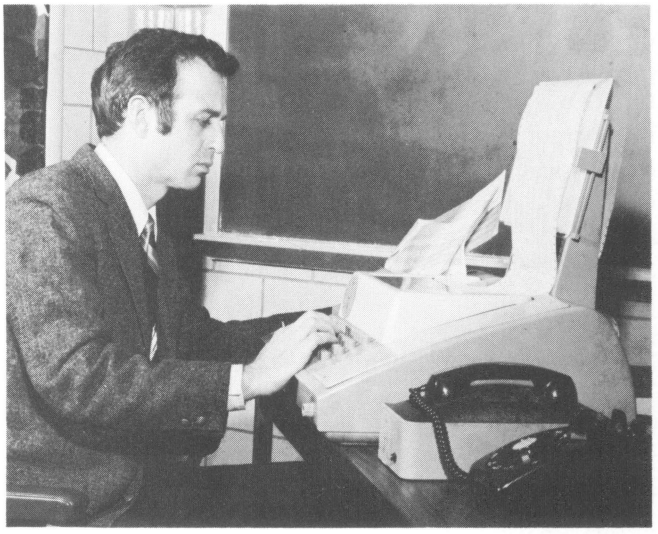
Markets for Ohio-grown agricultural products are by no means limited by state and national boundaries. The world is our market and OARDC researchers are working to increase the state's role in the world marketing arena.



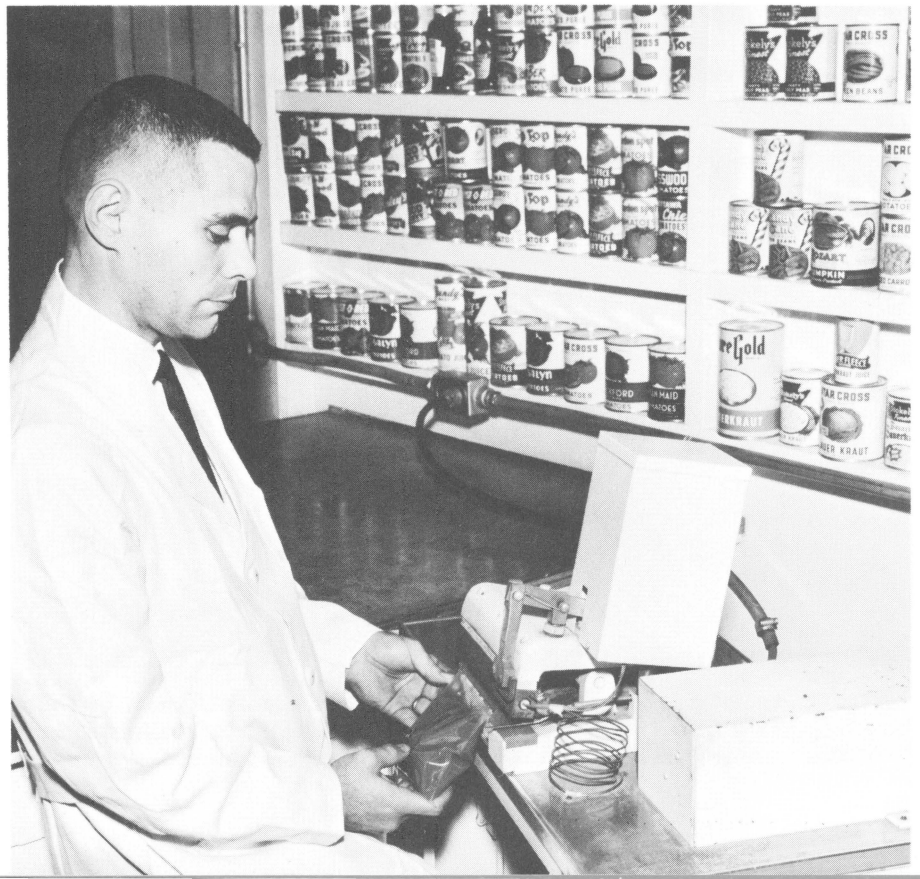
The surplus grain producing areas of Ohio operate under the competitive market influence of two separate and distinct markets—the U. S. domestic market and the foreign export market. OARDC agricultural economists are trying to maximize profits for Ohio farmers and local elevators by determining the best times to sell grain to each of these markets.

Thanks to OARDC research, more than 500 Ohio roadside markets have become important outlets for fresh fruits and vegetables. Many of these operations are now extended to almost the year around and rely more on the resale of purchased items.

Research (above) has improved food store management by applying better decision-making techniques.



A computer terminal, tied to a central computer by telephone, enables researchers to forecast costs of producing and marketing agricultural products.



