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Just in Passing...

It's Our Birthday

With this issue FARM SCIENCE REPORTER starts its second year. The publication is a year old.

Now that many of you have had a chance to follow it for a year, won't you give us the benefit of your judgment about it? Have we given you what you hoped to get, or where have we failed?

One of the defined purposes of the magazine was to present material in a shorter and more easily read form than it might have been given to you in a bulletin. Have we done that successfully? In cutting the corners have we been too brief? Have you had many unanswered questions at the finish of reading an article (we hope at least a few of you have finished reading some of the articles)? On the other hand, have some of you felt that our articles were too long and that briefer items, with more of them and fewer illustrations would be desirable?

These are questions we wonder about. You can help us. About the time this issue will be mailed, a letter will be mailed to some of you asking some of these questions. Hadley Read, a graduate assistant of the Bulletin Office staff is making a study of the FARM SCIENCE REPORTER and the IOWA FARM ECONOMIST issues. You will be of tremendous help if you will fill out this brief questionnaire and return it. It will require no postage.

Civet Cats and the Rat Fight

You may not be able to—or want to—battle rats on your farm with civet cats, but the report of experimental work carried on by Wilfred D. Crabb in this issue, we think you will find interesting.

In his work with civets over a considerable period, Mr. Crabb has devised a kind of trap for catching the civets—a sort of box affair that doesn't hurt the civet. Those caught are ear-tagged so that he can keep track of them. He devised means for doing this without permitting the civets to shower him with their famous perfume. It seems that if you can keep their tails down, you are all right, but when the tails get hiked—it's time for you to hike!

Want the Next Issue?

If you want the coming issues of the FARM SCIENCE REPORTER, you will have to ask to be continued on the mailing list. More than 18,000 people are getting this issue on their own request. Once each year the mailing list must be revised. So unless you ask for the coming issues, they won't be sent to you.

For your convenience a card is being enclosed which you may fill out and return to us. It will be a good idea to put your name and address on the card! Last year some people mailed the card without filling in their name and address. They're probably still wondering why they didn't get copies.

The next issue will be April, and it will go only to those who have asked for it.

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Much Interest in Crossbreeding

Because of the tremendous interest in crossbreeding in hogs and other classes of livestock, as judged by the letters that reach animal husbandry staff members at Iowa State College, we are giving you in this issue a condensed report of the results obtained in crossbreeding hogs at the Iowa Station. The advantages and disadvantages are pointed out, various systems discussed for carrying it out, and an attempt made to answer the main questions which people raise.

When Shelled Corn Spoils

About 233 million bushels of corn are stored in Iowa corncribs and granaries. Of the 233 million bushels, about 80 percent is under seal with a government lpan on it.

Whether the corn is under seal or not, you want to know that when you take it out it will not be spoiled.

Storing shelled corn on the farm was not widely practiced in Iowa until the AAA farm programs got under way. Iowa farmers generally have a fair idea about how corn will keep stored in the ear, but they do not know so much about storing shelled corn.

A small percentage of shelled corn has spoiled. What has caused it to mold? Sometimes it is "bugs" even though many of the owners didn't know it. The common flour beetle is one of the worst offenders.

Our lead article by Harold Gunderson and George Decker in this issue tells about shelled corn spoilage from insect damage and what to do about it.

FARM SCIENCE REPORTER

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Are Bugs in YOUR Corn?

During the first 2 weeks of December a dozen farmers called to find out what they should do to stop stored shelled corn from rotting.

To get this problem squarely before us, let us repeat the story told by one of these men. About December first he had examined his bin and found a small crusted area on the surface which did not appear serious. Two weeks later, however, he found that the crusted area was much larger and that 2 or 3 bushels of corn were molding and rotting.

So far as this farmer could tell the roof did not leak and very little snow had sifted into the bin during the early November blizzard. He had observed a few very small insects on the surface of the corn in August but considered it almost unbelievable that they could be responsible for the condition which he now finds.

The story adds up to but one answer—BUGS! It may sound unreasonable at first, but let us consider what may have taken place in that bin since last August.

Insects Are Causing Some of the Mold in Stored Shelled Corn

By H. Gunderson and G. C. Decker

At that time all of the corn in the bin was dry and warm. The bugs were active and moved about freely in the grain, particularly near the surface. Probably the number of insects increased considerably, if not even greatly, during August and September.

