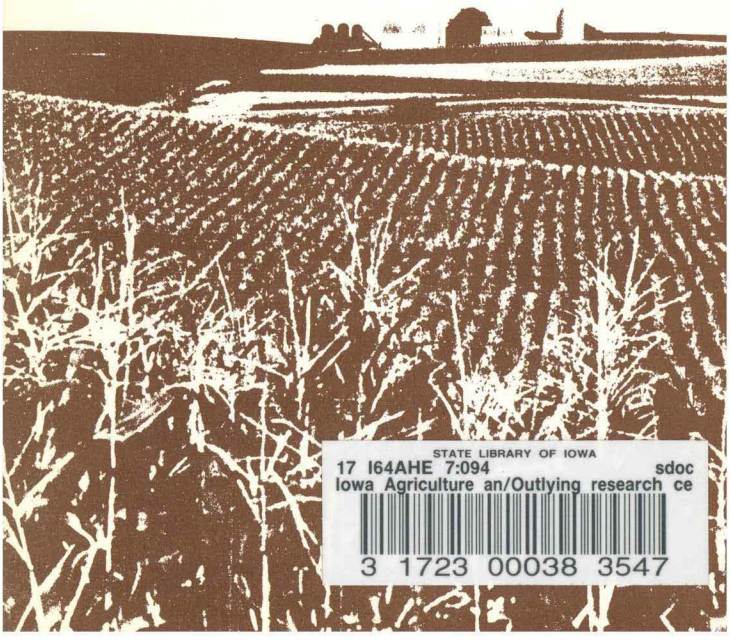
Agriculture and Home Economics
Experiment Station

Iowa State University, Ames, Iowa

Outlying Research Centers



PREFACE

The system of Outlying Research Centers described in this booklet developed and grew in response to the needs of Iowa farmers. The centers form a vital part of the research program at the Iowa Agriculture and Home Economics Experiment Station. They provide a direct link between farmers throughout the state and the Station's ongoing research efforts.

The centers are strategically located in several of Iowa's major soil association and climatic areas. This permits scientists to conduct field experiments under various agroclimatic conditions existing in the state. Field days, demonstration plots, and experimental facilities at the centers give producers an opportunity to see research in action under conditions similar to those on their own farms.

The strength of the Outlying Research Centers in Iowa stems partly from their close integration into the overall Experiment Station research program. The centers are administered within the Special Research and Development unit of the Experiment Station. Close liaison also is maintained with local producers and Extension Service staff in the area of each center. Over the years, this fruitful combination of central direction and local input has contributed significantly to the success of the Outlying Research Centers in serving Iowa agriculture.

The Outlying Research Centers are open to the public, and visitors are welcome.

—Lee Kolmer, Dean of the College of Agriculture and Director of the Iowa Agriculture and Home Economics Experiment Station

The predominance of Iowa's "big four"—corn, soybeans, hogs, and beef cattle—suggests a homogeneous farming sector. But the state's soils, climate, and topography, which greatly influence farm production, are more diverse than is commonly recognized.

Iowa contains about 20 major soil associations, or combinations of soil types, that form repeated patterns from field to field within a geographical region. Soil types may differ in topography, texture, drainage, content of organic matter and nutrients, acidity, and susceptibility to erosion. These characteristics partly determine the farm enterprises and management practices most suitable and profitable in a particular soil association area.

Climate also affects farming patterns and practices, although the relationship between climate and agricultural productivity is quite complex. To some extent, climate and soil characteristics interact in their influence on crop growth.

In Iowa, the average annual rainfall is least in the northwest (less than 26 inches) and greatest in the southeast (more than 34 inches). In general, areas of the state receiving similar amounts of rainfall lie along lines extending from the southwest to northeast.

The pattern of annual mean temperatures and length of the growing season varies fairly evenly from north to south. Mean temperatures in Iowa range from about 46 degrees in the northern tier of counties to 52 degrees in the southern two tiers of counties. The growing season varies likewise. For example, there is a difference of about 40 days in the frost-free season between northeast Iowa and southeast Iowa.

Production of crops and livestock is closely related in Iowa. Some 32 million beef cattle, hogs, dairy cattle, and poultry convert Iowa's corn, soybean, and forage crops into valuable and nutritious livestock products. In recent years, about 55 to 70 percent of Iowa's farm cash receipts have come from livestock marketings, valued at $5.5 billion in 1980.