Flexible packaging materials have been developed for preserving food and offer advantages over glass and tin containers such as low container cost, less shipping cost, less inventory space, and less consumer preparation time.

HUMAN DEVELOPMENT

The development and wise use of resources for the benefit of people is at the root of every OARDC project. Scientists in a number of fields concentrate their efforts on developing the potential of people.

In the 1950's, economists and rural sociologists began studying the problems of migrant laborers who come to Ohio as a seasonal labor force to help harvest such high value crops as sugar beets, tomatoes, fruits, and vegetables. Sociological data relating to age, education and training, family size and residence, work experience, religion, housing, and health have helped determine seasonal workers' true situation and helped improve their economic and social welfare.

Home economics research has benefited homemakers in numerous ways. Included have been studies involving the physiological responses of women at work in the home, the relationship of work methods to work area design and labor-saving appliances, household management, and fundamental facts about food, fiber, and shelter.

Scientists are currently investigating the developing mother-child relationship, the social-emotional growth of infants born prematurely, nutrition of preschool children, and the child-rearing information needs of rural Ohio residents.

OARDC rural sociologists have been studying the values and characteristics of rural nonfarm residents—a group growing in size and becoming more important in the social and political structure of the state. More people are moving to the country because they like peace and quiet, less pollution, less congestion, and more space and privacy.

This migration to the country has led to another problem—an increasing rate of rural crime. Preliminary findings of the first of a three-stage rural crime study by OARDC sociologists reveal vandalism tops the list as the biggest problem, followed by theft, burglary, drugs, traffic, and drunken driving.

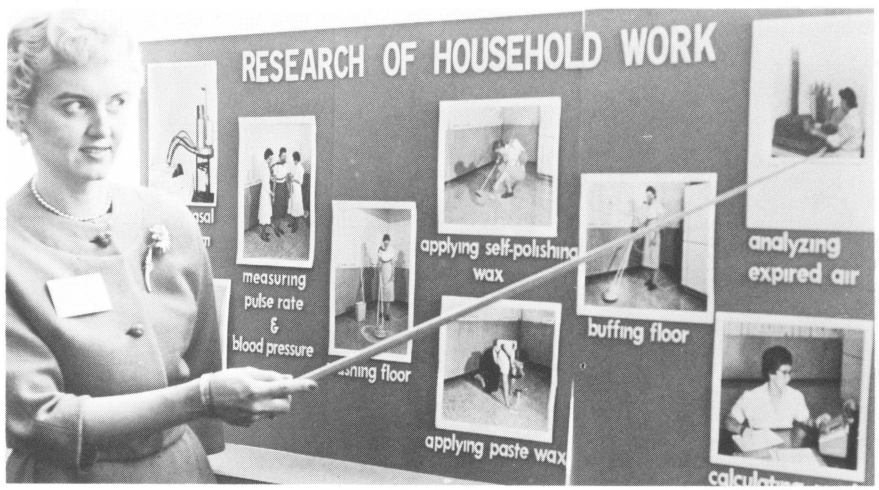
OARDC home economists were instrumental in development of school lunch programs in Ohio which feature hot, balanced meals with milk.

Researchers have conducted studies examining the development of children. Data are collected in a variety of situations including laboratory preschool (above), the home, and the hospital maternity ward.

Proper nutrition plays a very important role in human development. In the 1930's, dairy scientists discovered that vitamin A deficiency led to degeneration of the optic nerve. They studied methods of increasing the content of vitamin A and other vitamins in milk. These investigations eventually led to today's vitamin-fortified dairy products which have helped reduce the incidence of such childhood diseases as rickets.

In the 1950's, home economics researchers delved into nutrition problems of school children. Their work led to schools having hot, balanced meals for students. The scientists also urged the use of more milk in school lunch programs.

The emphasis on the relationship of blood cholesterol to heart disease has spurred a project using a recently developed technique to alter fats in feedstuffs. Animals receiving altered feed produce milk and meat with a lower proportion of saturated fats. These products are being included in the diets of normal humans and those with a history of high blood cholesterol and coronary heart disease to determine possible effects on blood cholesterol and triglyceride levels. Hopefully, this research will lead to breakthroughs in the fight against heart disease and other circulatory problems.



Home economics researchers have made extensive studies on the physiological response of women to household work.

A research assistant pretests interview questions with an inner-city homemaker as part of a study of living patterns of disadvantaged families.