During October the outermost portions of the grain became cooler, and instinctively the insects began to move toward the center of the bin to get away from the cold. This migration process has now resulted in a mass of insects concentrated near the center of the bin. Heat and moisture are by-products of the life processes of all animals, and insects are no exception. This mass of insects, therefore, is constantly producing heat and moisture which is imparted to the surrounding corn. As the warm, moisture-laden air rises, it soon reaches the cool surface where the moisture condenses. This results in the formation of a crust—in other words, a compact surface layer of corn of high moisture content.

The heat that comes up from below is often sufficient to permit the development of molds, and that is exactly what is happening in some of our bins. Melting snow might have increased the moisture content of the surface layer of corn, but in the absence of the heat resulting from insect activity, surface temperatures would be so low that molds could not develop until spring.

Crusting did not occur during the summer. You may wonder why. It was largely because the surface layer of corn was warmer than the mass of corn below. Therefore, moisture that came to the surface, instead of condensing on the corn, drifted away in the air.
Nevertheless they are present in some bins, particularly in large bins, and they may yet become a serious problem.

Our cold Iowa winters bring some blessings for not only weevils, but even the bran bugs have difficulty in surviving Iowa winters in many types of bins. In bins of 1,000 or 2,000-bushel capacity that are fully exposed to the weather, the temperatures usually drop to such low levels during the winter that few if any stored grain insects can survive. Even in these bins, however, relatively large amounts of cracked corn often permit insects to build up such large populations during the summer that the insects themselves are able to maintain a high temperature in the center of the bin throughout the winter, in which case winter mortality is reduced.

Large bins of 5,000 to 10,000-bushel capacity and temporary bins in barns or stables seldom cool down to a point where all of the insects will be killed. For this reason, we have found the percentage of serious insect infestations in large bins and bins in barns has been much higher than in smaller bins fully exposed to the cold winter winds. On some farms corn shelled from the same crib has been put into two bins, one exposed and the other in a protected building. Serious insect infestations have developed in the protected bin, while

Test for Bugs

To make sure that insects are involved in this problem dig down 10 to 20 inches below the surface of the moldy area and bring up several handfuls of corn. Place it on a piece of ordinary door screen and shake it over a white paper, cloth or pan. No doubt you will be surprised at the number of small brown insects that you get out of even a small sample of corn.

The so-called "bran bugs" are the most common cause of this type of trouble in stored shelled corn in Iowa. Several different species of insects similar in size, color and general habits are included under this one common name. The flour beetles, the sawtoothed beetle, the foreign grain beetle and a number of other species often found in heating shelled corn are similar in their habits and the same control measures are recommended for all.

All of these insects are small, reddish-brown beetles, usually about 1/8 inch in length. The larvae are small, dirty white, comparatively slender grubs or worms. Both the larvae and the adults feed largely upon cracked or broken kernels, and for this reason most of our serious infestations have occurred in bins of corn which had a comparatively high percentage of cracked corn and foreign material.

Yes! There are such insects as weevils. In southern states they are very serious pests of stored corn, and in many ways they are more dangerous pests than the bran bugs because they normally bore into and feed within broken kernels. Fortunately for us the weevils are not very winter-hardy, and consequently they have not given us a great deal of trouble in Iowa.
the corn in the exposed bin remained comparatively free from insect damage.

**Fumigating**

The man who is having trouble wants to know, "What can I do to kill the insects and prevent further damage to the corn?" Fumigation with one of the heavier-than-air gases is probably the most economical and most effective control measure that has been developed. We are recommending the use of a mixture of 3 parts of molding and taking the temperature of the corn in circles around the area that is crusted and molded. In general, all of the area where the temperature is above 60 degrees F. contains active insects which can be easily killed by the fumigant. This area should be marked with small stakes and the number of bushels in that area calculated. For example if the surface area of molded and crusted corn is 16 square feet and the corn is 10 feet deep, you have a volume of 160 cubic feet. This figure when multiplied by 0.8 gives you 128 as the number of bushels in the warm area, in other words, the amount of corn which should be fumigated.

