



DIXON SPRINGS EXPERIMENT STATION

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What it is doing to
develop agriculture in
southern Illinois

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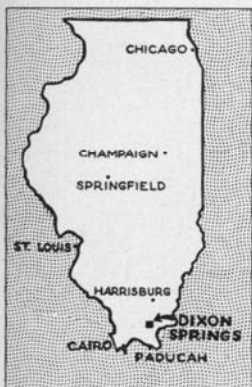
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Dixon Springs Experiment Station

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FARMING CONDITIONS vary greatly in Illinois, which stretches 380 miles from its northern border to its southern tip. Not only are there differences in climate, but there are also many different kinds of soil. To solve some of the special problems of the southern part of the state, studies are being made at the Dixon Springs Experiment Station in Pope county² under the direction of the University of Illinois. Here work is going forward to test, to develop, and to demonstrate farm practices which, besides being immediately profitable, will also build up the fertility of the land for the benefit of future generations.



The projects at Dixon Springs are so planned as to demonstrate how the tested practices work out under actual farm conditions. Some are carried out on a large scale immediately; others are first tried on a small scale and then applied more extensively. The research at the station can be conducted in this way because more than 5,000 acres are available for it and there are facilities for many different kinds of work.

Altho the land on which the station is located is owned by the U. S. Forest Service, which has general supervision of the area, the University of Illinois has a special permit to conduct research and demonstrations. Full direction of the work of the station was assumed by the University in 1940; experiments had been laid out, however, and buildings begun in 1935. Some studies of soil and water conservation are being made in cooperation with the Soil Conservation Service of the U. S. Department of Agriculture.

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²The station is located 35 miles southwest of Harrisburg, 15 miles east of Vienna, 25 miles north of Metropolis, and 20 miles northwest of Golconda. Mail for R. J. Webb, Superintendent, or J. M. Lewis, Assistant Superintendent, should be addressed to Robbs, Illinois.



On land like this, grassland farming is bringing a reasonable return. At the same time it is reducing erosion and improving fertility.

AREA SUITED TO GRASSLAND FARMING

Originally most of southern Illinois was covered with trees. These were cut down mainly because lumber was an important source of income, but some timber was cut and burned simply to get it out of the way so that crops could be grown. Once the trees were removed and the fields were kept in cultivation, the topsoil was soon washed away. The layer of topsoil is shallow and in some areas much of the land

Abandoned fields tell the story of how soil fertility was lost thru erosion.



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slopes enough so that it is subject to serious erosion. Added to this, the heavy rainfall and the mild winter temperatures, accompanied by much freezing and thawing, favor rapid erosion when the soil is bare. Once the productive layer of topsoil is lost, farmers work under a severe handicap.

It is likely that only a few of those who cleared the land realized why the stones apparently were heaving out of the ground more and more with each passing year. Even those who recognized erosion as the



Forests now neglected once provided much income. On steep slopes forests should be replanted to prevent erosion and provide income.

cause lacked the necessary knowledge and facilities to cope with the situation. Gullies were cut deep and wide, and their steep banks never became stabilized by vegetation. Many fields have been abandoned and on them now grow only sparse stands of briars, persimmon, sassafras sprouts, weeds, and other plants of little value.

Much of the hilly land is not adapted to agricultural use because it is stony and has steep slopes. Such land is suitable for forestry whether or not it is now covered with timber. On moderate slopes reasonably productive pastures may be developed. The soil in level areas, while not

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subject to much severe damage from erosion, must be managed well and improved because most soils in the southern part of the state are relatively low in productivity. They are most satisfactory for a type of farming which is slow to deplete the soil. For this reason grassland or pasture, farming is more suited to the area than the relatively intense



Declining fertility leads to the neglect and then the abandonment of once comfortable homes built when the soil was productive and capable of supporting them.

crop type of farming now being practiced on large acreages there. On sloping lands in cultivated crops an inch of soil may be lost in five to ten years. On carefully managed grassland three hundred years may pass before an equal loss occurs.

With a grassland system of farming carried out under good management, the soils in southern Illinois can be made to produce large amounts of feed, food, and fiber. Continuing research and demonstrations are needed, however, to show just how such a system of farming can be carried out most profitably, for there is no assurance that a program adapted to other areas could, with profit, be bodily transplanted to this area and made to take the place immediately of all the practices now current among the farmers living here.

GENERAL SCOPE OF RESEARCH

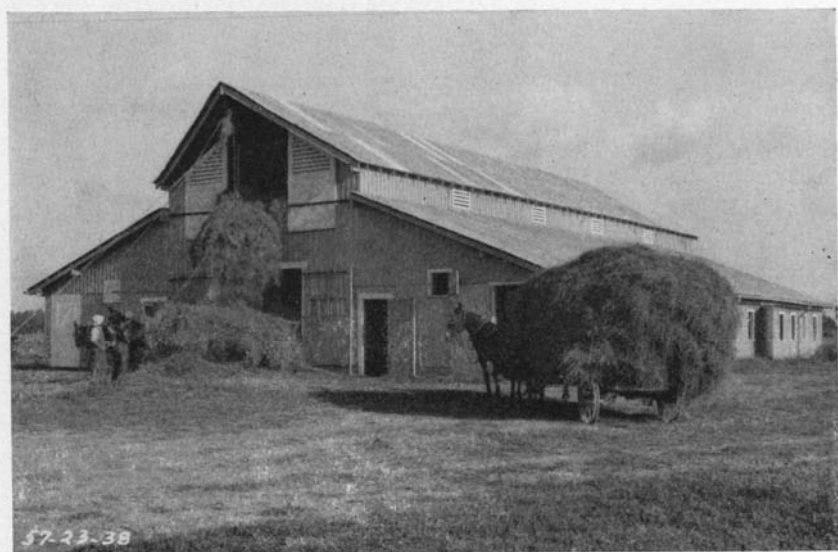
In the experimental work of the Station two basic needs are kept in mind—the need to improve the fertility of the soil and the equally urgent need to retain this fertility as long as possible by reducing soil depletion and erosion.