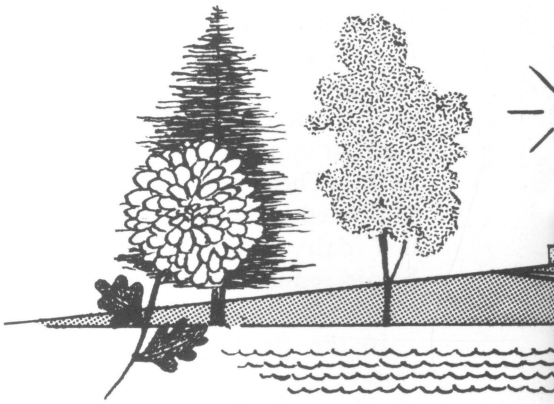
College women participated in a study of the effects of various dietary fats on levels of blood lipids to improve human nutrition.

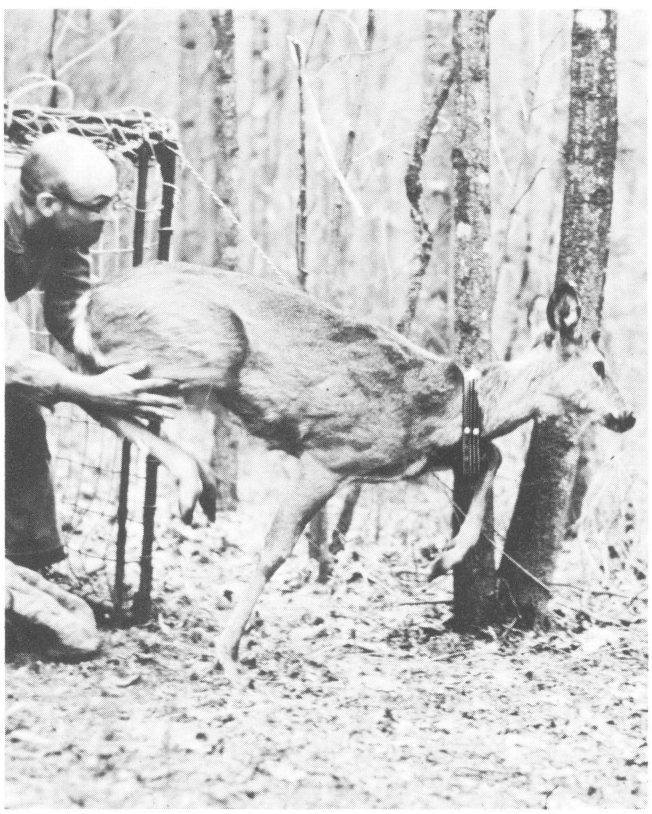
Dairy technologists use freeze-dried sludge from waste treatment plants to study the degradation of dairy plant wastes. Scientists believe that animal processing wastes such as whey and machine-deboned poultry products can be reclaimed and used in the production of processed meat products.

New dimensions in agricultural research have arisen from the increased awareness of our environment and dwindling natural resources.

One project involves measuring the levels and effects of airborne fluorides. The study is underway in southeastern Ohio and western West Virginia where by-product fluorides are present due to industrial processes in the area. Scientists from the OARDC Laboratory for Environmental Studies are comparing fluoride levels before and after the installation of air cleaning devices to provide a clue to the effectiveness of such equipment.

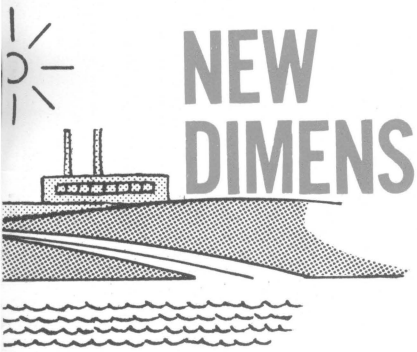
The dispersion of heavy metals (copper, cadmium, zinc, nickel, etc.) by various industrial and other processes into the environment is of concern to OARDC scientists. They are looking for the threshold levels at which plant injury from heavy metals is likely to occur. Specifically, the researchers will be studying the responses of corn, wheat, and soybeans to excess levels of copper, zinc, and cadmium (considered to be the one heavy metal most hazardous to human health).





Realizing the importance of Ohio's wildlife resources, resarchers are using radio telemetry to gain information on white-tail deer behavior pertinent to foresters, sportsmen, farmers, motorists, and naturalists.

To enhance and beautify America's city streets and highways, researchers are evaluating the performance of shade trees to determine which are suitable for urban America.



