Just in Passing...

We Greet You

With this issue of the FARM SCIENCE REPORTER, the Iowa Agricultural Extension Service and the Iowa Agricultural Experiment Station, begin a new method of presenting facts and information prepared especially for the farm people of Iowa.

For more than half a century the Iowa Agricultural Experiment Station has been publishing bulletins designed for farm people. The Iowa Agricultural Extension Service, founded later than the Experiment Station, has been issuing bulletins for more than 30 years. During that period more than 700 publications, designed for farm people, have been issued by these two large units of Iowa State College.

The Farm Science Reporter is planned to parallel in the other sciences the service which the IOWA FARM ECONOMIST (many of you are undoubtedly familiar with it) is giving to you in economics, rural sociology—the social sciences.

We are your "hired hands" at Iowa State College and we want to give information to you in the way you would like to have it. We hope that you will guide us in making this magazine provide the kind of service you would like in your problems on the farms of Iowa. We have already been urged to publish The Reporter by a committee of Iowa farmers who are members of the Iowa farm business associations.

This issue is our first step in this direction. We shall try to make it travel in the direction that will best serve you if we can find out how you would have it travel and have the ability to comply with your wishes.

R. E. Buchanan
Director, Iowa Agricultural Experiment Station

R. K. Bliss
Director, Iowa Agricultural Extension Service

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Apologies to You Women

The editor's ears are burning a bit yet, and his conscience is in a bad way, for he met a committee of farm women last month who had some very definite ideas about what they wanted to see in the FARM SCIENCE REPORTER.

And these keen thinking women did not wish to wait until April to have some home economics material in the magazine. They wanted something in the January issue.

But the magazine was all planned. In fact, we had more material laid out than we could get in. So the best we can offer is a very short article on preparing poultry for lockers (which you'll find on page 12) and the promise that things will be different next month.

We are planning to tell you in the next issue something about what happens to vitamin C (that's the vitamin which prevents scurvy, is tied up with growth, sore mouths, stiff joints, rheumatism) in various processes of preparing food for your family.

More About Trees

Those who are interested in more about the forestry studies made in Iowa, which are reported briefly in the article in this issue beginning on page 13, may be interested in obtaining a copy of Research Bulletin 269. The bulletins are free upon request from the Bulletin Office, Iowa State College, Ames, Iowa.

The Pasture at Your Right

The scene at the top of the opposite page shows a part of the purebred Holstein-Friesian herd on the State Hospital Farm at Mt. Pleasant on the pasture where studies reported in this issue were made.

FARM SCIENCE REPORTER

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PUTTING

New Life INTO PASTURES

Re seeding, Lime, Phosph ate Fertilizer at
Mt. Pleasant Brought Nearly Double Yields

MANY OF THE old permanent blue grass pastures in Iowa can almost be made “to feed two cattle where one fed before.” We found this out from a study of the problem at Mt. Pleasant during the 6 years, 1933 to 1938. In the past 3 years some 250 Iowa farmers in 45 counties have cooperated in demonstrating the possibilities of increasing the returns from permanent pastures by introducing clover into old grass sods and from applying lime and phosphate fertilizer in addition to reseeding.

When we reseeded and manured the land at Mt. Pleasant, the number of “animal-pasture-days per acre” increased from 97.8 to 174.9. That is, 1 acre of the untreated bluegrass pasture fed one steer or cow for 97.8 days, but an acre which was limed, reseeded (reseeded with sweet clover, alsike and red clover) and with phosphorus and potash fertilizers added fed one steer for 174.9 days. These were the averages for the 6-year period.

On the plot which was limed and reseeded, the animal-pasture-days increased from 97.8 to 133.1; on the plot which was manured and reseeded (with the three clovers), the animal-pasture-days increased from 97.8 to 174.9; liming, reseeding, adding phosphorus, potash and nitrogen fertilizers increased the animal-pasture-days to 151.7 days. The nitrogen fertilizer along with the other treatments did not pay, for it increased the cost and decreased the returns.

Our study at Mt. Pleasant was made in cooperation with the State Board of Control which furnished the land, the cattle for grazing, the lime, fertilizer, fencing and such other materials as were needed.

Mt. Pleasant Studies

The State Hospital farm at Mt. Pleasant, which is one of the 16 farms under the State Board of Control, turned over to us for the pasture improvement studies approximately 34 acres which had been in permanent pasture for many years. Part of this had once been in cultivation, but erosion and gullying had long ago made cropping impossible. The grass consisted mostly of Kentucky blue
Reseeding. The reseeding mixture used and the rate of seeding was 5 pounds of biennial white sweet clover, 3 of red clover and 2 of alsike clover per acre. This seed mixture was drilled into the grass sod the last of March or in the first days of April of 1933, 1935 and 1937. The drilling was done while the surface soil was wet and spongy, the discs of the drill being forced into the ground 2 to 3 inches.

Manure Top-Dressing. About 10 tons per acre of manure were applied evenly over the surface of pasture No. 2 in the winters of 1932-33, 1934-35 and 1936-37.

Lime. Lime at the rate of 3 tons per acre was broadcast over the surface of pastures 4, 5 and 6 late in April, 1933, at the same time that the first seedings were made. Tests of soil samples from different parts of the area indicated that 3 tons were sufficient to correct the acidity of the surface plow slice over most of the area—more than sufficient in some places and hardly enough in others.

Phosphorous and potash. Phosphorus and potash were applied to pastures 5 and 6 at the same time that the reseeding was done. Phosphorus in the form of 20-percent superphosphate was applied at the rate of 125 pounds per acre, and potash in the form of muriate of potash at the rate of 100 pounds per acre. The fertilizers were broadcast on the surface, assuming that the first rains would dissolve and carry them into the disc gashes where the clover seedlings would be coming on.

Nitrogen. Nitrogen in the form of ammonium sulfate was broadcast at the rate of 100 pounds per acre to pasture No. 6 about the first of April each spring, 1933 to 1937, inclusive. No application was made in 1938.