Since soil erosion is a serious handicap on all sloping land unless it is protected by a good covering of vegetation, which will slow down the flow of rain water and help it penetrate into the ground, research has centered about establishing and maintaining good stands of pasture crops. To be used in a practical and efficient way, these pastures must be grazed by adapted animals. For this reason the work of the station has been broadened from pasture and erosion-control demonstrations to investigations of livestock management, as well as studies of soil and crop management. Research on livestock management has been done mainly with cattle and sheep because these animals can rely on pastures for a large portion of their feed. In spite of some difficulties, the projects have proved so successful that a considerable portion of the money needed to operate the station is obtained from the sale of surplus animals.

In studying the way to maintain good pastures, different species and varieties of plants have been tested to see how suitable they are and how well adapted to the area when sowed alone or in mixtures. Tests of varieties of alfalfa, red and sweet clover, and lespedeza for hay crops have also been made, since legumes are among the best hay crops and are important in soil improvement. To get complete results from the different species, varieties, and mixtures, they are tested under various soil treatments. Even if only the better adapted plants are sowed, the kind of pasture a farmer has will still depend upon the way in which he manages it. To find out some of the best management practices, other studies are being made, such as the one to test whether it is better to graze a pasture continuously or with alternate rest and grazing periods and how heavily the pasture should be grazed at any one time; also, the way in which soil fertility affects plant yields and animal gains; and the best time to clip pasture weeds to keep them under control.

Since it is often necessary for farmers in this area to purchase feed to carry livestock thru the winter, experiments are being made to find a way to extend the pasture season by using cereal crops in combination with other pastures. In all the experimental work pasture crops are judged not only by their yield and quality but also by the amount and quality of the animal gains they produce.

Closely related to the projects with pasture crops and soils are the studies being made with beef cattle in order to get information as to the best method of handling steers, the best time to sell them, as well as the most desirable time to breed heifers in order to have them make the best calving and production record during their lifetime. Along with a project on how to control internal parasites in sheep, a severe handicap in any area, special studies are being made to breed and improve sheep so that they will have the utility features to make them most profitable to farmers in southern Illinois. Recently some experiments with turkeys were begun.



Practical substantial buildings are used at the Dixon Springs Experiment Station.

Extensive as the experimental work at Dixon Springs now is, it cannot provide answers to all the problems that farmers in southern Illinois are meeting. New projects will be started from time to time and other changes will be made in the plan of the present experiments as the need develops. Research carried on by the Illinois Station at Urbana and on the plots thruout the state, as well as experiments made elsewhere, also provide information of real value. Scientific research is the best source of reliable information for farmers.

PASTURE STUDIES

Adaptation Studies of Pasture Plants

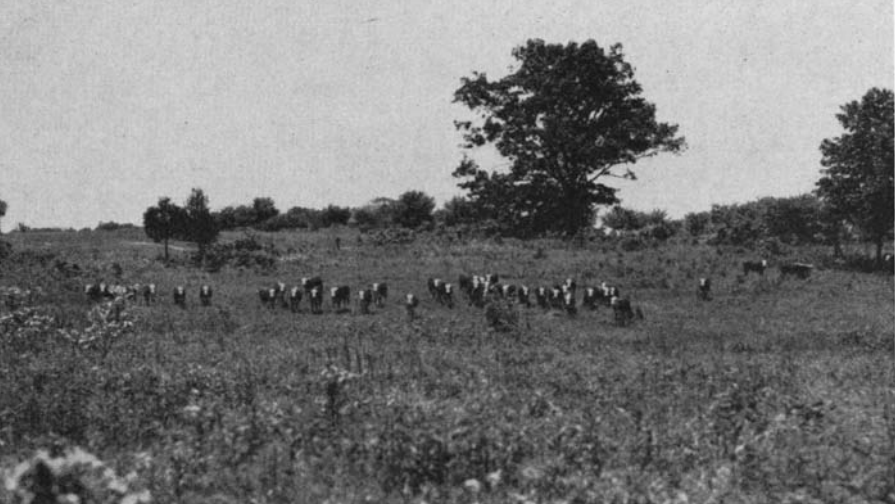
Since any profitable system of pasture farming depends upon the successful production of grasses and clovers, it is logical that the earliest projects at the Dixon Springs Station should deal with studies of soil fertility and the production of pasture plants.

Since 1936 tests have been conducted to learn which species and varieties of pasture plants are best adapted to southern Illinois. A thoro test of a species cannot, of course, be made in a single year—it takes several years to show whether a plant can produce seed or otherwise maintain itself and yield well under all the climatic conditions that will be met and under varied usage. The plots are planted with many species and varieties of plants, some of which are discontinued after a shorter or longer test while others are added.

Only a few important and useful species of pasture plants are able to survive on soils that have become badly eroded, for there seldom is enough fertility to support them. If the season is favorable, some crops such as redtop, timothy, and Korean lespedeza may do fairly well on the unfertilized eroded soils in southern Illinois if they contain very small amounts of lime and phosphorus, but much better crops can be grown if lime and phosphorus are added. After the application of these materials, other desirable species of pasture plants grow well. These other plants include alfalfa and the clovers—sweet, red, crimson, alsike, and Ladino—and orchard grass, Kentucky and Canada bluegrass, tall oatgrass, reed canary grass, winter vetch, Chewing's fescue,

Many plots such as these, located in suitable places, are used to study pasture management practices, fertilizers, and varieties and species of plants.



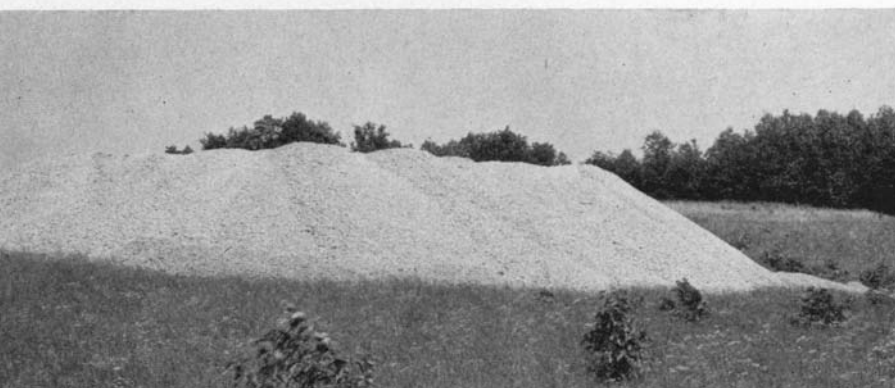


This field gives only poor yields of forage. It has been allowed to grow to weeds and brambles. At a small cost the soil could be improved and the pasture made productive.

and Bermuda grass. Further tests are being made with smooth brome-grass, perennial ryegrass, meadow fescue, and Italian ryegrass; at present they have not proved productive enough to be recommended for general use. Crested wheatgrass, which is an important pasture plant in some parts of the country, has not survived at Dixon Springs after the seeding year.