Because Iowa's land, climate, and agricultural enterprises vary considerably, farmers often have problems that are specific to their areas. In an effort to solve these problems and study the effects of regional differences, the Iowa Agriculture and Home Economics Experiment Station conducts research at several research centers located in

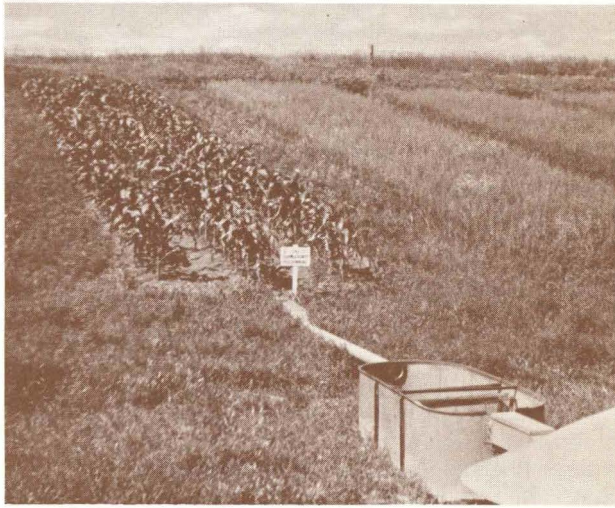
different parts of the state. Research at these outlying centers supplements that done in the laboratories and field research facilities in and around Ames.

Eight of the eleven outlying research centers, sometimes referred to as farms, are owned or leased by local, nonprofit associations of farmers and businesspeople in the area. Three of the research centers are state owned.

Association-owned research centers are leased to the Experiment Station for a rental fee equivalent to the annual taxes and insurance costs. Income from sales of farm products grown in the course of research is placed in a separate fund for each center and used to help pay for the research. The Experiment Station assumes the remaining costs of operating the centers.

The Northern Iowa Experimental Association, the oldest in Iowa, was formed in March, 1930. During the 1940s and 1950s, additional associations were formed throughout the state. Some have disbanded because the problems that initially stimulated their formation and the establishment of a research center have been solved or now are best studied at other locations.

Each association-owned research center has an advisory committee, composed of producers from the area, which



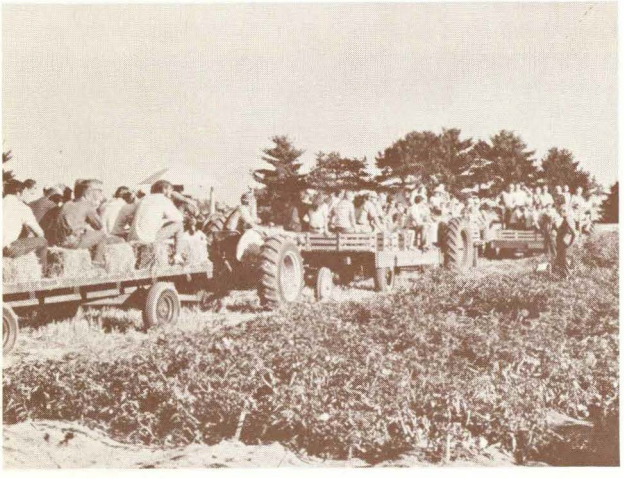
Field apparatus for measuring soil and water runoff at the Western Research Center.

meets at least annually with county and area extension staff and ISU research staff members. Each advisory committee suggests problems encountered by local farmers that need to be studied and acts as a liaison between Iowa State University and local producers.

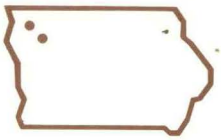
Research results obtained at the centers are presented in written annual progress reports and are used by Extension Service specialists in meetings, pamphlets, news stories, and broadcasts. Local farmers also attend annual or semiannual field days, held at most research centers, to observe experiments in progress and learn about the latest findings.

Research projects at the centers often are continued for many years to observe fluctuations in environmental conditions and long-term trends. Sometimes, similar or identical experiments are conducted at several centers so the influence of differences in soils and climate can be assessed.

Studies at the Allee Research Center and the McNay Memorial Research Center are concerned largely with livestock production. The Brayton Memorial Research Center is used for research in the management of forest resources. Both crop and livestock research are conducted at the Western Research Center and the Shelby-Grundy Research Center. Work at the other six centers is focused on crop production and soil-water management.



Producers observe experimental tomato plots during a field day at the Muscatine Island Research Center.



Northwest Research Centers

The Northwest Iowa Experimental Association, formed in 1954, owns two tracts of land—the 76-acre **Galva-Primghar Research Center** near Sutherland in O'Brien County and the 40-acre **Moody Research Center** near Doon in Lyon County.

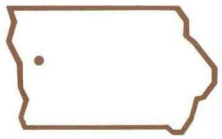
The two centers together have the major soil types characteristic of northwestern Iowa. Most land in this region is nearly level to gently undulating and is well drained, except for some flat areas with Marcus silty clay loam. The major soils have formed in loess that overlies an older glacial till.

Northwestern Iowa receives less rainfall than other parts of the state and has relatively low soil moisture reserves. Thus, although the soils are favorable to high yields and much of the land is intensively cropped with corn and soybeans, average yields are slightly lower here than in regions with better moisture conditions.

Research at the two centers involves primarily studies on fertilizer requirements of corn and soybeans grown in different cropping systems, the effect of tillage practices on crop yields and soil properties, the effect of planting rates and fertilization on corn yields under different moisture conditions, herbicide evaluations, and variety testing of oats, soybeans, barley, and grain sorghum.