Never use less than a gallon of fumigant in a bin, and for small quantities of corn you should use at least 1 gallon for every 100 bushels of infested corn. Since larger volumes of corn can be successfully treated with less fumigant, the following schedule is recommended: 1 gallon per 100 bushels for 100 to 500-bushel quantities; 3/4 gallon per 100 bushels for 500 to 1,000-bushel quantities and 1/2 gallon per 100 bushels for quantities of corn over 1,000 bushels. The required amount of fumigant may be applied to the surface of the corn with an ordinary garden sprinkling can, or it may be sprayed onto the corn with a pressure sprayer.

**Temperature Drops**

While taking temperatures in the bin you will find that the corn outside the infested area has dropped to somewhere between 55 and 50 degrees F. or even lower. In the area below 50 degrees the insects are dormant and are not causing any damage to the corn. (Continued on page 16)

Left: Insects seldom bother corn in Iowa stored in small bins well off the ground if they're well exposed. Below: It's large bins, such as this (32 x 48 x 8 feet), where insects thrive.
BUTTER and lard once were the only table and cooking fats. Then other fats gradually appeared which were mild in flavor and odor, had higher smoking points than lard, and during the years their creaming qualities were gradually improved.

Buttermakers developed grades for their product, and the homemaker now can buy butter with a definite score and know she is obtaining a uniform product. But lard manufacturers did little or nothing to improve or standardize lard. As a result butter consumption remained practically constant over a long period of years, that of lard dropped, while that of lard substitutes increased.

Now lard manufacturers are getting busy and are doing something about lard. As a result one packer is selling experimentally in two large cities a lard which:

- Is mild or practically odorless and flavorless.
- Has a smoking point much higher than ordinary lard.
- Will keep much longer without becoming strong or rancid because of the addition of small amounts of various substances.
- Has creaming ability improved by the addition of about 10 percent of hydrogenated lard.

This is good news to Iowa homemakers, because lard is cheaper per pound than its substitutes. The new lard has been used in the Home Economics Department at Iowa State College, and the home economists who have done experimental tests with lard for 8 years are “keen” about the new product. These new lards probably soon will be marketed in Iowa.

Hogs usually comprise about 35 percent of the annual farm income in Iowa. And since from 15 to 18 percent of the hog is marketed as lard, the price of lard is important to the income of the farm family.

Lard is digestible. Some experiments in the Office of Home Economics of the Department of Agriculture showed that 97.8 percent of the lard was absorbed from the human intestinal tract. This was not true of the harder fats. As the hardness of a fat increases through hydrogenation (a process of treating an oil with hydrogen to produce a fat or treating a soft fat with hydrogen to produce a firmer one) or otherwise, the percentage absorbed decreases.

For example, deer fat, which is quite firm, had only 81.7 percent of the fat absorbed during digestion. On the other hand, the partially hydrogenated cottonseed oil used in these experiments varied with the degree of hydrogenation. The melting point of a fat is raised...
as the degree of hydrogenation is increased. For melting points varying from 106.3° to 122° F. the absorption was 96.6 to 87 percent, respectively.

In using fats for frying doughnuts and potato chips at Iowa State College it was found that the time the food stayed in the fat, rather than the temperature of the fat, determined the amount of fat absorbed. If too high a temperature is used to shorten the cooking time, however, the fat breaks down more readily. But if the temperature of the fat is too low, the food must remain in the fat an unduly long time to cook and brown.

It was suggested as a result of these tests that doughnuts might be more desirable if cooked to a slightly lighter brown color than is customary. Students who bought the doughnuts made in this laboratory came to prefer those cooked 3 minutes at 340° F. to those cooked 3 minutes at a temperature often recommended for frying doughnuts, namely 365° F. Fats used at lower temperatures are suitable for frying for a longer time than if used at higher temperatures—they are decomposed or broken down less readily and rapidly at the lower temperature.

It also was found that the lower the smoking point of a fat (smokes at a low temperature), the greater the fat absorption of doughnuts cooked in this fat. Since the absorption of too much fat makes doughnuts and other foods less desirable, it is preferable to use a lard for frying that has a high initial smoking point. Two of the many lards which were used in these tests, produced by a special method not ordinarily used in making lard, did not smoke until a temperature of 425° F. was reached. The new lard mentioned at the first of this article also has a very high smoke point.

Food particles, like flour from doughnuts, crumbs from croquettes or particles of potato, which accumulate and become charred in the fat during cooking, help to hasten the breaking down of the fat. When a fat decomposes in this way, its smoking point is lowered and it develops a brownish or gray color. Other changes also are occurring, and after decomposition proceeds further, disagreeable odors and irritating fumes are given off. The longer the fat is heated the greater its decomposition.