Measuring Results

We measured the relative productivity of the different pastures in animal-pasture-days, pounds in gain of animals and actual weight and composition of the herbage produced. For comparison in this discussion the animal-pasture-days record seems to be most useful.

The plan was to graze the pastures with 1-year-old steers, weighing in the neighborhood of 600 pounds each at the beginning of the pasture season. For a part of the 1933 season milk cows were used and in 1937 2-year-old dairy heifers. For the 1936 season 2-year-old steers, weighing in the neighborhood of 1,000 pounds, were used. An effort was made at the beginning of each pasture period to estimate the probable carrying capacity of the different pastures for the entire season when the animals got no supplementary feeding. When we found later that certain pastures were being grazed more closely or less closely than others, to even up the grazing, a sufficient number of animals was transferred from one pasture to another, after three daily weighings.

The animals usually were not placed on the pastures until after the middle of May when the grass varied in height from 4 to 8 inches, or more, because we expected the pastures to carry the animals through the dry summer period; also, it seemed desirable to allow the clover seedlings to make considerable growth before grazing was begun. We do not recommend this grazing management practice for general use.

In the accompanying table the animal-pasture-days per acre is shown for pastures 2 to 6, inclusive,
and for each of the 6 years, 1933 to 1938. In the first year of grazing we found that pasture No. 1, reseeded only, was not comparable with the other pastures. The grazing of this pasture was therefore discontinued so far as this study was concerned, and no results are included.

As an average for the 6-year period equally good production records were obtained from the manure-reseeded pasture (No. 2) and from the limed-reseeded-phosphated pasture (No. 5). Each had an average of 174.9 animal-pasture-days or 78.8 percent more than the untreated pasture (No. 3). The increased production on pasture No. 2 was due in the main to the manure top-dressing and not to the growth of clovers. Except on relatively small portions of this pasture where manure was not applied, there was very little clover. The vigorous, rapid growing, thick-sodded grass provided too much competition to allow the small clover seedlings to get established. At no time during the 6 years was there any significant amount of sweet clover on any part of the manured pasture. The soil evidently was too acid. This pasture had not been limed at any time.

Few farms produce anything like as much manure as could be used advantageously on the cropland. Since it appears that as good or better results can be obtained in pasture improvement by liming and getting clovers established in the grass sod, we believe that generally the manure could better be used elsewhere than on permanent pastures.

There is one exception to this general rule, however. In almost any permanent pasture there are points, slopes and knobs where the surface soil has been almost wholly lost by erosion and where the cover consists perhaps wholly of such weeds as poverty grass and Indian tobacco and where it is almost impossible to get clovers or grasses to grow. A top-dressing of stable manure applied on such areas during the fall or early winter will almost insure the success of seedings of grass or clover made the following spring. The manure gives the needed available fertility, mulches the surface and prevents rapid dry-

**Phosphorous Big Help**

In the sixth year of the test at Mt. Pleasant the limed, reseeded and phosphated pasture (No. 5) made an outstandingly better production than any of the other pastures, including the manured pasture (No. 2). In the first 2 or 3 years the manured pasture surpassed No. 5 rather consistently; in the fourth year there was very little difference; in the fifth year No. 5 was superior, and in the sixth, outstandingly superior. The lime and phosphorus on plot 5 so stimulated the growth of the sweet clover that we feared even the bluegrass might be weakened and smothered. The considerable amount of nitrogen evidently added to the soil by the sweet clover, however, greatly stimulated the growth of the grass so that at the end of the 6-year period there was an ideal combination. Sweet clover seems to have a decided advantage over any other clover for the improvement of pastures, because when once established it will reseed itself and volunteer in the bluegrass from year to year.

In pasture No. 4 which was limed but not phosphated, red clover and alsike clover predominated over a considerable part of the pasture, and the growth of sweet clover was not particularly vigorous.

Perhaps the most striking result on any of our pasture treatments at Mt. Pleasant was the greatly increased vigor and yield that apparently resulted from the phosphorus on the clovers, and especially on sweet clover. Pastures No. 4 and No. 5, which were side by side, were handled exactly alike except that 5 had an application of 125 pounds per acre of 20-percent superphosphate and 100 pounds of muriate of potash. The phosphate added about 40 animal-pasture-days as an average for the 6 years. We believe the increased growth of clover on No. 5 resulted from the phosphate application rather than from the potash, because on plots at Mt. Pleasant where the potash was omitted the growth of clovers was fully equal to that where both fertilizers were applied.

The results were relatively uniform in the different years. Pasture No. 4, which was limed and reseeded only, gave the smallest increase over the untreated pasture in each year, except the first, when the results were not considered significant.

Pasture No. 6 which in addition to lime, reseeding and mineral fertilizers (phosphorus and potash) received each spring until 1938 100 pounds of ammonium sulfate (at a cost of $2 an acre) produced less each year than the plot that received no nitrogen. It apparently is not profitable to apply nitrogen.
fertilizer in Iowa for pasture improvement.

**Is Liming Justified?**

Sweet clover is the best soil improving legume for the Corn Belt, but it will thrive only on soils well-supplied with calcium. Most of Iowa’s unproductive pasture soils are acid, so sweet clover cannot be used in any improvement effort without applying lime.

The pastures and portions of pastures at Mt. Pleasant that were not limed had no sweet clover. There were considerable areas on some of the limed plots with a good stand of red and alsike clover but no sweet clover. These areas had not received enough lime to correct the high acid content of the soil.

It is important that sweet clover be included in any pasture improvement seeding, not only because of its value for pasture and as a soil builder, but also because this is the only clover adapted to the Corn Belt which can be expected to reseed, maintaining itself from year to year in a bluegrass pasture by voluntering from shattered seeds.

When a pasture is to be limed and reseeded the lime should be applied well in advance of the actual time of seeding. In 1933 and 1934 there was no sweet clover in the Mt. Pleasant pastures even though seed of this clover made up half of the quantity sown. This was because we could not get the lime on in advance of the seeding but had to apply it at the same time.