Because inadequate moisture frequently limits yields in northwestern Iowa, considerable research has been conducted to determine how farm practices influence the water supply available to crops and to develop superior moisture conservation methods.

Experimental plots at Moody Research Center in northwestern Iowa.



Western Research Center

The 240-acre **Western Research Center** at Castana in Monona County was purchased by the Western Iowa Experimental Association in 1946. The Ida and Monona soils at the center are typical of a large area of rolling land in Crawford, Harrison, Monona, Woodbury, and adjacent counties.

The topography of this region is characterized by narrow, gently sloping ridges and steep side slopes that gradually change to well-defined alluvial valleys. Nearly all the upland soils have formed from very thick deposits of loess that covered the rolling glacial till plain. In places, the loess is more than 100 feet thick.

Although the valleys, less steep slide slopes, and ridges usually are cultivated, erosion is a common and widespread problem. The sloping soils of western Iowa are very erosive and require terracing, contour listing, or other soil conservation practices for adequate erosion control. The steeper slopes often are kept in permanent pasture.

Tillage practices that tend to decrease erosion have been studied for many years at the Western Research Center. Current research includes comparing the effects of conventional tillage and several conservation tillage systems on corn stands, corn yields, and the movement of sediment, plant nutrients, and pesticides.

Other studies are in progress on fertilizer requirements of corn grown in different cropping systems, the effects of fertilization on soil properties, the rooting patterns of soybeans, foliar fertilization of soybeans, evaluation of corn herbicides, and the effects of sulfur and zinc fertilization on corn. Oat variety tests and grain sorghum hybrid performance tests also are carried on at the Western Research Center.

Because some of the land in this region should not be continuously row cropped, research on the management and use of pasture and forage crops also is conducted at this center.

In tests of cool-season grasses, reed canarygrass and smooth bromegrass have yielded the best and seem well adapted to western Iowa. In another long-term project, Station scientists found that crownvetch, a nonbloating legume, and cool-season grass mixtures produced higher total yields, and higher crownvetch yields, when harvested under a four-cut management than when harvested more frequently. They also found that these mixtures were more responsive to spring-applied nitrogen than to mid-summer applications.

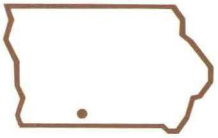
Total yields of crownvetch and cool-season grasses increased with each increasing rate of nitrogen, but the crownvetch component yield decreased with increasing rates of nitrogen. Under nitrogen and harvest management, reed canarygrass was the most competitive cool-season grass tested.

Grazing studies at the Western Research Center have assessed the persistency and productivity of mixed crownvetch-grass pastures. Results suggest that yearling steers will produce 2½ to 3 times more liveweight gain per acre on improved, mixed crownvetch pastures than on unimproved bluegrass pastures.

Evaluation of a two-component system, including smooth bromegrass and switchgrass in separate pastures, began in 1975. Scientists have found that the warm-season switchgrass provides excellent summer pasture during July and August when bromegrass hits its midsummer slump. The yield of switchgrass is relatively low, however, compared to cool-season grasses native to the area.

Because of interest in commercial vegetable production in the Missouri River Valley, the Experiment Station has conducted research on vegetable crops at private farms near Whiting in Monona County. Outstanding yields of snap beans, sweet corn, and processing tomatoes were obtained.

The effect of phosphate fertilization on corn yields is demonstrated at the Western Research Center.



Shelby-Grundy Research Center

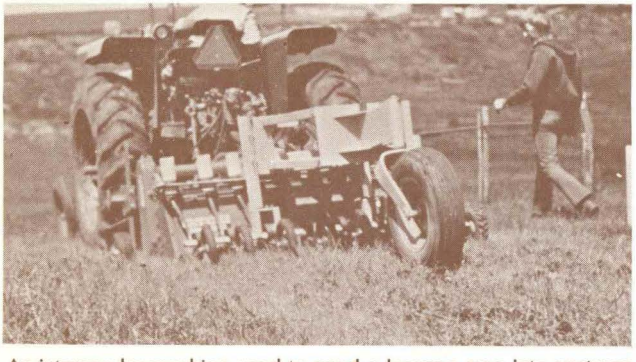
Research aimed at developing productive cropping and livestock systems suitable to the hilly terrain and erosive soils of southern Iowa is conducted at the **Shelby-Grundy Research Center.** Located near Beaconsfield in Ringgold County, the 320-acre center was purchased by the Shelby-Grundy Experimental Association in 1948.

Southern Iowa is marked by an intricate pattern of narrow ridge tops flanked by gently sloping to steep side slopes. The conspicuous, irregular upland flats have eroded extensively so that, today, they constitute only about 20 percent of the land area.