It also was found that the larger the amount of water in food cooked in the fat, the faster some changes occurred in the fat. Since potatoes have a higher water content than doughnuts, the breakdown of fat is only hastened if you attempt to clarify it by cooking potatoes in it, a procedure often advised. It is better to strain the fat through a cloth woven closely enough to remove the particles.

The work with lard at the College has shown that lard which does not cream well—and few lards do—cream well except those containing some hydrogenated lard—can be used successfully in cakes by modifying the method of mixing.

Lard in a cake tends to make it velvety or soft IF the cake has a good texture. But when cakes are made with lard by the conventional process of creaming the fat and sugar, adding the egg and then flour and milk, they usually have poor texture. The cause for this is the effect of the lard and egg upon each other when combined early in the mixing process.

We have found it best to add the egg late in combining the ingredients. This may be done in a plain cake by (1) combining the whole egg with the milk, or (2) by beating part of the sugar gradually into the whole egg until it is light and fluffy and adding this egg-sugar mixture last. More air is incorporated if the egg-sugar mixture is beaten with an electric mixer or very rapidly with a rotary egg beater. Before this egg-sugar mixture has time to lose the air, stir it into the cake mixture. If the eggs and sugar are beaten before the cake batter is mixed, a great deal of the air is lost while standing. Or (3) the egg yolk may be combined with the milk and about one-fourth of the sugar beaten into the egg white.

For a white cake, combine in the usual manner, but beat about one-fourth of the sugar into the egg white. Fold it into the cake batter.

You may use lard with your usual cake recipes, but you will make a better cake by using one of the three above methods of mixing.

Tests show that lard does not have the "brittleness" of some other fats; it is plastic over a wide range of temperatures. It will blend satisfactorily with flour immediately on bringing it up out of the cold basement or taking it out of a refrigerator.

Lard possesses the greatest shortening power of any of the plastic fats—that is, it will produce the most tender pastry. In addition to cutting into the flour readily and producing a tender pastry, it gives a flaky pastry. Because of these characteristics it is the fat "par excellence" for pastry making.
**CROSSBREEDING HOGS?**

Is there any advantage in crossbreeding hogs for market?

To help answer this question, we have summarized here about 10 years of work at the Iowa Station with 1,015 pigs in 108 litters. Various other stations have conducted similar studies. In our experiments we got these results:

1. Fewer pigs were born dead among the crossbreds than among the purebreds (6 to 10 percent as against 15 to 17 percent). Slightly more of the crossbreds lived to weaning age than of the purebreds (68 to 76 percent as against 55 to 61 percent).

2. At weaning time crossbred pigs averaged nearly 4 pounds heavier than purebreds. Crossbred litters weighed more than purebred, partly because the crossbred pigs were heavier and partly because the crossbred litters had slightly more pigs, on the average.

3. Crossbred pigs outgained the purebreds about .09 to .12 pound per day. Because of this the crossbreds reached a market weight of 225 pounds around 10 days to 2 weeks earlier than the purebreds.

4. It took 25 to 30 pounds less feed to bring the crossbreds to 225 pounds than was required for the purebreds. Most of this difference—perhaps all of it—resulted from the more rapid gains.

5. Crossbred sows were reasonably efficient pig producers, either when mated back to a boar of one of the parent breeds or to a boar of a third breed. When sired by a purebred boar the pigs from the crossbred sows, either backcross or three-breed cross, compared favorably with the first-cross pigs.

6. Breeds probably differ in their response to crossing, and families or strains within breeds probably differ also. We do not have enough evidence to know which breeds can be expected to cross best, nor whether distinct families which cross better than others exist and can be identified and maintained within pure breeds. At present all we can advise about breeds or strains to cross is that the boar should come from a breed and herd which is especially strong in those important characteristics in which the sow herd is weak.

7. The existence of good purebred herds is a necessary prerequisite for successful crossbreeding. Crossbreeding can be continued as a steady policy only by going to purebred herds for at least the boars needed for replacement. Crossbred animals have a lower value than purebreds as transmitters of inheritance. Crossbred sows may be used successfully for breeding if the boar is a purebred. In such matings the hybrid vigor...
of the crossbred dam in nursing and rearing pigs may more than compensate for her lower value as a transmitter of inheritance. No such offset for his lowered transmitting value could exist with a crossbred boar. Planless and unsystematic crossing may quickly result in a mongrel herd from which the owner will get neither profit nor pride of ownership.