The increases in the yield of pasturage in these years were evidently due entirely to the red and alsike clover. Both of these clovers are considerably more tolerant of acid soil than sweet clover, but they grow much more vigorously and make larger yields on limed soils or on soils that are naturally sweet.

**Seedbed; Seed Early**

When the stand of grass is thin and the growth weak, splendid stands of clover have been obtained by drilling early while the ground is loose, forcing the discs into the ground from 2 to 3 inches. But at Mt. Pleasant, on those parts with a good strong grass sod, little or no clover stand resulted; the grass apparently smothered the new seedlings.

Under average conditions we believe that discing the grass sod thoroughly in the very early spring, or late the preceding fall will be necessary. If lime is applied in the fall, we suggest that the discing be done afterward but before winter sets in. The seed can then be broadcast in late March and the phosphorus applied at the same time, these operations to be followed by harrowing or, if the surface is dry enough to permit it, by firming with a cultipacker or roller.

From many seedings observed, we have concluded that if it is not possible to seed very early in the spring while there is plenty of moisture in the soil and it is loose from the freezing and heaving of winter, the expense of seed and seeding had better be saved by not seeding.

If the discing is done in the late fall, there is no reason why the seeding cannot be done early in the spring, almost regardless of soil or weather conditions.

The clover mixture used on the pastures at Mt. Pleasant, and more generally than any other over the state, is 5 pounds of biennial white sweet clover, 3 of red clover and 2 of alsike clover per acre. We recommend this mixture for limed soils and especially those which may be somewhat low in fertility. On soils which have not been limed and are likely to be acid, omit the sweet clover, increase the red clover to 5 pounds and the alsike to 3.

**In 2 of the 6 years at Mt. Pleasant heat and drouth in midsummer made it necessary to take the animals off the permanent pastures entirely, and in other years animals lost weight for several weeks in midsummer. Sudan grass has outstanding value for summer pasture. A planting of this grass made in the latter part of May will provide a large amount of palatable, succulent, nutritious pasture for 6 weeks in midsummer just when Kentucky bluegrass is at its worst.**

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**NUMBER OF ANIMAL-PASTURE-DAYS PER ACRE, YEARLY, 1933 TO 1938, INCLUSIVE, AND PERCENT OF THE AVERAGE OF THE UNTREATED PASTURE.**

<table>
<thead>
<tr>
<th>Plot No.*</th>
<th>1933</th>
<th>1934</th>
<th>1935</th>
<th>1936</th>
<th>1937</th>
<th>1938</th>
<th>Six-year average</th>
<th>Percent of check</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>99.8</td>
<td>152.6</td>
<td>332.3</td>
<td>88.4</td>
<td>212.7</td>
<td>163.6</td>
<td>174.9</td>
<td>178.8</td>
</tr>
<tr>
<td>3 (Untreated)</td>
<td>49.6</td>
<td>75.9</td>
<td>172.4</td>
<td>53.6</td>
<td>112.6</td>
<td>122.9</td>
<td>97.8</td>
<td>136.1</td>
</tr>
<tr>
<td>4</td>
<td>88.7</td>
<td>120.6</td>
<td>219.6</td>
<td>70.4</td>
<td>140.3</td>
<td>159.2</td>
<td>133.1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>80.0</td>
<td>141.1</td>
<td>308.0</td>
<td>85.6</td>
<td>218.1</td>
<td>216.4</td>
<td>174.9</td>
<td>178.8</td>
</tr>
<tr>
<td>6</td>
<td>76.5</td>
<td>124.4</td>
<td>256.9</td>
<td>77.5</td>
<td>196.4</td>
<td>178.2</td>
<td>151.7</td>
<td>155.1</td>
</tr>
</tbody>
</table>

*Treatments of the various plots were: No. 2—manured and reseeded; No. 3—no treatment; No. 4—limed and reseeded; No. 5—limed, reseeded, phosphorus and potash; No. 6—limed, reseeded, phosphorus, potash and nitrogen.*
Many Experiments Show They Are Well Adapted to Needs of Chicks, Laying Hens and Turkeys

By H. L. WILCKE

FOLKS ARE GOING to feed a lot more oats to their poultry in the next few years if they agree with the conclusions we have reached about their value here at the Iowa Agricultural Experiment Station.

Our experiments over a period of about 5 years show that oats are the best single grain for young growing chicks, turkeys and excellent for laying hens, too. Experimental work elsewhere also indicates that oats are highly valuable as a poultry feed.

Here are a few of the conclusions we have reached about oats as a result of our own experiments and those of others:

1. They are the best single grain for poultry of those commonly available in the Corn Belt (this includes corn, wheat, barley and oats).
2. Up to 40 percent, or perhaps even more, of the ration of the growing chick, the laying hen and the turkey may well be made of oats when the quality is good and the price justifies it.
3. Chicks fed on a ration that is high in oats will grow faster and feather more rapidly than on any other common grain.
4. When laying flocks are fed only one grain, mortality is least with oats.
5. Whole oats reduce cannibalism and feather picking in growing and laying flocks.
6. Chicks from hens on a high oat ration have more vigor than those from hens with a high corn ration.
7. Hens will not lay as many eggs if oats are the only grain used as they will if corn is the only grain fed.
8. A high oat ration produces chicks with light or no yellow pigment in the beaks and shanks.
9. Even oats as light as 17 pounds to the bushel may be ground and used successfully in the mash of growing chicks, laying hens or mature turkeys when the amount is limited to 28 percent or less.
10. For fattening rations, oats are far less efficient than corn.

Slipped Tendons

We started testing the value of oats in poultry rations some 5 years ago as the result of a Canadian publication which reported that when chicks were fed high percentages of corn in starting and growing rations their bone development was poor—many of the chicks had abnormal leg bones—and there were many slipped tendons. The Canadians reported further that when they added wheat germ, or oat hulls and wheat germ, or complete oats that the leg malformations were prevented.