Trials with varieties of alfalfa and red clover have not been in progress long. To date alfalfa from seed grown in Kansas and northern Oklahoma has yielded and survived well. That grown from seed brought from New Mexico and Argentina has not yielded so well and

Limestone is the basic soil treatment for practically all soils in southern Illinois. If the limestone is of the right fineness and the soil is managed well, the effects of the treatment will last many years.





After being improved, this field was sowed to lespedeza. Yields of the more desirable species of plants, especially legumes, are increased after soil improvement.

has been more severely winterkilled than strains brought from areas nearer Illinois. In the trials of red clover some strains selected from old established varieties growing in southern and central Illinois have done best. Highest yields were produced by Havelka, Rahn, and the Cumberland strains. Hay yields from them averaged about 3 tons an acre in 1943.

More than 100 acres of alfalfa are being grown at Dixon Springs. The good stands obtained on areas to which limestone and phosphate have been applied are evidence that alfalfa can be grown on large areas of land in southern Illinois.

Improving Pastureland Pays

When good practices are followed, grass farming on land similar to that of the Dixon Springs Station is not only sound because it is a practical way of combining erosion control and production, but there is reason to believe that it will bring larger financial returns than any other system of farming that can be widely used on this kind of land. Just how well grassland farming pays in any instance will, of course, depend upon a number of factors, some of which are related to the soil and its productiveness, some to the animals, some to the business ability of the farmer who works the land, and others to outside influences such as prices and markets.

Any kind of farming, to be justified, must yield enough profit over a series of seasons to allow for a reasonable return on the money

originally invested in the land. In general, the price of land is determined by what it may be expected to produce. Even unproductive land, if it can be purchased at a low figure and improved at not too great a cost, may return a good profit. Large areas of land in southern Illinois that are now lying idle or giving only low yields can be made into productive pasturelands—the question most frequently asked is, will it pay?

Just how much improvement can be brought about by applying fertilizers and how long the improvement will last are questions that have not been completely answered. Sometimes improving the land costs more than the land itself, but this does not mean that improvement is unprofitable. If the product from the land brings a high price, the yield per acre may be small and yet be enough to cover all production costs and give a profit as well. When the soil is further built up and production still further increased, the cost per unit of product will be cut down, leaving an even larger profit.

Experiment shows results from soil improvement. That soil improvement causes marked increases in yields of hay and meat on pastureland is shown by a partial review of data from one of the Dixon Springs experiments. In this experiment, Fields 1 and 2 were planted to corn in 1934 and from then until 1942 they were left idle

YIELDS OF HAY OR MEAT FROM UNLIMED FIELDS AND FROM FIELDS IMPROVED BY LIMING, 1942 AND 1943

Field No.	Treatment	Yields per acre			
		1942		1943	
		Hay	Meat	Hay	Meat
		<i>tons</i>	<i>lb.</i>	<i>tons</i>	<i>lb.</i>
1.....	None.....	...	56	2.3	...
2.....	None.....	1.03	31
5.....	Limed.....	...	152	2.7	...
6.....	Limed.....	1.65	172

or used only to a very small extent as part of a general pasture. The vegetation on these unfertilized fields was very sparse, consisting chiefly of weeds, wild grasses, briars, and sprouts. No fertilizer was applied, but early in 1942 Korean lespedeza was seeded on both fields at the rate of 10 pounds an acre. Field 1 was used as a pasture and



The value of this pasture is being measured by the number of animals it can carry, their gain in weight, and the amount of forage produced. Forage production is computed from samples taken from small areas protected by cages.

Field 2 was used for hay production. The following year the use of the fields was reversed, No. 1 being used for hay and No. 2 for pasture.

The production and carrying capacity of these two untreated fields may be compared with that of Fields 5 and 6, which were originally similar in fertility but received 4 tons of limestone an acre in 1936 (see table on page 12). There may also have been some residual effect on Fields 5 and 6 from 250 pounds of 36-percent superphosphate applied in 1937. In 1942 Korean lespedeza was sown on the limed fields at the same rate as on the unlimed fields.

The use of limestone made the carrying capacity of Fields 5 and 6 triple that of Fields 1 and 2. Whereas Fields 1 and 2 furnished forage for 1 ewe and 1 lamb per acre, the limed fields carried 3 ewes and 3 lambs. Meat production was likewise greater on the limed fields. Whereas the unlimed fields produced 56 pounds of meat an acre in 1942 and 31 pounds in 1943,¹ Field 5, which received limestone, produced 152 pounds in 1942, and Field 6, also limed, produced 172 pounds in 1943.

Hay yield was also increased on the limed fields during both years. From Field 2, unlimed, 1.03 tons an acre were harvested in two cuttings in 1942. The first cutting of 368 pounds was mostly weeds and wild grasses; the second cutting of 1,706 pounds was chiefly lespedeza. On Field 6 limestone increased the yield in 1942 to 1.65 tons an acre. Whereas the 1943 hay yield was 2.3 tons an acre from Field 1, unlimed.

¹A few more animals could have been pastured on Field 2 in 1943.

it was 2.7 tons an acre from Field 5, limed, and the hay was of better quality.

The only difference in costs between the limed and the unlimed fields was the price of the limestone and its application. There was no difference in the cost of seeding, as the same kind and amount of seed was used on all four fields. On Fields 5 and 6 the limestone and its application cost about \$2.50 a ton, or \$10 an acre. Since the effect of one application of limestone often lasts for at least ten years, one would have ten years or more in which to recover this cost. Yet it could have been recovered in a single year, either 1942 or 1943, by marketing at prevailing prices the increases in yields of lambs and hay obtained as a result of liming. This was possible even tho the treatment had been made six or seven years earlier.