NEW DIMENSIONS

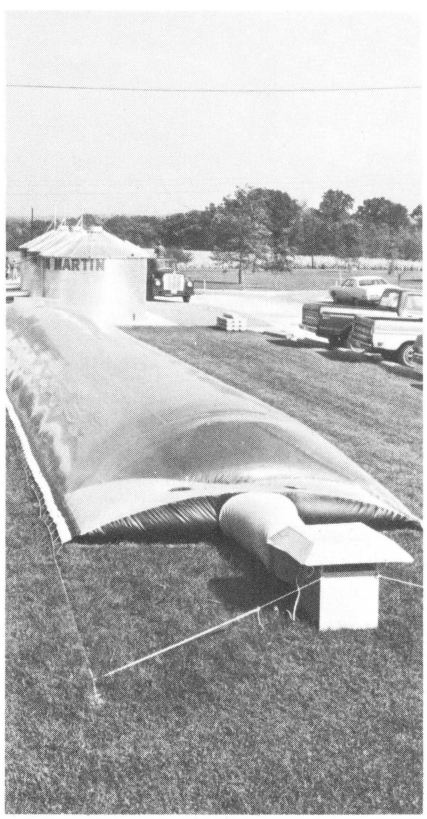
Agriculture is deeply concerned about the current energy crisis as both a producer and consumer of vast amounts of energy. Thus, OARDC scientists are spearheading projects to find new ways to reduce energy consumption by production agriculture and, more importantly, to develop new sources of energy.

Introduction and adoption of minimum tillage techniques (no-tillage, double cropping) have reduced fuel consumption by reducing the number of field operations needed to produce a crop.

Center engineers and plant scientists have started investigations on how waste heat (such as that from power generating stations and foundries, which now reject large amounts of heat into the environment) can be recovered and used to enhance and improve plant growth for food production. These include a search for ways to achieve efficient heat transfer to soil from hot water pipes.

Even more recently, Center engineers have initiated research to develop effective systems to capture, store, and utilize solar energy for drying grain and for heating greenhouses and rural residences.

An increasing number of Center studies deal with soil, water, and air pollution. The Laboratory for Environmental Studies initiates and coordinates the research effort in these important areas.



The utilization of solar collectors is under study as one means to bin-dry grain crops with less fuel consumption.

Many of the more than 200 borrow pit ponds (created by highway construction) in Ohio represent an existing or potential source of quality fishing waters. Scientists have been evaluating properties of these ponds and estimating costs involved in making them suitable for sport fishing.

PRICE AND INCOME TRENDS

FRANCIS B. McCORMICK

The farm sector of U. S. society is experiencing a technological revolution never experienced previously in any other country of the world. This revolution is evidenced by a number of factors, including enormous increases in crop yields and livestock production per animal unit during the past 100 years and especially during the past 35 years. Total production per man hour on the farm has increased at a more rapid rate than has output per man hour in industry in recent years. Each farm worker now produces enough food for himself and more than 50 other people.

Educational programs played a great part in bringing about great increases in our total farm production since 1875. The U. S. Congress has generally supported legislation designed to promote technological growth and productivity during the period. Some would suggest that a number of pieces of legislation were designed to make "two blades of grass grow where one previously grew." A statement or two about a number of legislative acts is of interest as we review agricultural production during the past century.

FIRST FEDERAL APPROPRIATION—The first appropriation for U. S. agriculture (only $1,000) was made in 1839. It was made to the Bureau of Patents with instructions that the Bureau use the money to (1) collect and disseminate agricultural statistics concerned with production, and (2) to distribute improved seed varieties throughout the country.

By 1854, the appropriation for agriculture had increased to about $35,000. It was still through the Bureau of Patents for the same purposes as the original appropriation. The U. S. Department of Agriculture was established in 1862 but did not gain cabinet status until 1889.

MORRILL ACT—This legislation, enacted in 1862, created the Land Grant College System. These colleges were established for the purpose of teaching agriculture and mechanical arts.

HATCH ACT—This act, passed in 1887, provided for the creation of Agricultural Experiment Stations throughout the United States. It still provides the major part of the Federal financial support for agricultural research at the experiment stations.

SMITH-LEVER ACT—Passed in 1914, this act established the Cooperative Extension Service. It still is a basic source of Federal support for Extension programs.

SMITH-HUGHES ACT—This legislation, enacted in 1917, provided for the teaching of vocational agriculture in high schools throughout the country. It is still the basic support for vocational agriculture instruction in the U. S.

In addition to these educational programs, a number of other legislative acts have contributed immensely to U. S. agriculture's technological revolution. These include the creation of the Soil Conservation Service in the 1930's, the creation of the Farm Credit System, the Rural Electric Administration programs, the production adjustment programs during the past 40 years, and the incentives to boost farm production during World War II.

These programs and many others have contributed to an improved standard of living for U. S. citizens, even though production adjustment problems for some members of the farm sector have been very serious in some periods since 1875.

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