Corn is a pretty important crop in Iowa! We wanted to know whether this charge the Canadians made about it as a poultry feed was correct. We had considered corn a valuable poultry feed. Should Iowa poultrymen be feeding less corn and more of some of the other grains? We wanted the answer.

The first series of experiments was designed to test the efficiency of oats, corn and wheat in preventing slipped tendons in chicks. In other words, we were following up the charges of the Canadians. To make such a test, the rations were made up as simply as possible. Only one grain was used with each lot of chicks, the grain being supplemented with what we thought should be the necessary vitamins and minerals. We did not expect that these rations would be practical on the farm, but it was necessary to make them simple in order to find out the exact effect of each grain. The test rations were as follows: The test grain (corn, wheat or oats), 72 parts; dried skim milk, 25 parts; ground oyster shells, 1 part; steamed bone meal, 1 part; salt, 1 part; and cod-liver oil, 1 part.

When we started this test, we expected that the chicks on the oats, with its high percentage of fiber, would grow rather slowly and perhaps show a high mortality. But the opposite was true—the oat-fed chicks were uniformly larger than any others in the experiment, and the corn-fed chicks were smallest. In this experiment there was a heavy mortality in the wheat-fed chicks, most of the deaths occurring between the fourth and fifth weeks. There were no slipped tendons in either the oat or wheat groups, but there were in the corn group.

Corn has less protein in it than wheat or oats, so we decided to even...
Same age, same care and feed except the two 8-week old chicks at the left got oats and the two below corn. Those which got oats as the only grain gained more rapidly, feathered more quickly, were healthier and better in all respects than those that got only corn. The grains were supplemented with dried milk, oyster shell, steamed bone meal, salt and cod-liver oil. Note that the left chick, of the two below, has a slipped tendon. Many of these occurred when corn was the only grain fed. Also, those on corn had rough, shaggy feathering, as shown in this picture.

Oats seem to have something about them that prevents cannibalism, one form of which is feather-picking. The factor which speeds growth and feathering apparently is in the hulls.

up the protein content and thus give corn a better chance to show its value. We found that oats even at a lower protein level produced much better growth than corn in this type of diet. When we fed oats as 90 percent of the ration, with only 5 percent dried milk, the growth of chicks was much more rapid than on corn as only 72 percent of the ration and 25 percent dried milk. Besides the more rapid growth of these chicks on practically an "all-oats" diet, they feathered much better than those getting only 72 percent of corn and 25 percent dried milk. Both the oats and wheat lots were much better feathered than the corn lots. The high corn ration produced a characteristic, ragged feathering appearance.

Test with U.S.D.A.

Our next attack on the grain problem was to find out whether or not some of them tended to produce rickets in chicks, even when sufficient minerals and vitamin D were in the ration. Some evidence had been produced to show that oats had this tendency. This "rickets" experiment was carried on in cooperation with the United States Department of Agriculture at the National Agricultural Research Center, Beltsville, Maryland.

In the experiment at Beltsville, oats, corn and barley were used as single grains in the rations, and, in addition, oat hulls and hulled oats were added to wheat and corn in an effort to find out which part of the oat kernel, if any, had this rickets-producing effect. Other lots of chicks were fed combinations of whole oats along with corn, barley and wheat.

In these experiments in cooperation with the U.S. D.A., using entirely different strains of chicks from those used at Ames, the lots on oats and those getting a combination of oats and barley produced the best growth, followed in order by the barley, wheat and corn diets. Again, as at Ames, the corn diet gave the poorest growth, oats the best. The addition of 20 percent of ground oat hulls, ground hulled oats or ground whole oats to corn or wheat diets increased the rate of growth and improved the quality of feathering of the corn-fed chicks.

The tests with the U.S. D.A. disclosed that none of the grains had a rickets-producing effect in chicks.

So much for the value of the grains for the growing chicks. Would pullets reared on a ration high in one of the grains be as healthy and lay as well as those on other feeds? To answer that question, we continued some of the pullets through a complete year of egg production on these high single-grain rations, and other pullets which had been reared on the usual mixed ration were changed to rations made up with corn, wheat or oats as the only grain.

The pullets on the oat diet continued through the year in a quite satisfactory manner, but those on the wheat diet showed a heavy mortality after about 3 months of production. The pullets which had been reared on the corn ration were so poorly matured, poorly feathered and afflicted with slipped tendons and other deficiencies that they could not be continued on this diet.

For egg production, corn seemed to have more value as a single grain than oats or wheat. And this was at least "score one" for corn. On the other hand, mortality was lowest in the group which got the high oats ration.
Fertility of the eggs was not affected significantly by the different rations, but hatchability was best with the eggs from the wheat-fed birds, followed by oats. Corn and the mixed grains were approximately equal. Hens on wheat or oat rations produced chicks with more vigor than those on corn.

Cannibalism

Experiments conducted at the Western Washington Station at Puyallup, Wash., have shown that oat hulls in the ration will help prevent cannibalism or feather picking in growing or laying flocks. We have worked under way at the Iowa Station to throw additional light on this point. Observations on the college flock have indicated that there is something about oat hulls which helps prevent cannibalism and feather picking.

One of the things we are trying to do now at the Iowa Station is to find out just what it is in the oat kernel but not present in corn that is necessary for the nutrition of chickens and turkeys. Perhaps if we can "put our finger" on the right factor, just a little addition of "something" to the ration will again place corn in the high esteem of the poultryman which it has had in the past.

Oat Hulls Help

For the past 2 years we have been carrying on experiments in which oat hulls have been added to diets made up with corn and with oat groats (hulled oats) as the only grain. We have found that up to 30 percent of oat hulls added to a corn diet or to an oat-groat diet will stimulate growth, produce more rapid feathering and better quality of feathers in chickens.

Our experiments with oats, in comparison with corn, have included turkeys, too. We got much the same results with turkeys as with chicks.

Poults were reared successfully on a diet containing 77 percent ground whole oats, with milk as the protein supplement. Oat-fed turkeys when fed at the same level of protein grew much more rapidly and feathered much better than similar birds on a corn ration. The corn-fed turkey poults required about 6 weeks longer to reach the marketing stage when judged from the standpoint of weight and freedom from pin feathers.