More than limestone may be needed. While applying limestone alone is a good way to improve the soil for both plant and animal production, additional benefits will be secured when other materials, such as rock phosphate or superphosphate, are used with the limestone. On some fields where both phosphate and lime had been applied, much more grass was present than where limestone had been used alone.

Phosphate is necessary for growing Kentucky bluegrass and some other grasses, as indicated by other experiments at the Dixon Springs Station. By making it possible for more kinds of grasses to grow, phosphate helps to produce a more complete vegetative cover, which is important in protecting the soil against erosion.

The productivity of the limed or the limed and phosphated fields is not only increased at the time the fertilizer is applied but it is also greatly increased in succeeding years, whereas the productivity of untreated fields becomes less as time goes on.

Profitable farming on soil like that at the Dixon Springs Station is an impossibility unless the soil is improved. This has been indicated by the work already done. The first step in soil improvement is the use of limestone. How farmers who do not have the funds with which to proceed with soil improvement might obtain them is a problem which has not been studied at Dixon Springs; but the increased yields caused by fertilizers make it apparent that credit agencies would be justified in giving the necessary financial assistance to careful, intelligent operators. Without such help it would be impossible for some farmers ever to undertake a soil-improvement program.

Good management must accompany soil improvement. Improving soils so that they will produce better pastures means little unless

the pastures are well managed. The importance of this is emphasized by the old adage: "The foot of the master is the best fertilizer."

One of the most common faults in pasture management is overgrazing. As pastures are improved there is a special temptation to overgraze them because too much is expected from the better vegetation. If too many animals are put on any area, the results are sure to be disappointing, for animals do not gain on overgrazed pastures.

Besides cutting down animal gains, overgrazing destroys a good stand of pasture. Good grasses and legumes become scarcer each year, weeds and sprouts take hold, and soil erosion usually increases. In experiments testing the effect of certain grazing practices, overgrazing caused an increase in the amount of broom sedge, rough buttonweed, and briars despite the fact that both limestone and phosphate had been applied. Of course, it is possible to graze pastures so severely that the animals, especially sheep, will eat even the briars and unpalatable weeds. Altho overgrazing during a single year may not seem to cause serious damage that season, the harmful effects will show up later and become increasingly serious if overgrazing is continued.

Undergrazing also permits some weedy growth and fails to utilize enough of the good vegetation to give full returns. There is no substitute for good judgment in applying the principles of soil, crop, and livestock management and there is no way to overcome the failure that is sure to follow poor management.

That overgrazing a pasture soon destroys the stand is confirmed by the evidence from a special study made on four 20-acre fields. All four fields received similar treatments of lime and phosphate and the same seeding of Kentucky bluegrass, redtop, and Korean lespedeza in 1937. In 1940 all four fields showed a similar type of cover, consisting chiefly of bluegrass, redtop, and Korean lespedeza. From 1940 thru 1943 the fields were used as follows: Field 1 was pastured heavily and continuously; Field 2, moderately and continuously; Field 3, heavily but alternately; and Field 4, moderately but alternately. The fields grazed alternately were given a rest period of about a month after a grazing period of similar length.

In 1943, as a result of overgrazing, Field 1 had the largest percentage of ground without vegetation. Even the weeds and sprouts had been eaten. Fall growth left at the end of the grazing period was negligible. Field 2, which was grazed moderately, had a good stand of grass and lespedeza, but large areas of broom sedge were also present, indicating that the pasture had not been grazed enough. The best stand of grasses remained on Fields 3 and 4, which like Fields 1 and 2 were

grazed one heavily and the other moderately but were used only in alternate periods. Fall growth on Fields 2, 3, and 4 was good. The system of heavy alternate grazing followed on Field 3 produced the largest animal gains per acre.

A system of pasture management in which the number of animals is carefully adjusted to the amount of forage and in which there are rest periods seems to give the best results.

Recommendations for seeding and managing pastures. On the basis of experience gained at the Dixon Springs Experiment Station, the following recommendations are made for seeding and managing pastures:

1. Test the soil or have it tested. Be sure that there is enough plant nutrient in it to produce a good stand of pasture crops. If not, apply limestone, limestone and phosphate, or whatever is needed. When phosphate is required, either rock phosphate or superphosphate is satisfactory. Manure is good for pastureland; use it whenever available.

2. Prepare a good seedbed. To prevent soil erosion, prepare land on the contour and leave all possible protection in waterways.

3. Use good seed of adapted plants and sow enough of it to produce good stands. It takes 15 to 25 pounds of grass and legume seed mixtures per acre to do this.

4. Choose a suitable time to seed. About September 1 is generally satisfactory for fall seeding in the southern part of Illinois; February and March are best for spring seeding.

5. Cover the seed lightly; about $\frac{1}{4}$ to $\frac{1}{2}$ inch of soil is enough. Make the seedbed firm by using a corrugated roller.

6. Do not turn the animals to pasture until the stand is well established—that is, until it is at least 6 to 8 inches high—and limit the amount of grazing the first year. Fall-sown grasses and legumes should not be pastured until the next spring.

7. To control weeds, mow them during the summer; set the cutter bar 6 to 8 inches above the ground. Cut the brush sprouts out with an axe either at the ground level or below it.

8. Do not allow the pasture to be overgrazed at any time. A system of management which provides rest periods gives the best results.

9. Make use of a pasture when it is most palatable and nutritious. No pasture plant is equally desirable at all times of the year. In general the cereals—rye, wheat, and barley—are best early in the spring; grasses in the spring and fall; legumes—lespedeza, clover, and alfalfa—in the summer. Neither plants nor animals thrive unless the pasture is well managed.



These steers were used in a study of feeding flood-damaged corn. This was the first livestock experiment made at Dixon Springs.