Table 1 shows some of the evidence obtained at the Iowa Station when comparing the purebred and crossbred sows. In table 2 is shown evidence collected by the Iowa Agricultural Extension Service in 5 different years of comparing purebred and crossbred pigs.

The crossbreds do not always lead. In 1928 (table 2) the purebred sows had more pigs at weaning time than the crossbreds. In all characteristics there was much variability both between litter mates, from litter to litter on the same farm or same experiment, and from experiment to experiment or from farm to farm. Many factors not related to the system of breeding may affect success in pig production. Results of crossbreeding at other places are generally similar to those at the Iowa Station.

Crossbreds, such as the Duroc-Poland pigs at the right, gained faster than the purebreds in our tests, but were not so uniform, especially in color. Below is pictured a group of purebred Polands.

Disadvantages

The lower transmitting ability of crossbreds makes it undesirable to use them for breeding purposes. In crossbred sows the disadvantage of their lower transmitting ability may be partly or wholly offset by their own extra hybrid vigor and vitality which often makes them better mothers and nurses of pigs. This seems not to be offset by any advantage in the case of boars. Therefore we can see no circumstances under which a crossbred boar should be used, except perhaps if one is making the attempt to produce a new breed. Such an attempt probably will be financially unsuccessful for reasons of time, necessary numbers, large percentage of culls and limited or poor market for surplus breeding stock in the early generations.

Advantages

The main practical advantages of crossbreeding are the lower mortality or greater vitality and the faster growth rate of crossbreds; faster growth results in less feed expense, less risk and getting the pigs to market earlier. Then there is some increase in productivity of the hybrid females if they are used for breeding. These advantages amount to an increase of something like 5 to 8 percent and are economically worth considering to the man who is producing hogs for market, although they are not tremendous.
If a man adopts the plan of producing first crosses and selling them all on the market, then he must count on buying from purebred herds all the sows he needs for replacements. This may cost enough to eat up the profits from crossing.

Crossbred pigs may be motley in color and conformation, especially if their dams are crossbreds. Pigs which are first crosses between purebred sows of one breed and a purebred boar of another breed should, in general, be just as uniform in color as the parent breeds.* Pigs which are not uniform in color and conformation may be at a slight disadvantage on the market, but such a disadvantage is less serious than it would be in beef cattle.

The man who crosses breeds does not have much incentive to do constructive breeding work with his sows by selecting and breeding from the most productive ones. But a man with high grade sows has little incentive to do much of such breeding either, since he always gets his boar from some purebred herd, and about half of what he would accomplish through selection among his sows would be lost in the next generation when the inheritance of those sows is diluted with inheritance from the new boar. That is, the grade herd is moving toward the kind of inheritance which prevails in the herd from which its purebred boars come, and whatever may be accomplished by selection among the grade sows the breeder keeps is rather temporary.

Crossbreeding Plans

There are several plans for crossbreeding. One plan is to use purebred (or very high grade) sows, mated to a purebred boar of another breed. The sire should come from breeds and herds which excel in conformation, while the sows preferably should be from breeds and herds that excel in prolificacy and nursing ability. The chief drawback to this plan is the problem of getting replacements. A whole new batch of sows can be bought, or a part of the herd can be bred each year to a boar of the same breed. But the latter plan means keeping two boars and producing some barrows which are not crossbred.

A second general plan for crossbreeding is sometimes called "crisscrossing." In this plan, one keeps the best of the crossbred gilts as brood sows for the next year and mates them back to a boar of the same breed as one of their parents. Thereafter boars of the two breeds are alternated in producing pigs from dams saved from the last generation, the sows always being bred to a purebred boar of the breed to which their sire did not belong. After the plan gets well under way, about two-thirds of the inheritance in the pigs comes from the breed of the boar used last and one-third from the other breed. A sample plan of this kind is shown in the upper part of the accompanying diagram.

A third general method of crossbreeding is similar to the crisscross-plan except that the boars of three or more breeds are rotated as sires of each new generation of pigs. There is some reason to believe that pigs produced by a three-breed or a four-breed rotation crossing may show a little more vigor than those produced by crisscrossing, and the actual evidence does point in this direction, although it is scanty. An example of the kind of pedigree which would result from regular three-breed crossing is shown in the lower part of the diagram on the opposite page.