Most of our experimental work with oats has been done with oats weighing from 28 to 34 pounds per bushel. But we have used successfully in chick rations oats weighing only 17 pounds to the bushel. Oats this light did not work so well in turkey rations.

What is the significance of all this work with oats? We are recommending a more liberal use of oats in poultry rations. Rations such as those used in the experiments described here are not practical because when oats make up the major part of the ration, the only source of vitamin A is in the fish oil. There is grave danger, therefore, that if the feed is not mixed frequently with an oil of high potency, there will be a vitamin deficiency.

This high oat ration also produces chicks with light or no yellow pigment in the beak and shanks. This may be undesirable from the standpoint of those who sell breeding stock. It should be pointed out also that all of the experimental work has been done in complete confinement and that the birds have not had access to green range. It is apparent to us that too much emphasis has been placed on low fiber in poultry rations in the past and that feeds may be utilized more efficiently if the fiber is not kept at a minimum.

The mixed grain type of ration is still recommended in preference to a ration made up with any single grains, because there are certain deficiencies in each grain which may be supplemented by another.

Much work remains to be done with the grains, but the work has progressed far enough to make a definite recommendation that up to 40 percent or perhaps even more of the ration of the chick, the growing hen or the turkey may be made up of oats when a good quality of oats is available and when the price justifies such usage, although it appears that it would be advisable to reduce the amount with extremely light weight grains. While the grains will be ranked in the order of oats, barley, wheat and corn for growth, they would be ranked almost in the opposite order for fattening, that is, corn, barley with oats and wheat equal.
Iowa’s Wildlife Is Increasing

Farmers, Sportsmen are Working with State and Federal Agencies in a Conservation Program that is Getting Results

By THOMAS G. SCOTT
Leader, Iowa Cooperative Wildlife Research Unit

and

GEORGE O. HENDRICKSON
Assistant Professor in Wildlife Management, Iowa State College

could be made from the sale of skins, many of them turned to hunting and trapping wildlife beyond the demands of necessity. Thus began the depletion of many forms of Iowa wildlife.

Depletion

With the building of railroads and the cutting of roadways the settlers found agricultural operations more and more profitable. New settlers came, miles of fences were built and more land was placed under cultivation. Depletion of such larger forms of wildlife as elk and buffalo was inevitable, as was the restriction of habitats in general. With land values and profits in farm products increasing, more land was brought into cultivation. Wildlife populations continued to decline, the habitats of the animals were increasingly restricted, and the way was paved to overproduction, glutted markets, poor prices and eroded soils. The people as a whole were too close to the operations to realize fully their trends and results, and besides wasn’t everyone making money? Even before the crash conservative administrators suggested a thorough appraisal of our natural resources. The suggestion was followed up and from it sprang “The Iowa Twenty-five Year Conservation Plan.”

Twenty-Five Year Plan

In 1931 the State Legislature instructed the State Board of Conservation and the State Fish and Game Commission to collaborate in the preparation of a long-term conservation plan and program. Those two bodies gathered together the history of natural resource utilization, an analysis of its direction and causes, and a plan for achievement of a more orderly husbanding. Here laid open were such eye-sores as soil erosion, pollution, silting, woodland stripping and destruction of wildlife. A broad, general program was outlined for the following 25 years. There remained, however, more obvious than before the need of active and continued investigation of the basic phases. In wildlife conservation Mr. J. N. Darling came forward with a plan to correlate the efforts of the Iowa State Fish and Game Commission and the Iowa State College along these lines. So enthusiastic was Mr. Darling that he agreed to share in financing the work. A 3-year cooperative program of research and education was completed so successfully by 1935 that the participants were encouraged to initiate a broader program for a longer term of years.

Cooperating Agencies

Federal agencies led by the Soil Conservation Service and the Agricultural Adjustment Administration entered Iowa to cooperate with the state agencies which were already attempting to conserve. The Iowa State Conservation Commission, the American Wildlife Institute, the Iowa State College and the United States Biological Survey agreed to cooperate with the state agencies to correlate the efforts of the Iowa Cooperative Wildlife Research Unit. Mr. J. N. Darling came forward with a plan to correlate the efforts of the Iowa State Fish and Game Commission and the Iowa State College along these lines. So enthusiastic was Mr. Darling that he agreed to share in financing the work. A 3-year cooperative program of research and education was completed so successfully by 1935 that the participants were encouraged to initiate a broader program for a longer term of years.
It was soon realized that sound wildlife management techniques and practices could not be formulated overnight. A thoroughgoing investigation of each form of wildlife and its habitat was necessary. This task, complicated by the many forms of wildlife and by the various types of habitats, including seasonal and annual variations, simply could not be completed during these first 4 years.

The investigations of the Unit were vigorously pursued along four principal lines: (1) Development and improvement of practical census techniques; (2) determination of the economic importance of wildlife; (3) analysis of factors producing fluctuations in wildlife populations; and (4) the testing and improving of techniques and practices in wildlife management.

All the research findings were submitted in special reports to the cooperating agencies. Through them the findings were adapted to and released for use in the education and action programs of wildlife conservation.

It was soon recognized that the wildlife crop was tangible and that much could be done to restore and conserve it. Because of an effort over a period of several years the Iowa State Conservation Commission now has the lawsmost needed for the proper administration of the wildlife that it holds in trust for the people of Iowa. The Commission is so empowered that it may adjust the harvest of wildlife to the available surplus, and thus provide for a restrained and orderly utilization of this resource.

Conservationists are cognizant of the common-sense value of such a program and lend their wholehearted support to Commission regulations. This exhibits a purposeful form of public unity and cooperation of which Iowans may well be proud. Let us consider cross-sections of the progress that has been made.