Grundy soils, which developed from deposits of fine-textured loess, occur on upland ridges and side slopes with a gradient of 2 to 7 percent. Shelby soils have formed in glacial till exposed by geologic erosion and occur on slopes of 9 to 30 percent. These two major soils are subject to rapid erosion when clean tilled unless effective erosion control practices are used. Eroded land, where the subsoil has been exposed, is quite difficult to work and not very productive.

Although continuous row cropping is not feasible in much of southern Iowa, the region is well suited for cattle enterprises based on pasture and forage crops. Because of this, many experiments at the Shelby-Grundy Research Center involve the production, management, and use of forage crops and pastures. These include studies on the yield and persistence of cool- and warm-season grasses, fertilizer requirements for hay and silage production, grazing management, and pasture improvement.

When cool-season grasses become dormant during



An interseeder machine used to seed a legume crop into pastures is tested at the Shelby-Grundy Research Center.

midsummer, other types of pasture must be available to meet grazing needs. Hybrid sudangrass pastures and birdsfoot trefoil-grass pastures (plus supplemental corn and protein) are two summer alternatives under study at the Shelby-Grundy Center. Grazing studies conducted so far indicate that both of these pasture systems support good animal growth during July and August.

In a study of alfalfa-grass and red clover-grass mixtures under various nitrogen fertilization and cutting managements, Station scientists found that Arlington red clover seems to have potential as a legume base for a short-term, legume-grass forage crop. They also found that the alfalfa percentage increased steadily to compose over 90 percent of the sward by the third harvest year, regardless of the grass species in the mixture.

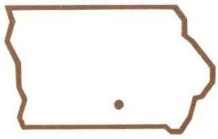
About 3 million acres in Iowa are in permanent Kentucky bluegrass pasture, which is relatively unproductive unless fertilized. Although expensive, renovation of these pastures with more productive legume-forage species generally increases pasture carrying capacities 3- to 4-fold. But complete renovation, including plowing and reseeding, is not practical on much of this land because of the steep slopes.

To get around this problem and reduce the costs of pasture improvement, Station scientists employ a machine that interseeds a legume crop into pastures in one operation. Tests at the Shelby-Grundy Center and other sites have shown that interseeded pastures yield significantly better than unimproved Kentucky bluegrass pastures.

The Shelby-Grundy Center also is used for research on plant populations and fertilization rates for continuous corn, planting dates for corn and soybeans, and fertilizer requirements of different cropping systems. Current studies include winter wheat variety tests, grain sorghum performance tests, a long-term study of fertility needs of oats, and a new study on the influence of corn plant populations on yield.

It also is the site for research on ewe flock management. In addition to early lambing and crossbreeding studies, various pasture studies have been conducted with the flock.

In the past, various tillage practices and cropping systems were evaluated at the Shelby-Grundy Center for their effect on crop yields and soil water losses. Information from this earlier research has formed the basis for soil conservation work in the area.



McNay Memorial Research Center

The **McNay Memorial Research Center** was established in 1956 when Harry McNay and his sister, Winnie McNay, deeded 480 acres to the ISU Alumni Achievement Fund for use by the Experiment Station. The farm, located near Chariton in Lucas County, was used for beef cattle breeding research from 1956 to 1967.

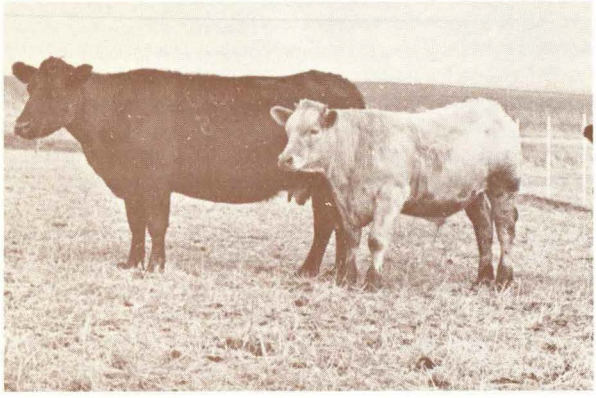
Acquisition of additional land between 1967 and 1973 increased the center's size to 1,845 acres. Although beef cattle research still receives the major emphasis, the McNay Center eventually will serve as the Experiment Station's major research site in southern Iowa and include research activities formerly conducted at several other research centers that have been closed in recent years.

The research program on beef breeding was expanded considerably in the late 1960s. Studies on the reproductive management of beef-cow herds were started in 1972. Experimental pastures were seeded in 1974 for work on forage varieties and pasture utilization.