BEEF CATTLE STUDIES

Steers Used to Salvage Damaged Corn

As a result of the flood early in 1937, thousands of bushels of corn stored in cribs on bottomlands were very severely damaged. One of the first experiments at the Dixon Springs Station was concerned with finding means of storing and using this damaged corn. Since floods recur from time to time, a report of this work is included here.¹

About 1,000 bushels of the damaged corn was purchased, some of which had been snapped and some husked when gathered. During the month that elapsed between the time of the flood and the time it was removed from the cribs, the corn heated, a temperature of 139° F. within the ears being recorded when the temperature outside was 15° F. Because of the water and the dirt, the husked corn weighed 113 pounds a bushel and the snapped corn 133 pounds. All the corn was run thru a silage cutter and stored in a trench silo. One gallon of hydrochloric acid for each ton of corn was added to some of the corn as a special preservative as it was put into the silo. This acid did not seem to have value, as the cattle did better on the other silage.

During a 62-day period the badly damaged corn, salvaged by ensiling, was fed, along with small amounts of cottonseed meal, limestone, and alfalfa hay, to three lots of medium grade steers (10 head

¹A 4-page mimeographed report may be had on request to the Department of Animal Husbandry, University of Illinois, Urbana, Illinois.

to each lot). These steers made an average daily gain of 2.15 pounds. This was 73 percent as much daily gain as was made by a group of similar steers fed ear corn of low sample grade, normal corn silage, alfalfa hay, cottonseed meal, and limestone, this latter group gaining 2.95 pounds a day.

Steers on Pasture

Steer calves produced at the Dixon Springs Experiment Station before 1941 were taken to Urbana for feeding after weaning in the fall. During 1941, 1942, and 1943 the steers as well as the heifers were kept at Dixon Springs. The steers have been used in pasture tests as yearlings and then finished for market the second winter. The station will probably continue this plan, since there are a number of cattle feeders in the southern part of the state interested in this type of beef production.

In 1941 on 20 acres of good pasture composed of grass, chiefly redtop, and Korean lespedeza, 18 yearling steers gained at the rate of 1.9 pounds a head daily during six months. In 1942 on 20 acres of improved pasture 15 head gained 1.4 pounds daily during a period of about the same length. In 1943, 14 yearling steers and heifers on 20 acres of pasture gained 1.3 pounds a head daily for 130 days. These large gains made on pasture at the Dixon Springs Experiment Station indicate that, if pastures are improved and managed well, there are possibilities in feeding yearlings in the southern part of the state.

Cereal-grain pasture used to supplement grasses and legumes may, by providing a longer pasture season, do away with much of the winter grain feeding and still make it possible to produce good market cattle. Whether this is true has not been determined as yet because cereal pastures have been tested for only short periods. Such pastures have, however, produced large gains during short periods. In April, 1941, 77 head of yearling cattle grazing 28 acres of rye gained 1.96 pounds a head daily during a 10-day period. During a 15-day period the same season and on the same field, 122 lambs gained .23 pound a head daily when grazing with 119 ewes.

Winter-Feeding Steers

In southern Illinois, as in many parts of the United States, there is not enough grain for fattening all the animals raised. Feeders sometimes have to buy grain for winter feeding or sell their cattle to be fed and finished elsewhere.



A study of economical winter feeding is being made with these calves. In this study 60 head of cattle are to be used annually for three years.

Cattle raised in southern Illinois that are of good quality respond satisfactorily to good grain and roughage rations. This was indicated by the results of tests made with 29 yearling steers full-fed on ground corn and cobmeal, soybean oilmeal, corn silage, and lespedeza hay. These steers gained 220 pounds per head from November 1, 1942, to March 11, 1943, or an average daily gain of 1.7 pounds. This gain was made in spite of the fact that the corn was light, chaffy, and of poor quality because freezing weather occurred on September 27 before it was fully matured. Nine head of these steers, averaging 1,012 pounds per head, were sold on the East St. Louis market March 15, 1943, at \$16.10 a hundredweight, only 40 cents below the extreme top for the day.

Whether it is better to feed steers grain during the winter or market them as grass-fat cattle after wintering them on a liberal feed of silage and legume hay is a question that is being studied at the Dixon Springs Experiment Station at the present time. Sixty calves dropped in 1943 are being used and other calves born during 1944 and 1945 are to be added. The results secured from the three calf crops should indicate the more suitable method of feeding.

Handling a Breeding Herd Economically

To have enough beef cattle for tests of pastures and of feeding and management, it is planned to keep from 200 to 250 breeding cows at Dixon Springs. Enough of these cows, together with their calves and the steers and heifers from the previous year, will be kept to make up a herd of about 500 head. From 50 to 75 of the breeding cows are to constitute a registered purebred herd. Since it is planned to use only



Sergeant is one of the bulls used for breeding at the Dixon Springs Experiment Station. He represents the type of vigorous productive bull necessary for a successful pasture program.

good purebred bulls and to maintain a herd of high quality, a registered herd of this size will furnish some surplus animals to sell to farmers for improving their herds.

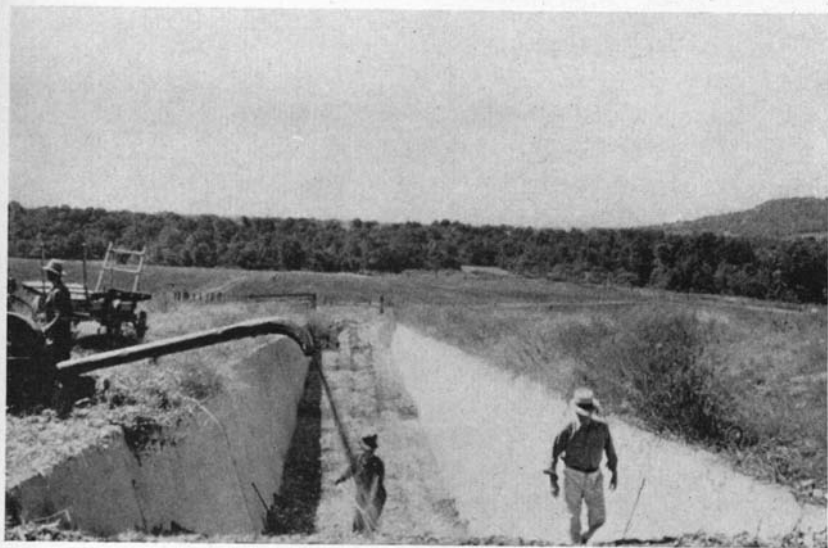
Winter feeding the breeding herd. One of the favorable features of southern Illinois as a cattle-producing area is that here it is necessary to carry a breeding herd on harvested feeds for only a relatively short time during the winter. If winter feeding is to be done most economically, roughages such as hay and silage must be the basis of the ration. Such a roughage ration containing good corn silage will, of course, have a considerable amount of grain in it. At the Dixon Springs

Experiment Station the silage is made chiefly from corn grown on bottomlands. Using the corn crop as silage assures the most benefit from it for cattle feeding, as shown by the results of many comparative studies.