Guarding Seed Stock

During the extremely cold winter of 1935-36 many pheasants died of exposure, and the poor nesting season that followed did not increase their numbers. Hence the following two seasons were declared closed to hunting, and the seed stock was zealously guarded. In the meantime a new game farm established by the Commission near Ledges State Park produced several thousand young pheasants that were cared for by conservation clubs for a few weeks and then released on farm lands previously prepared for the birds. This has served principally to unite the interest and efforts of farmers, sportsmen and commissioners in the management of upland game birds. The seed stock was guarded carefully against the reduced number of poachers, and the improved cover and food conditions increased natural repro-

About 38 years ago the ring-necked pheasant was accidentally introduced into Iowa. At that time, during a severe windstorm about 2000 birds were released to the wild when their pens were blown apart on the farm of William Benton near Cedar Falls. This original stock has been supplemented by birds set free by state game authorities and citizens. The pheasant has increased and held its numbers better in the northern five tiers of counties than in the southern four tiers, but in several localities of southern Iowa the ringneck is becoming more numerous. Drouth, insect damage to food and cover, over-shooting and severe winters have at various times greatly reduced the pheasant population. With methods of hushanding being continually improved, such losses should be minimized.

A Windstorm—Then Pheasants!

About 38 years ago, William Benton, a farmer living near Cedar Falls, was raising ring-necked pheasants. A severe windstorm hit his farm, blew the pens apart and released about 2,000 of his birds to the wilds. This original stock has been supplemented by birds set free by state game authorities and citizens to build the pheasant population of today.
duction. This year, 1939, the pheasant population was such that it was deemed advisable to enlarge the shooting grounds.

Greater insight and improved methods have provided for better administration of the quail surplus. When agriculture became established in Iowa, habitats superior to those offered by the unbroken prairie were created. At first quail increased in numbers but decreased later with the removal of brushy fence rows and wooded areas. In 1916 the season on quail was closed, and it was not opened again until 1933 and then only experimentally on limited areas. The soil-erosion control work, has done much to restore cover for quail. The "heaviest population of quail in memory of old time hunters and farmers who have lived in quail territory for years" has been reported this year (1939). That zealous protection of the wildlife seed stock has paid dividends is evidenced in the history of all our game animals.

The Farmer's Role

The Iowa farmer today finds a new world of interest on his lands. He appreciates wildlife and values it not only for the profits it may bring but also for the recreation gained in observing and hunting it. To insure a continued population of wildlife the farmer now recognizes the part he must play, and hence gives serious consideration to the food and cover necessary to restore, increase and maintain wildlife.

It is recognized that in winter game birds may have great difficulty getting enough to eat. In such times of stress the birds may wander from the home range in search of food, and finding it elsewhere are not likely to return, much to the farmer's loss. If food is not found, the birds will die from starvation and the continued cold. Without a good food supply in extremely cold snaps, quail may live but a few days and pheasants not much longer. Predators may take many birds that are weakened by starvation and cold. Through such losses the farmer has learned that winter feeding is sometimes one of his most effective conservation measures. Some farmers leave a shock of corn near protective cover such as thickets, tall weeds or grasses for wildlife. Some men find it more convenient to do this than to leave a row of corn near cover or to build feeding stations.

Many farmers now encourage game birds to seek shelter about their barns and groves during extremely cold periods of winter. Today farmers protect thickets, sloughs, marshes, fence rows and waste areas from over-grazing, burning and other destruction, thus adding to the cover provided by their groves and decreasing the mortality of pheasants through exposure to the cold blasts of blizzards and strong winds. Furthermore, the good farmer profits from moderate grazing and knows that burning of fence row cover does not control harmful insects and weeds. Instead the fire destroys fences and causes weed seeds to germinate in larger numbers.

Farmers know that places for nesting and rearing the young are important. Old stands of grass such as are found along fencelines are known to be especially valuable, for many of the birds nest early before there is a new growth from which to build a nest.

The Sportsman's Role

The sportsman has learned that much can be done for his recreation by wise personal conduct in the field. He finds a welcome sign each year at the farm home where respect has been shown for the farmer's property and family, and what is more important, good friends are there to welcome him. He realizes that his sport is worth paying for and finds it of value to remunerate the farmer in some manner for making his days in the field possible.

The sportsman's code requires a diligent search for injured birds, and a good retrieving dog greatly increases the chances of finding the cripple. The training of a good dog is a pleasure in itself, and its use will bring the hunter increased satisfaction in hunting.

The sportsman does not shoot more than the law permits. He knows that trained observers have spent many hours in the field checking populations so that hunting dates and bag limits may be set to furnish him with the greatest possible number of birds and yet leave seed stock for the next season. He finds obedience of the law common sense and good business.

Where wildlife is found in flocks or coves the sportsman understands that to tenaciously hunt down and kill each individual in the flock or covey may deprive him of birds to hunt in that locality the following season. Here, as in other instances, the sportsman has come to realize that much responsibility for the success of his sport rests squarely on his shoulders; for regulations, no matter how complete, cannot entirely substitute for good judgment and self-control.

Conclusions

Conservationists throughout Iowa are to be commended for the progress made in the conservation of their wildlife resources. If the courage they have demonstrated during recent years may serve as evidence, there is no question but that they will continue to carry the program forward. Progress has been made, and the way has been opened to new successes.

PREPARING POULTRY for LOCKERS

If you put poultry in your cold storage locker, it makes little difference in the flavor and aroma when cooked whether you washed the drawn birds with running water or whether you merely "wiped" them dry before freezing them up. The "washed" birds may present a better appearance, however, because the skin is not likely to appear so dry.

These are conclusions reached in an experiment conducted jointly by the Home Economics and Poultry Husbandry staffs of the Iowa Agricultural Experiment Station. The experiment was carried on with 24 roasters, half of which were "wiped" and half of which were "washed." At the same time a similar number of roasters was washed and kept at 32 degrees F. to compare unfrozen with frozen birds.
A B O U T  T H E S E  I O W A  F O R E S T S . . .