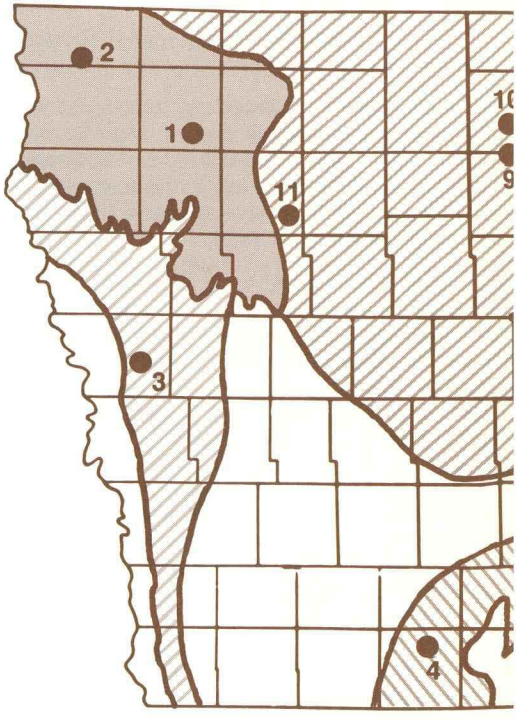
Beef Breeding

Experiment Station scientists recently completed a 6-year crossbreeding study involving two beef breeds (Angus and Hereford) and two dairy breeds (Holstein and Brown Swiss). In the first part of the study, the 16 crosses possible from the four breeds were produced. In the second phase, crossbred heifers were mated so that their fertility and mothering ability could be compared with those of purebred heifers.

In general, crossbred calves were slightly heavier at birth, gained weight faster, and yielded about the same quantity



Crossbreeding has become an accepted practice in commercial beef-cow herds.



Crops research results obtained in the Outlying Research Centers are applicable to the major soil associations in which the centers are located.

1. **Galva-Primghar Research Center,** crops and tillage research. Alan Vogel, superintendent, Route 2, Sutherland, Iowa 51058.
2. **Moody Research Center,** crops and tillage research. Gene Meyers, crops manager, Box 334, Doon, Iowa 51235.
3. **Western Research Center,** crops and cattle research. Wayne Fruehling, superintendent, Route 2, Castana, Iowa 51010.
4. **Shelby-Grundy Research Center,** crops, beef, and sheep research. Kenneth Driftmier, superintendent, Route 1, Beaconsfield, Iowa 50030.
5. **McNay Memorial Research Center,** beef cattle, forage and entomology research. Jim Secor, superintendent, Route 2, Chariton, Iowa 50049.
6. **Muscatine Island Research Center,** vegetable crops research. Vincent Lawson, superintendent, Fruitland, Iowa 52749.

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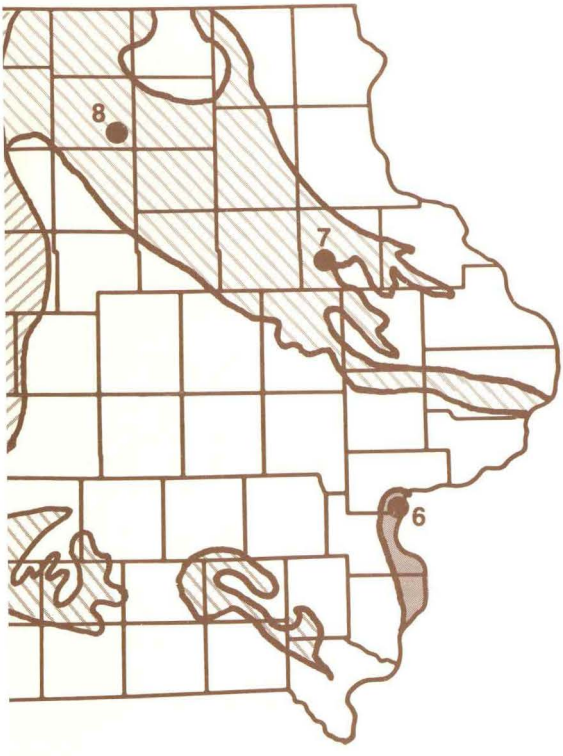


Livestock research at five of the centers is applicable to livestock production enterprises throughout the state.

7. Brayton Memorial Research Center, forest research. Delhi, Delaware County.
8. Northeast Research Center, crops research. Kenneth Ross, superintendent, Route 2, Nashua, Iowa 50658.
9. Clarion-Webster Research Center, crops and drainage research. Bernard Havlovic, superintendent, Box 282, Kanawha Iowa 50447.
10. Northern Research Center, crops research. Bernard Havlovic, superintendent, Box 282, Kanawha, Iowa 50447.
11. Allee Research Center, cattle feedlot management, entomology, and corn breeding research. Hubert Hensley, superintendent, Route 1, Newell, Iowa 50568.

Headquarters of the Iowa Agriculture and Home Economics Experiment Station are in Ames at Iowa State University. Professor in Charge of Outlying Research Centers is H. L. Self, 20 Curtiss Hall, Iowa State University, Ames, Iowa 50011. Farms Manager is Floyd Ransom, 20 Curtiss Hall, ISU, Ames, Iowa 50011.

of retail product as purebreds. Crossbred heifers also outperformed purebred heifers by producing, on the average, 5 percent more calves with 4 percent greater yearling weights. The beef-dairy crossbred heifers performed significantly better than those containing all beef or all dairy blood. Research now being concluded at the McNay Memorial Research Center will permit evaluation of the lifetime production of cows that have 0, 25, 50, 75, and 100 percent dairy blood.