A disadvantage of these regular systems is that when any of the breeding sows are to be replaced, it is necessary to replace all of them unless the herd is large enough for more than one boar to be used or the breeding system is to become irregular. This makes it difficult or irregular to keep for many litters the sows which have been good producers, while culling the poor producers among them after those have shown their true colors by their production in their first or first two litters.

What Breeds to Use

Not enough critical data are available to identify which breeds cross best. The general principle for crossing breeds is to choose a boar of a breed which is particularly strong in qualities in which the sow herd is especially weak. Thus if the sows are a bit too rangy and long-legged, one might well select a boar from a somewhat more compact and blocky breed and need not worry much if that breed is a bit small. On the other hand, if the sows are too refined and small, one would choose a boar from a larger and quicker growing breed and would not be too concerned if that

![Table 1. Comparison of Crossbred and Purebred Brood Sows.](image)

![Table 2. Pig Crop Contest—Yearly Summary.](image)
breed were somewhat coarse and rough.

In choosing breeds to cross, if there is any difference in prolificacy or nursing ability, the breed which excels in these features should furnish the sows.

Crossing distinctly unrelated strains or families within a breed would be expected generally to produce hybrid vigor similar to that of crossbreeding but to a lesser degree. Pure breeding customs, however, are usually such that strains or families within breeds do not often become different enough genetically to produce a large amount of increased vigor or capacity for growth when crossed. When a family within a pure breed becomes prominent, blood from that family is soon introduced into most of the herds of that breed and most of the genetic distinctness between that family and the rest of the breed disappears. Crossing families within a breed is similar in principle to crossbreeding but is so very much milder in degree that only a small amount of the comparable hybrid vigor results.

The Purebred Business

When crossbreeding is general the market for purebred boars will be just as large as if all farmers were producing high grades for market. This is true because all good crossbreeding plans require the use of purebred boars as sires. Purebred breeders probably never did have a very extensive market for purebred sows to use in producing market hogs. Apparently crossbreeding will not change that much, unless the plan of producing first crosses for the market became very widely followed. That plan would increase the market for purebred or very high grade gilts. The main market for purebred females is to other breeders who want fresh blood and to new breeders who are establishing herds. Crossbreeding seems not likely to disturb the purebred breeders' business greatly.

The primary function of the breeder of purebreds is to produce sires for use in the herds of the producer of market hogs. This function and this market would apparently be as large when crossbreeding is general as it would be when grading continually to the same breed is the most widely practiced method of breeding market hogs.

General Picture

Crossbreeding has a distinct place in the production of animals for market. It has practically no place in the production of seed stock except that in crisscrossing or in rotation systems it is possible to use the crossbred females for breeding purposes. Some difficulties in crossbreeding are encountered in that the animals produced are less uniform, and there is not much incentive to constructive breeding; in following any regular crossbreeding system some difficulties are encountered through overlapping of generations which make it necessary either to replace the whole sow herd at the same time or to keep males of two or more breeds in order to follow the system with perfect regularity.

In swine the hybrid vigor from crossbreeding amounts to about 5 to 8 percent increase in growth rate, in economy of gain and perhaps a little more than that in vitality or fertility. There is much individual, litter-to-litter and farm-to-farm variation in the results of crossbreeding.

Almost the maximum benefit of crossbreeding is derived in the first generation in which it is practiced. Success in crossbreeding rests fundamentally on the use of good purebred sires which cross well with other breeds or with grade or mixed stock. Future improvement of the animal population to a level above which can be reached now by a generation or two of crossbreeding depends upon the breeders of purebreds continuing to improve their herds until those reach still higher levels of ability to perform well as sources of sires for the commercial producer.

SWEET CLOVER
Variety Tests, Clipping

Experiments at the Iowa Station with various varieties of sweet clover have shown that the best yielding ones so far found for Iowa are Iowa Late White, Illinois Sangamon and Ohio Evergreen.

A portion of the same experiment was devoted to cutting the sweet clover at different dates to determine the effect on the yield of seed.

With yellow sweet clover, considerably higher yields were obtained from the unclipped plots than from the plots clipped at a height of from 8 to 12 inches on May 16, May 23 or on May 30.