Experiment Station, Extension Service and Government Cooperate to Improve Woodlands

I F Y O U THINK of forests as vast areas of mountain lands covered with towering evergreen trees, you may find it hard to believe that more than one-fourth of the commercial forest land in the United States today is represented by farmers' woodlots. An individual farmer in, let us say, Davis or Boone County, Iowa, can be forgiven for thinking that his 5, 10, or 20-acre woodland is practically worthless to him, and consequently cannot be of much importance to the country as a whole. But when that small area is multiplied by several million farms between the Atlantic and Pacific Coasts, the total farm woods area comes to about 127 million acres. This is a lot of land.

Iowa farmers have, in the aggregate, between 1 1/2 and 2 million of these 127 million acres. The whole state is concerned in the management of its forest areas, because these lands ought to pay their own way. If they do not produce enough to pay taxes, plus a reasonable income on the investment, then the rest of the land in the state must support the woods areas.

Consequently, the Iowa Agricultural Experiment Station has started a series of studies in which it hopes to find out, first of all, if the farm woodlands are in good producing condition; if they are well-stocked with high-quality trees, and if they are being managed in such a way that they will remain productive indefinitely. A second objective is to find out how much wood and how much revenue an acre of Iowa farm woods ought to produce. Finally, if they are not producing as much as they should, we want to find out what needs to be done to increase production.

Federal Support

The federal government has long shown an interest in farm forestry. A recent evidence of this was the congressional appropriation under terms of the Norris-Doxey Cooperative Farm Forestry Act for the encouragement of good farm forestry practices in all the states.

A state-wide plan for putting this act into operation has just been completed by Prof. G. B. MacDonald, State Forestor, and members of his staff. The execution of this plan will depend upon close cooperation of the farmers and the Forest Service.

By CHARLES M. GENAUX and JOHN G. KUENZEL

Left: A farm woodlot that was pastured, even though it provided little feed. It has no young trees to take the place eventually of those now present.

Below: An unpastured farm woodlot. Note the young trees in contrast to the pastured woodlot above.

Photo by U. S. Forest Service
cooperation among workers in a number of agencies, including the U. S. Soil Conservation Service, U. S. Forest Service, Iowa State Conservation Commission, Iowa Agricultural Extension Service and the Iowa Agricultural Experiment Station.

In 1924 the Clarke-McNary law made provisions for federal cooperation with the states in several important phases of farm forestry. One section of this law authorized the cooperative production and distribution of planting stock for farm woodlot, windbreak and shelterbelt planting. Trees are growing at Ames in a forest nursery owned by the Iowa State Conservation Commission. The federal government, through the United States Forest Service, contributes up to $2,000 a year which is expended, along with a somewhat larger state appropriation, for the production and distribution of trees from this nursery.

It would be difficult to estimate the dollars and cents value of the benefits that this state has derived from participation in cooperative tree distribution. Up to 1939, 4,775 acres of private, municipal and state land had been planted in Iowa. State and federal forestry agencies distributed a total of 1,865,000 trees in the spring of 1939. Farmers pay only about half the actual cost of production for the trees they receive under the Clarke-McNary program, because the government does not permit the state to recover from farmers more than the state's share of the cost of growing the plants. In return for this consideration, farmers are required to use the trees for farm forestry purposes only, and not for decorative or landscape planting, nor for resale.

Extension Forester

Another section of the same law provided additional funds of up to $2,000 annually to match a similar state appropriation for the employment of an extension specialist in forestry. Iowa's extension forester is Mr. Guy R. Ramsey. He has a wide variety of tasks, not the least of which is supervising the distribution of farm tree-planting stock. He not only receives the orders for trees, but works closely with the local county agricultural agents in helping farm owners to properly prepare their planting areas, to select the right kind of trees for their special purposes and to care for the plantations until they are well established.

Don't Pasture Woodlot

The United States Forest Service, through the Central States Forest Experiment Station, has participated actively with the Iowa Agricultural Experiment Station in cooperative studies of the quality of the timber in some of our forest stands. Results and recommendations from these investigations are now in press. Studies made in stands of mixed oaks and hickories in southeastern Iowa showed that many woodlands in that section of the state were below par. In too many cases the woods were given over to pasture. The result of this kind of use was almost always a third-rate pasture and a very low-grade woodland.

This was not an altogether unexpected finding, because other states have had the same kind of a problem to deal with. In the Lake States, for example, in timber similar to ours, it was found that there was less money in pasturing woods than there was in either pasture or woods alone. It was finally recommended there that the farmers clear off from one-fourth to half of their woodlands and get a good bluegrass sod on this part of their so-called "woodland pasture." This would give them a first-rate pasture. Then by fencing livestock out of the rest of the woodland, they would also have a creditable farm woodlot. Present studies indicate that we may take a lesson from their experience.

Anyone knows, of course, that good bluegrass pasture does not grow under timber that is even moderately dense. It seems often to be overlooked, however, that timber must be fairly dense in order to produce good clear logs. Even a dairy herd grazing in woods will injure the bark of some trees so that insects and decay get through to the wood and seriously damage, if not eventually kill the trees. They also nip the tender tops from young sprouts and seedlings. Steers often "ride down" young saplings and strip the foliage. The result is always the same—fewer trees in the stand.

When a timber stand is thin or open, the lower branches fail to die and break off as they should, so that big trees are usually limby and of poor quality. It may be perfectly good pasture management to have shade trees in the pasture. It is not good woodland management to have cows in the woodlot. It is unfortunate that the term "woodland pastures" has been widely used. Such areas are either woodland or pasture; they cannot be both.
Forest fires hold no terror for the average Iowan. Yet we have found in our forestry studies that woods fires have done considerable damage in the state. We are apt to think of forest fires as devastating hundreds or thousands of acres and being of little consequence except in the great commercial forest areas.

The fact is that a great many young trees are killed annually by the harmless looking surface fires that are so common in the spring of the year all through the state. These same fires do a variety of other kinds of damage. They destroy food, cover and nesting places of wildlife. They consume leaves and twigs that would otherwise go into building up the soil. They make scars in the buttlogs, through which insects and decay get into the best parts of the trees. Besides this, it is questionable—at least there is no proof—if such fires do any good in controlling weeds and crop-destroying insects. It may be that by driving out insect-eating animals and birds fires ultimately increase these insect pests.