Silage for winter feeding has on some occasions been made from sorghum varieties, some of which are grown each year. Sorghum silage is usually not so high in feeding value as corn silage. Of the sorghum varieties grown, Atlas sorgo and Early Sumac have yielded highest. Since either sorghum or corn silage has a relatively low calcium and protein content, it is advisable, if legume roughage is not fed also, to use some mineral and protein supplement. One pound of soybean oilmeal daily for each cow provides the minimum amount of protein. A mixture of equal amounts of salt and finely ground limestone, fed free-choice, seems to meet the usual mineral needs.

Trench silos, both lined and unlined, have been used and the silage has kept well in both kinds. The unlined trench silos have not proved satisfactory, however, because they tend to cave in. Various types of temporary silos have been used. Two upright concrete ones are to be built for experiments with silage.

Any of the legume hays—alfalfa, clover, lespedeza, soybean, or



This trench silo was lined with concrete to keep it from caving in. A stationary cutter is being used to fill the silo. Both stationary and field cutters are satisfactory for this purpose.

cowpea—if fed in reasonable amounts with silage, will meet the needs for protein and minerals and no supplement will be needed. For this reason finding varieties of legumes that are better adapted and give higher yields of roughage will benefit cattle raisers in southern Illinois.

Breeding. In an effort to develop a herd of similar bloodlines, a considerable number of the cows were bred by artificial insemination during three summers. This procedure meant much extra handling and, altho bulls were turned with the cows later in the summer, many cows did not produce calves. Since a cow must produce a calf regularly each year to make the herd profitable, artificial insemination has been discontinued temporarily at least.

The 1943 calf crop was the first one produced by the natural method of breeding. More bulls are, of course, needed for this method, but there is a decided saving in labor in handling the cattle. Of 208 cows and heifers bred in 1942, 9 were shipped to market because they failed to calve. Of the remaining cows only 4 failed to produce calves in 1943 and 9 calves died. Since breeding difficulties are often ascribed to poor nutrition, this good calving record may be taken as an indication that the pastures and feeds were nutritionally sound.

A study of the best age at which to breed heifers was begun in 1943. When the results are complete, they should provide a basis for recommending that heifers be first bred either as yearlings or as two-year-olds.

The work done at Dixon Springs up to the present time has confirmed the opinion that the only way to maintain a herd of cattle on a productive and profitable basis is to cull the poor producers and irregular breeders. Further improvement can best be made by using superior bulls for breeding.

SHEEP STUDIES

Sheep Thrive on Good Pasture and Roughages

Of our domestic animals none surpass healthy sheep in the ability to thrive on pastures and roughages with only a relatively small amount of grain. They may depend upon pastures and roughages for 75 to 100 percent of their feed. For this reason it is natural that sheep should have a prominent place in a system of grassland farming.

Some lambs raised on pasture without grain feeding at the Dixon Springs Station have been sold at the top of the market. To feed sheep

successfully without grain requires good pasture and healthy lambs of the right type.

Grass and legume pasture for sheep have proved satisfactory and productive. If used properly, winter rye, wheat, and barley lengthen the pasture season. Of these cereal crops, rye seems best all points considered.

Pastures on improved lands may, on the basis of the work done at Dixon Springs to date, be expected to produce about 150 pounds or more of lamb an acre besides carrying about 3 ewes an acre for about six or seven months of the year.

Winter Feeding of Bred Ewes

The winter feeding of bred ewes presents no serious problem if one has a good supply of legume hay or is able to provide corn silage. Korean lespedeza hay is very palatable and nutritious and can be used for both ewes and lambs.

For several seasons the breeding ewes at Dixon Springs were wintered on corn silage as the only roughage. A supplement of soybean oilmeal and limestone or of cottonseed meal and limestone was fed with the silage. In addition, the ewes were given $\frac{1}{2}$ to $\frac{3}{4}$ pound of corn daily from one month before lambing until they were turned onto pastures with their lambs. This ration seemed to supply the basic needs of the ewes, since no troubles developed that were directly traceable to the feed. Good farming systems will provide legume roughages to use with the silage.

Types of Ewes and Breeds of Rams

One of the earliest efforts at Dixon Springs was directed toward obtaining information on the types of ewes and breeds of rams most suitable for southern Illinois. Altho it would take a very long time to make a complete test, types and breeds should be selected on the basis of results and not prejudice.

Information already gathered shows most types of ewes from the western range areas are likely to be satisfactory as lamb raisers. Some fine-wool blood, such as that of the Rambouillet, seems to increase hardiness, which is important in withstanding changes in climate.

Ewes should be sound and in good health and should be bred to meat-type medium-wool rams. Observation indicates that the ability of a ewe to produce a fast-growing lamb is very closely related to her

ability to provide a large amount of milk. Milk production is affected both by breeding and the quality and quantity of feed consumed. Good pastures are among the very best feeds for milk production.

The kind and quantity of wool produced by ewes varies widely within types. In general, under the conditions in southern Illinois, ewes that are free of skin folds and have wool of medium to fine grade 2½ or 3 inches long after a year's growth are most satisfactory.



Ewes of good size and type, such as these, should be used for breeding. These ewes are part of the Hampshire breeding project.