The highest seed yields from the Iowa Late White variety were obtained on plots clipped May 30.
CIVETS ARE

Spotted Skunks Have A Large Appetite For

The little spotted skunk—you may know it as the “civet cat”—is proving itself one of Iowa’s most valuable fur-bearers, not from the fur standpoint, but because of the assistance it may render in the control of rats and mice. This is shown by research we have carried on in an area of southeastern Iowa.

So those Iowa farmers who have long considered “civet cats” as chicken-killing vermin that should be killed whenever possible, may well temper or reverse their attitudes.

It was during a study of the food habits of the spotted skunk or civet that we discovered its value. Detailed analyses were made of 834 samples of feces, which represented every month of the year.

During the course of our investigation a mother civet reared a family of five young under a piece of floor in one end of a chicken house. The civets ran in and out of the house, passing under the hens roosting only 3 feet from the floor and sometimes past hens on the floor without molesting them.

And that is a partial answer to your question, “Well, it might be that civet cats will help control rats and mice, but what about my chickens? Will I have any left after the rats and mice are gone?”

In our investigation, domestic poultry appeared in less than 1.5 percent of the fecal samples examined during the winter months, and not at all during the summer months. Evidently the danger of civets bothering poultry is not as great as farm people generally believe.

Civets are admirably adapted for the control of rats and mice. They are small enough to enter and follow the runways of rats in pursuit of their prey. They readily climb the poles and rafters in barns and other buildings, and thus there is no escape for their victims. They do all of their hunting at night when rats and mice are most active.

A farmer recently told the writer of a commotion in front of his cows one night while he was milking. A rat scampered between the legs of the cow he was milking, and it was followed closely by a civet in hot pursuit, paying no attention to the human spectator. The rat ran up an upright, unbarked oak pole supporting the side of the barn and at the top of the pole was seized by the little skunk.

Civets are restless, nervous and quick-moving creatures, more like weasels than skunks, and have enormous appetites. They habitually eat their prey entirely, but may sometimes skin rats as do house cats. (One captive civet kept by the writer for a time always skinned rats given to it before eating them.)

In the fall, winter and spring seasons, predation on rats and mice is most noticeable. During the period of our food habits study, there was a very heavy population of cottontail rabbits. A great many of them were shot by farmers to protect fruit trees and shrubbery and were left on the ground.

These dead cottontails provided abundant food for the civets during much of this period, but even so rats made up 10 percent of the food during the winter months, while rats and mice together made up 40 percent of their diet. Cottontail remains were found in 50 percent of the fecal samples.

David E. Lantz of the United States Department of Agriculture reported, “In Kansas the writer once lived in a house with cellar openings on the outside. The dwelling had been unoccupied for a year and during this time the cellar had been used for storing corn, with the
RAT KILLERS

Rats and Mice, Recent Iowa Study Shows

By

WILFRED D. CRABB*

result that the entire house had
become infested with rats and mice.
A short time after the writer oc-
cupied the house it was noticed
that a prairie spotted skunk had
taken up its quarters in the cellar
and night combats with rats were
often heard. The skunk was fre-
quently seen, but it was carefully
left unmolested. After a few weeks
the rats and mice had all been killed
or driven away, and the skunk then
left the premises.*

The experience of Lantz as here
related has been repeated many
times under similar circumstances
on the research area in southeastern
Iowa.

Civets have been known many
times to kill or drive out rats under
circumstances where good cats have
had little effect upon them. In
several places we observed that a

*Fish and Wildlife Service (U. S. Department
of the Interior), Iowa State College, Iowa State
Conservation Commission and the American Wild-
life Institute are cooperating in this study. The
project is under the supervision of Dr. Geo. O.
Hendrickson, Iowa State College, and Thomas G.
Scott, United States Fish and Wildlife Service.

heavy population of rats during the
summer and fall completely dis-
appeared during the winter months
when spotted skunks were in res-
dence. Whether the skunks killed
more than they drove away is a
question, but, nevertheless, they
had a definite controlling influence
on the rats.

The little spotted skunk is very
fond of the farmyard as a place to
live during the winter. If con-
ditions are favorable, civets will
make some building around the
farm a year around residence. Corncribs and granaries which usu-
ally harbor rats and mice are often
the favorite den locations of the
civets.