Crossbreeding generally affects one characteristic, such as weaning, weight, or percentage calf crop, by only a few percentage points. But the cumulative effect of these small changes can be substantial. Research at Iowa and other state experiment stations strongly suggests that crossbreeding could increase commercial beef output per cow bred by 15 to 25 percent.

Reproductive Management

The performance of a beef cow is judged by her production of calves. Unlike feedlot cattle, beef cows must be evaluated continuously, throughout their lives. For example, a cow may produce a 700-pound offspring one year, but if she fails to settle and produce a calf the following year, her average production is only 350 pounds per year.

Reducing the age of first calving is another possible way to increase the lifetime productivity of beef cows. In one study at the McNay Research Center, 15 heifers conceived younger than the usual age for first breeding. Ten of the heifers produced their first calf at approximately 18 months of age with only one needing minor assistance. The preliminary results of calving at an early age looked promising, but the performance of offspring and cows after early calving must be evaluated further.

Early weaning, particularly of fall-born calves, has been studied extensively at the McNay Center. Early weaning of fall-born calves avoids the problem of maintaining a lactating cow during the severe winter months and permits cows to be used more extensively to salvage crop residue. Cows not nursing can use low quality residues and other plant material unsuitable for nursing cows. Early weaning removed the nursing activity, which seems to inhibit estrus, and helps cows to return to their first post-calving estrus sooner.

Forage Production and Utilization

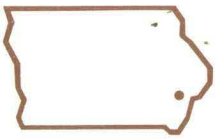
Research on the efficiency of forage utilization by beef animals was transferred from the Albia Research Center to

the McNay Memorial Research Center in 1975. Scientists are using information gathered earlier at other outlying research centers to develop and test a variety of pasture and forage reserve systems. The long-range objective is to increase substantially the proportion of beef cattle feed derived from forages and crop residues and to reduce the proportion derived from cereal grains.

Ruminants such as beef and dairy cattle can produce highly nutritious and desirable food from materials that humans cannot eat or digest directly. Experiment Station scientists believe, for example, the level of grain and protein concentrates used in beef production today can be reduced by 50 percent or more if highly productive forage systems are adopted by producers. Such a shift would reduce the demand and prices for grains and oilseed crops, lessen the need to use unsuitable land for production of row crops, and allow continued production of beef at reasonable prices.

During the first few years of this project, growing beef cattle have grazed three different mixed pastures during the 6-month summer grazing season. The yield, composition, and persistence of the pastures, measures of animal performance, and grazing efficiency are being evaluated.

Field day demonstration of mechanization of bulk forage for beef cattle at McNay Research Center.



Muscatine Island Research Center

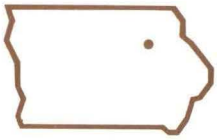
Since 1936, the Muscatine Island Truck Growers Association has provided land for studies on vegetable production in the Mississippi River bottomlands of eastern Iowa. Easily tilled sandy soils, irrigation, and proximity of major markets have fostered profitable truck crop farming in the bottomlands of Muscatine and Louisa Counties.

Trials of advanced breeding stock and the newest varieties of muskmelons, sweet potatoes, watermelons, tomatoes, cucumbers, sweet corn, and other crops are conducted annually at the 60-acre **Muscatine Island Research Center** located near Fruitland.

New cultural methods are evaluated, such as growing tomatoes in cages, using irrigation water for cooling in summer and for frost protection in early fall, chemical control of fruit ripening, and use of mulches and transplanting to increase early yields of muskmelons. Muscatine melons have a widespread reputation for excellent quality and flavor.

Studies on weed and pest control also are carried on at the center. Other research includes studies of different tomato transplant treatments, studies on rates and techniques of fertilization, and on problems associated with mechanical harvesting.

Growing tomatoes in cages increased the average quality of fruit and reduced the number of cull fruits, but had little effect on total yield at the Muscatine Island Research Center.



Northeast Research Center

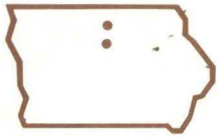
The Northeast Iowa Experimental Association purchased a 260-acre tract in 1976 and leases it to the Experiment Station. **The Northeast Research Center** is located 1 mile south and 1½ miles west of Nashua in Floyd County in the glaciated soil region of northeastern Iowa.

The region's numerous soil types have formed in loamy material, overlying an old glacial till. The land is nearly level to undulating, with low swells rising gradually between intervening scales, which often are poorly drained. Areas with slopes of 5 to 10 percent or more require some erosion control measures when planted in row crops. On the nearly level soils, tile drainage often is required for good crop yields.

Most experiments at the Northeast Research Center focus on problems of corn and soybean production in the area. These include studies on nutrient requirements, tillage methods, weed and pest control, and the long-term effects of different tillage practices on yields (including disease and insect damage).