Three breeds of rams, Shropshire, Hampshire, and Southdown, have been used with the various types of ewes. The Southdowns sired lambs of the best shape and more of them were fat at weaning time, but most markets do not offer enough premium for the better quality of Southdown lambs to offset the advantage of the extra weight of the larger breeds. Hampshires sired lambs which weighed about 7 pounds more per head at weaning age than those by Southdown rams. Lambs by Shropshire rams were about the same size as those by Southdowns but were not so desirable in carcass.

Because Hampshire lambs are large and perhaps also because of their shape, they are more difficult for ewes to deliver than are lambs by either Southdown or Shropshire rams.

That good lambs can be produced in southern Illinois is shown by the fact that carload lots of lambs from the Dixon Springs Station won prizes at the International Livestock Exposition in Chicago in 1940 and 1941.

Each year practically all lambs raised at Dixon Springs have been

sold and replacements for the breeding flock have been purchased in the West. Some of the ewe lambs by Shropshire rams have been kept for the development of a grade Shropshire flock. The ewes of this flock have tended to breed later and to be more irregular in lambing than western ewes.

Because lamb raisers in southern Illinois have shown the greatest interest in Hampshires, a purebred flock of this breed was established at Dixon Springs in 1942. It is hoped that this flock will provide rams for the station, as well as some surplus. In 1943, 100 purebred registered ewes were bought and added to the flock. A project was then begun to study the breeding and improvement of Hampshire sheep.



A flock of lambs fed and finished on grass and legume pasture. It is possible to fatten lambs without grain if they are kept healthy.

Internal Parasites Can Be Controlled

Internal parasites, such as stomach and nodular worms, are among the most serious handicaps to successful sheep raising. During the summer the weather is often favorable to the development of these parasites which impair the health of the ewes and lambs and in this way keep them from making the best use of feed.

Phenothiazine has proved very valuable for parasite control and extensive studies are being made at Dixon Springs of the best method to administer it. During the spring and summer of 1943 three groups of sheep were used, each consisting of about 200 ewes and their lambs.

The sheep in two of these groups were allowed to eat all they would of a mixture of 1 pound of phenothiazine and 14 pounds of salt. The mixture was put in troughs so placed as to be easily accessible but protected from rain. The third lot of ewes and lambs was not treated for parasites.

On August 3 the untreated lambs weighed an average of 53 pounds. They showed large numbers of stomach worms and many nodules on the intestines when slaughtered. One group of treated lambs, which had grazed the pastures after the untreated lambs but had free access to the phenothiazine-salt mixture, weighed an average of 56 pounds. These lambs were also rather heavily infested with parasites, which showed that the phenothiazine mixture did not keep parasites out of lambs when they grazed infested pasture. The other lot of lambs, which was put on less heavily infested pasture and given the phenothiazine-salt mixture, weighed an average of 72 pounds. This lot was much thriftier and the animals slaughtered showed fewer parasites and nodules. The mixture of phenothiazine and salt, coupled with efforts to provide clean pastures, did much to control internal parasites. It is planned to make more tests with larger proportions of phenothiazine with salt.

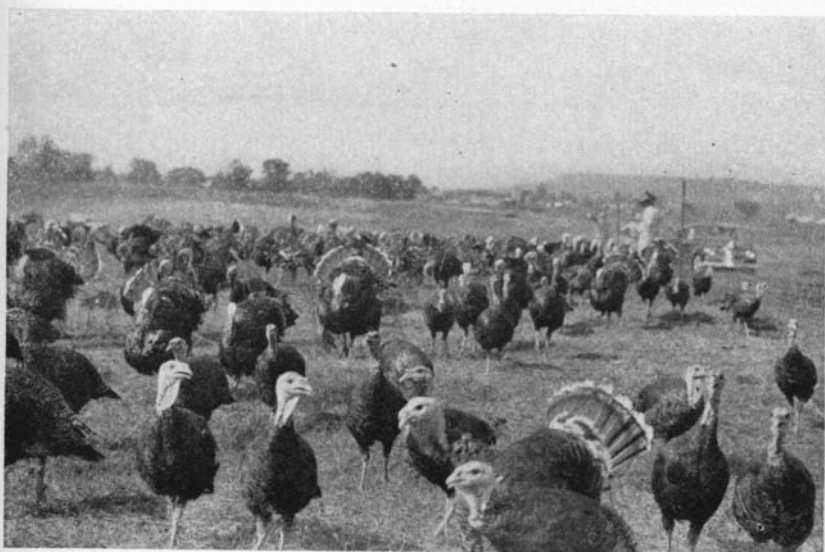
Tests made to date indicate that sheep should not only have the phenothiazine mixture before them at all times when on pasture, but should also be given two treatments with phenothiazine, one in the fall and one in the winter.¹

Since phenothiazine seems to be a thoroly effective means of controlling internal parasites, one of the severest handicaps to sheep raising is being overcome.

STUDIES OF TURKEY RAISING

Raising chickens has been a standard enterprise on many southern Illinois farms for a long time, but turkey raising has not been developed in this area. To study the possibilities in turkey raising here, a limited number of experiments have been made at the Dixon Springs Station even tho such an enterprise does not utilize large areas of land. The climate and other conditions have proved suitable for turkeys.

¹Detailed directions for preparing and administering the phenothiazine may be secured from the Dixon Springs Experiment Station at Robbs, Illinois, or from the College of Agriculture, at Urbana.



Climate and other conditions having proved suitable for turkeys, a limited number of tests with them are being made at Dixon Springs.

For several years a large number of day-old poults have been purchased by the station and raised there. All their feed has had to be shipped in. The turkeys have been kept in a well-cleaned brooder house from about May 1 to late June or July and then they have been placed on a clean range. All the equipment is portable and the fences are temporary so that the turkeys can be shifted to a new section of the range every 10 to 14 days. Losses have been light except when the poults apparently carried some infection at the time of hatching or contracted it soon afterwards. The turkeys have grown and developed satisfactorily on a mash mixture containing the following ingredients:

	<i>Pounds</i>		<i>Pounds</i>
Ground yellow corn	20	Alfalfa leafmeal	10
Ground wheat	20	Meat scrap	12
Ground oats	15	Dried milk	10
Bran	12	Salt	1

In a feeding test made in 1943, the meat scrap and dried milk in this mash mixture were satisfactorily replaced by soybean oilmeal. The results indicated that soybean oilmeal has high value as a source of protein.