Logging injuries, lightning scars, frost-cracks, wind, snow and ice-breakage may be more or less important, depending upon the location and climate. Some of these can be controlled to a large extent by a farm-owner who has an area small enough that he can give detailed supervision to his woods. He can cut out the injured or defective trees first and keep the straight clear specimens for later harvest.

**Leave Good Parents**

Poor management results where owners cut young trees just when they are beginning to put on their best growth. It takes about 15 years before a young white oak, for example, is big enough to start putting on any considerable volume growth. If it is left for another 15 years, before being cut, it will make wood a lot faster during the second period. Young trees are not so valuable for fence posts and mine props as the older ones, either, because this kind of product needs to be made up partly of the decay-resisting heartwood. Heartwood is always small, if not entirely lacking, in the very young trees.

“High-grading”, or in other words, consistently taking the best tree out of the woods when timber is needed around the farm is faulty woodland management. Obviously in forestry, just as in livestock breeding, the poorer the parents the poorer the offspring. If, for instance, all the good white oaks are taken out, leaving a mixture of elm, ironwood, inferior white oak, hickories and black oak, the next generation is likely to have a smaller proportion of white oak, and these from poor parent stock.

A more comprehensive statement of the experimental work so far completed is to be found in Research Bulletin 269, copies of which are available upon request to the Bulletin Office, Iowa Agricultural Experiment Station, Ames.

The determination of actual volumes of standing timber and of potential returns from Iowa farm woodlands is being studied now but requires a somewhat longer time for completion.
LAST YEAR IOWA farmers grew 40,000 acres of flax, the most in many years. They will probably grow a still larger acreage in 1940 because of the yield and price of the 1939 crop, and as in 1939, they may grow and harvest flax under the 1940 AAA program without having it count as a soil-depleting crop providing it is used as a nurse crop for clover, alfalfa or grass seeding.

The average yield of flax last year in Iowa is estimated to have been 10½ bushels per acre. With the price around $2 a bushel, the returns were good from many acres that under the AAA program could not have been used for corn, oats, soybeans or any other grain crop. That’s why so many Iowa farmers who have never had any experience with flax are becoming interested.

In the main, flax can be sown and handled throughout growing and harvesting with the same machinery as any other small grain crop. It can either be sown with a drill or broadcast with a seeder. About 3 to 4 pecks of seed per acre are required for the best yields. A firm to hard seedbed is desirable. If the seed is drilled, it should be covered not over an inch deep. If it is broadcast, it is best covered with a harrow and should then be rolled afterward. It is almost impossible to get a seedbed too firm for flax.

Sow Early

In the past 10 years of experiments at the North Iowa Experimental Farm at Kanawha and at the Iowa Agricultural Experiment Station at Ames, we have found that the one thing most important to a successful flax crop is to sow the seed early.

In the 10 years at Kanawha and Ames we have seldom obtained or observed a satisfactory flax yield when the seed was sown as late as May 1, and we have seen many failures from seedings in the last week of April. We believe that the number of failures increases rapidly with each day in delay of sowing after the middle of April.

Early seeding is essential for several reasons. First of all, it permits the flax seed to germinate ahead of the weed seeds. Flax is a poor weed “fighter.” A good stand of sturdy flax plants with an early start can compete with the foxtails which germinate late, but it cannot compete with the large weeds such as pigweed, giant ragweed, lambsquarters and others found around the barnyard. Thus the best place for flax is usually following a well-cultivated, clean corn crop.

Early sowing also aids in getting a stand when the seed is treated with New Improved Ceresan dust it prevents the seed-rotting fungi from ruining the stand. Later in the season, seed treatment may do little good. The treatment advised is ¼ ounce of New Improved Ceresan for each bushel of seed. The dust at this rate costs only about 1½ cents per acre.

Dusting Helps

We obtained satisfactory yields and increases of about 1 to nearly 4 bushels an acre from seed treatment in our experiments in the earliest sown flax in each of 3 years. Later sown flax seldom yielded well and was not benefited by seed treatment.

In 1935 treated seed of six out of nine flax varieties, including Bison and Red Wing, in the test produced nearly satisfactory stands following corn on sweet soil. In a similar experiment on acid soil only treated seed of Red Wing produced a satisfactory stand. We also found that a fallowed soil encourages the seed-rotting fungi. It seems advisable to stir the soil, usually by disk ing, just before sowing flax.

Red Wing Best

The two best flax varieties for Iowa are Red Wing and Bison. Red Wing usually can be sown a week later than Bison and still produce a satisfactory yield. This means that when sowing is unavoidably delayed, Red Wing is a safer variety to use than Bison.

Red Wing has these other advantages: It is more resistant to damping-off fungi in the soil, and if it has been sown early it will mature just following small grain harvest. In Iowa this is usually a safer time than later when rains are more prevalent. Flax is difficult to harvest in rainy weather because it stays green and starts to grow and blossom again.

If all conditions are favorable, Bison outyields Red Wing, but this means that planting must be very early, harvest somewhat late, and that high temperatures do not occur at blossoming time to cause too many empty bolls. On the whole, we consider Red Wing the better adapted variety for Iowa.

WANT MORE ABOUT FLAX?

If you’d like more information about flax growing, ask your county agent for Bulletin 344 “Flax as an Iowa Crop,” or you may obtain a copy from the Bulletin Office, Iowa State College, Ames, Iowa.

Early sowing of flax gives a wider choice of soils. If conditions are most favorable for the development of the seed-rotting soil pathogens, stands are often ruined in spite of seed treatment. Flax cannot be sown successfully as late on acid soils as on sweet soils, and seed treatment is of value only on the very early plantings. It is easier to get good stands of flax on sweet soils, and seed treatment on sweet soils is often beneficial as late as May 1.