In 1977 an extensive conservation tillage research program was initiated and will continue for several years. In 1978 a weed garden was established to serve as an education tool for weed identification and control.

In 1978, a weed garden was established at the Northeast Research Center to serve as an educational tool for weed identification and control.



Northern Research Center
Clarion-Webster Research Center

These two outlying research centers are located only about 1 mile apart in north central Iowa, nearly level to gently sloping terrain, dark brown to black surface soils, and a neatly rectangular gridwork of roads and fields. Cash-grain farming is very important in this part of Iowa.

The dominant soils—Clarion, Webster, and Nicollet—all developed from loam glacial till deposited when the last glaciers advanced into Iowa about 11,000 to 14,000 years ago. Because much of the land has naturally poor drainage, about a third to half of the area is drained artificially by tile systems and open ditches.

Some soils in north central Iowa contain excess lime, which reduces the availability of potassium and phosphorus and also may aggravate iron-deficiency chlorosis in soybeans. Water erosion generally is not excessive, except on occasional short, steep slopes. But wind erosion often is substantial, especially during winter and early spring when the soil surface is exposed.

The **Northern Research Center,** located at the edge of Kanawha in Hancock County, was established by the Northern Iowa Experimental Association in 1930. During its early years, the 93-acre farm was used primarily for

A small, highly maneuverable sprayer is used for accurate placement of chemicals on herbicide-evaluation plots at the Northern Research Center.

research on crop disease and sugar beet production and to produce certified seed, which was not otherwise available to farmers at that time.

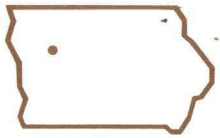
Most recently, this center has been a site for testing foliar fertilization of soybeans and oats, for small grains variety tests, for studies of nitrogen fertilization rates on corn, and breeding soybeans with resistance to brown stem rot. Corn and soybean herbicides are tested extensively at the Northern Research Center.

A home garden for vegetable production was established for demonstration in 1977 and a weed garden was started in 1978 to assist Extension personnel and producers in learning to identify and control weeds common to the area.

The **Clarion-Webster Research Center,** located 1 mile south of Kanawha, is owned by the Clarion-Webster Experimental Association. This 80-acre tract was purchased in 1953 to study drainage problems.

Today, part of the Clarion-Webster Research Center is used for corn breeding research and for increasing the seed of experimental lines developed in breeding programs. Fertilization experiments also are conducted on continuous corn, continuous oats, and different rotations involving corn, oats, soybeans, and meadow. Scientists are studying the effects of phosphorus and potassium fertilizers on crop yields on the acid Webster soil, the fertility needs of oats, the effect on corn of late sidedressed nitrogen fertilizer, and the effects of sulfur and zinc fertilization in a corn-soybean rotation.

Recently, a study was concluded on the influence of planting date and hybrid maturity on corn and soybean yields. Scientists found that yields of late planted early maturing corn and soybeans were about average, but corn moisture levels were high in late planted plots. This research led to the current study designed to determine whether the optimum plant population of corn and soybeans varies with planting date.



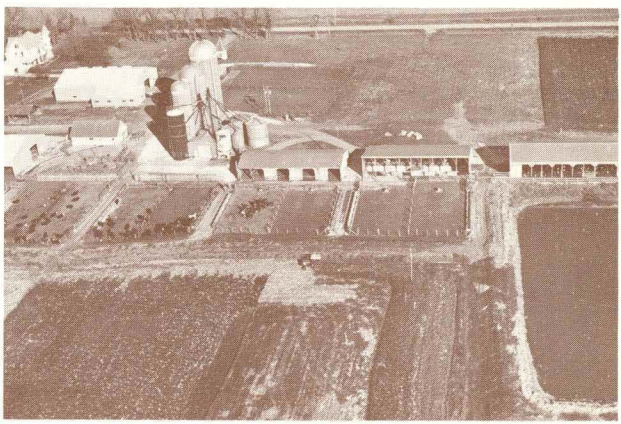
Allee Research Center

The **Allee Research Center,** in operation since 1958, is located 1 mile south of Newell in Buena Vista County. Part of the 288-acre center was willed to the Iowa Experiment Station by George M. Allee, and part of it is leased from the Newell American Legion Post.

Research at the Allee Center has focused on cattle feedlot management, although long-term studies on corn breeding and corn insects also are conducted at this site.

Studies started in 1970 to compare effects of environment on performance of feedlot cattle indicate that, on a year-around basis, the rate of gain for yearling steers fed in confinement about equals that for similar steers in open lots without shelter. Confinement-fed steers are more efficient, however, requiring about 6 percent less feed per pound of gain than open-lot animals. Steers fed in open lots with shelter available have performed better than either confinement steers or open-lot steers without shelter.