When the birds were large enough, they were fed a grain mixture, which consisted of the following ingredients:

	<i>Pounds</i>
Shelled corn	30
Whole wheat	30
Whole oats	40

Almost all the turkeys raised at Dixon Springs have been dressed in a slaughterhouse built for the purpose and local labor has been used. The dressed turkeys have been sold on a graded basis on the wholesale market. When the turkeys were handled and packed carefully, a large percentage of them made top grades.

THE WATER SUPPLY

To obtain water for human use as well as for some livestock, four wells have been drilled and developed at the Dixon Springs Station. These wells range in depth from 350 to 600 feet. Since, in this part of the state, it is necessary to drill to some depth before water is reached, it is difficult and expensive to get a supply of water for human use. Perhaps the electricity that is now being furnished in some of these rural areas will be used to run home-size filtering and cooling devices that will make it safer to use the cistern water.

A regular supply of clean water is necessary to keep livestock producing satisfactorily, as well as to safeguard their health. At the station an additional supply of water for the livestock is secured from ponds. These ponds have been built with earth dams and they collect water as it drains from sloping areas. The water is reasonably free of silt because the areas that drain into the ponds are all in permanent grass pasture. Under these conditions it will probably be a long time before the ponds fill up with soil.

Connected with the ponds are spillways which carry off excess water. These are of various types. The spillways that have proved most satisfactory are level from side to side and are not deep, being designed with adequate width to maintain shallow depth of flow. They also have a very gradual slope thruout their length so that the water flows out slowly and does not cause damage by removing soil. To help hold the soil and resist erosion the channels have a good covering of vegetation. Bermuda grass and Kentucky bluegrass have both proved excellent for this purpose.

The dams, ponds, and spillways are fenced off to keep the stock at a reasonable distance from them. This keeps the water supply clean and prevents damage to the structures as well. The animals do not drink



A good supply of clean water for livestock is furnished by this pond at Dixon Springs Experiment Station (*upper picture*). The animals are kept away from the water by a fence. The supply of water is piped from the pond to tanks or tubs (*middle picture*). The grass-covered spillway (*lower picture*) allows surplus water to flow slowly away from the pond.

water directly out of the ponds but from tanks supplied by the ponds. To carry the water from the pond to the tank, a pipe is laid under the dam as it is built. The inlet to the pipe is about 2 feet above the bottom of the pond where it is deepest. Here the pipe is set upright and is surrounded by a box filled with crushed rock or gravel. The flow of water at the tank is controlled by float valves or faucets.

SHELTERS FOR ANIMALS

Since the winters at Dixon Springs are comparatively mild, most of the animal shelters are open. Closed sheds have been found to be an advantage for winter lambing because the very young animals need special protection from the cold. Barns are used for storing feed and housing some livestock.

Plans for the buildings illustrated in this circular, as well as other plans, may be secured at a small cost upon request to the DEPARTMENT OF AGRICULTURAL ENGINEERING, UNIVERSITY OF ILLINOIS, URBANA.

FIVE GUIDES TO PROFITABLE FARMING

Already the work of the Dixon Springs Experiment Station has shown that much of the gently sloping and level land in southern Illinois is well suited for grassland farming. Whenever the land is used in this way, there are opportunities for operators with intelligence, good judgment, and willingness to exert continuous effort. Whenever the land is used in a way for which it is not fitted, or good management practices are not followed, failure is sure to result.

The following guides to profitable farming, good in any section of the state, are essential in southern Illinois, as already demonstrated by the work at the Dixon Springs Station:

1. By means of good soil management and good crop and livestock practices, prevent further losses of soil fertility.
2. Work to build up the fertility of the soil by adopting effective methods of soil improvement.
3. Use all practical ways to control soil erosion.
4. In all phases of farming better practices are being continually found. Follow the best practice.
5. Use only high-yielding varieties of plants and highly productive animals.

Much of the progress made by the American farmer has been pos-

sible because he has applied the results of reliable research. Successful farming in the future will depend even more upon such work. In no area will research be of more importance in helping farmers build up a sound and profitable farming system than it will be in southern Illinois.

Special reports on the experiments at Dixon Springs will be issued from time to time as they are completed, so that the results of the work can be of use to farmers as soon as possible. Because much of the research is complicated and many things must be taken into account that may influence results, it is impossible in a short time to obtain reliable data on which to base recommendations. Certainly if a practice involves considerable expense to adopt, it should not be recommended simply because it gave good results in one very favorable season. The benefits from a practice must be measured over a reasonable number of years, during which time seasonal conditions have varied from the most favorable to the most unfavorable. This is why it often takes several years before sound conclusions can be reached about any experiment and recommendations made on the basis of the work.

There is no question, however, about the desirability of adopting certain better farming practices that are not especially expensive to adopt and that lead quickly to greater profits. Among these are the saving of the fertilizing value of all manures, the use of better seed, the adoption of better pasture management and better methods of erosion control, the use of superior bulls, and the control of internal parasites of sheep and other animals. Many farmers will find, too, that with careful attention and effort they can succeed beyond what is indicated by the results obtained at the station itself.



Hundreds of farmers come to the Dixon Springs Experiment Station every year to hear about and to see the results of more profitable farming practices. These Franklin and Hamilton county farmers are inspecting the grass and legume plots near the Administration building.

OUR SOILS ARE THE MOST IMPORTANT natural resource of our nation. They give the only permanent assurance of freedom from want and are a great storehouse of the materials for victory in times of national peril. Their intelligent use is therefore of deep concern to every citizen.

The public meets its responsibility when it provides the facilities for research into the best land-use practices and the means of spreading this knowledge to the people on the land. This circular tells about the work being done at the Dixon Springs Experiment Station, established under the supervision of the University of Illinois, where the special problems of southern Illinois are being studied and their solutions demonstrated. The object is to develop a sound, practical system of grassland farming for the area.

Research and demonstrations by public agencies are, however, only a guide to the preservation of our soils. Final responsibility lies with those who own the land and farm it. It is for them to put the better practices into effective use. To keep soils productive is an achievement; to improve them is an outstanding accomplishment.