Although confinement feeding may not be justified solely on the basis of rate and cost of gain, there are other advantages to confinement systems, including better waste control and the possibility of reusing animal wastes. To meet pollution control standards, some producers may have to feed their cattle in confinement. The recycling of manure into livestock feed and fertilizer may become an important feature of confinement systems if the prices of feed and fertilizer continue to increase. Confinement systems also eliminate the need for bedding, require less land, and permit greater mechanization.



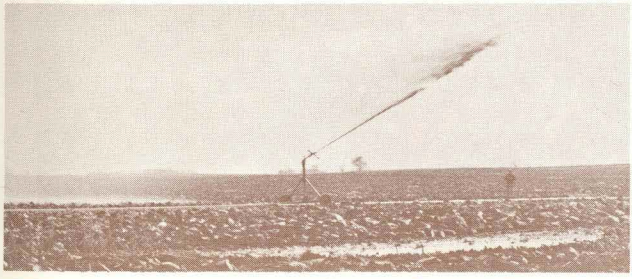
Research on cattle feedlot management is the major activity at the Allee Research Center.

In one study on the effect of mature animal size and the grain-to-silage ratio on performance of yearling steers, researchers found that the level of silage in the diet had little influence on the efficiency with which dietary metabolizable energy was utilized. Slaughter weights of animals fed the different diets had little if any influence on any carcass grade or compositional factor. More recent studies suggest that optimum grain-to-silage ratios may be in the 60-40 percent or 80-20 percent range. These studies are continuing.

Calcium carbonate, the most common source of supplemental calcium in feedlot rations, has been used as a buffer to improve starch digestion in high grain diets in another experiment at the Allee Research Center. Results indicate that calcium carbonate fed at twice the recommended rate did not improve performance. In a study comparing calcium carbonate and dry calcium chloride as a calcium source, calcium chloride significantly depressed performance of yearling steers.

Station scientists tested the effectiveness of mechanical control of estrus in feedlot heifers. The effects of the inserted device on average daily feed intake, average daily gain, feed required per pound of gain, carcass grade, and dressing percentage were not significant.

Because of the need for more knowledge about techniques to handle, treat, and eventually dispose of beef animal wastes, a new beef confinement unit was built at the Allee Center in 1974. The facility, financed largely by a grant from the Iowa Beef Industry Council, is used to test and demonstrate two variations of the "flushing floor" principle. The conventional sloping floor-flush gutter system and a new type called the ISU Multi-Flume Flush Floor are the types of floors being tested.

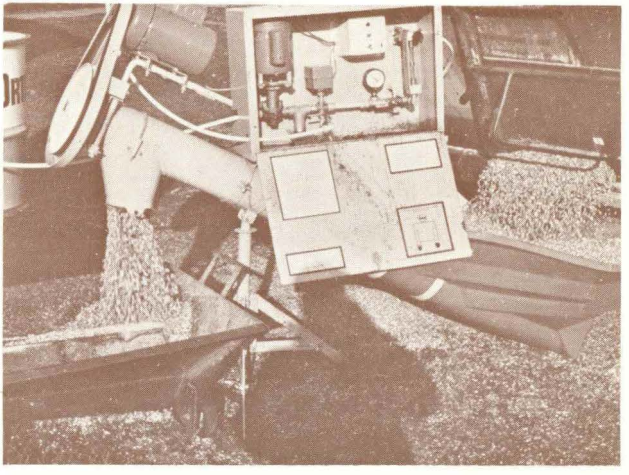


This overhead irrigation system at the Allee Research Center is being tested as a way to recycle liquid manure through crops.

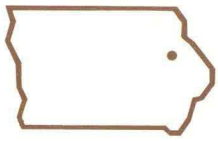
The performance of the cattle on the different floors did not differ significantly. Studies are underway to determine if liquid manure from a lagoon can be recycled through crops with an overhead irrigation system.

Station scientists also have evaluated methods for storing and using high moisture grain in livestock feeding operations. Harvesting corn while the moisture level is too high for storage in conventional bins reduces harvest losses resulting from ears dropping off the stalks. Drying corn for conventional storage, however, has become increasingly expensive because of scarce fuel supplies and high equipment costs. Harvesting and direct storage of high-moisture grain offers a way to increase yields, to reduce equipment and fuel requirements, and to eliminate bottlenecks that often slow harvest operations.

Tests at the Allee Research Center have shown that high-moisture corn, when properly stored, has a feeding value equal or superior to grain handled by the conventional method of drying before storage. High-moisture corn also can be preserved by treatment with proprionic acid or ammonium isobutyrate.



Applying chemical preservatives to high-moisture corn grain at the Allee Research Center.



Brayton Memorial Research Center

The **Brayton Memorial Research Center**, located near Delhi in Delaware County, was given to Iowa State in 1949 by the late Emma L. Brayton. The 305-acre forest has been used to study methods of reproducing, growing, managing, and utilizing timber stands.

Research being planned for the forest includes contrasting regeneration techniques in oak-hickory forests, walnut fertilization and release studies, intensive culture of alder and populus hybrids, and Christmas tree culture.