The civet fur is of good quality,
for the civet belongs to the skunk
and mink family, but the color
lowers the value. Spotted skunk
fur is not worth much on the
market. For this reason, many
farmers have not encouraged civets
to remain about the farm premises
as they frequently do the striped
skunk whose fur is of more value.

Records of the cause of death of
civets on a research area of 17½
square miles over a 2½-year period
show that 47 met violent deaths.
Farm dogs killed 36 percent (of the
47), 34 percent were killed by trap-
pers for fur, 25 percent were shot
or otherwise killed by farmers who
suspected or knew the civets were
killing poultry and 4 percent were
killed by traffic on highways.

With the rat problem becoming
more serious as vast amounts of
corn are stored on Iowa farms now
the year around, many farmers may
wish to give the civets a chance to
aid in ousting the rats.

Good management practices for
the encouragement of the spotted
skunk should include:

(1) Do no trapping around corn-
cribs, granaries and barns if civets
are known to be around.

(2) Kill civets around poultry
houses only when you positively
know that the civets are molesting
the birds—merely suspicion or cir-
cumstantial evidence is not enough,
our study indicates.

(3) Control the farm dog. He
must be tied up at night or else
discouraged in the pursuit of civets.
Dogs normally learn to leave these
animals alone unless they are en-
couraged by their masters.

Rat killed by a civet in a barn, but
not eaten. Note its "chewed" head.
The civet is found to be much more
like weasels than skunks in habits.
Civet caught in a trap set for rats.
Better let the civets catch the rats.
One of the chief problems which Iowa farmers have in growing alfalfa is to find a satisfactory variety. Few alfalfa fields are worth leaving after the third year because wilt has thinned the stand so much. The Iowa Station, along with various others and the United States Department of Agriculture, has been trying to solve this problem by finding or developing varieties or strains which are wilt-resistant, winter-hardy and yield well.

Ladak, a variety superior to Grimm and the common strains in wilt resistance and yielding ability, has been found. Over a 14-year period at the Iowa Station, it has outyielded all other varieties compared with it.

An alfalfa breeding program, organized on a nation-wide basis, has been under way for several years. The United States Department of Agriculture is cooperating with the state agricultural experiment stations in developing varieties more resistant to wilt.

Besides wilt resistance, these varieties must also be winter-hardy, have desirable recovery habits, produce large yields of high quality forage and be good seed producers. Considerable progress has been made. In fact, the seed of a composite variety or strain is now being produced in southwest states. As a result of tests at the Iowa Station, and at other stations cooperating with the United States Department of Agriculture, the "Verified Seed Service" was begun in 1927. This made it possible for seed dealers to know with certainty the source of the seed they handled. This almost immediately eliminated the most poorly adapted seed from the Iowa markets.

With the new Federal Seed Law, which has become effective within the past few months, the records of the source of production are dependable and the Seed Verification Service has been discontinued.

The Grimm and Cossack varieties were recognized as having outstanding value in our early tests because of their extreme winter-hardiness. Experienced growers had pretty generally settled upon one or the other of these varieties, purchasing certified seed in order to make sure of its genuineness, with the expectation that fields when once established would be left down for several years. And then came the bacterial wilt disease, which introduced a new factor.

In 1910 and 1915, and up until about 1920, a well-established field, planted with a good winter-hardy variety, might be productive for 8 or 10 years or, with cultivation to keep out bluegrass and other weedy growths, even longer. About 1920 alfalfa bacterial wilt disease appeared. The first reported observation of the disease was in Iowa, but almost immediately thereafter it was found in other important alfalfa-producing areas.

In western Iowa, where the acreage of alfalfa had been particularly large it decreased. Many fields failed to such an extent that they were plowed up. On land where alfalfa has been grown and the wilt introduced, the stand usually has been reduced by the end of the third cutting year so that it is no longer profitable and should

A uniform seedbed, well worked in advance of seeding to sprout and kill weed seed and to fine and firm the soil, contributes much to success in getting a good stand. The disc, harrow and cultipacker all aid in proper preparation.
Seek Wilt-Resistant

With the general prevalence of bacterial wilt it soon became apparent that Grimm, although particularly winter-hardy, was one of the most susceptible to bacterial wilt injury. Cossack, also extremely winter-hardy, seemed but little more resistant than Grimm. Ladak has shown more wilt resistance and is also extremely winter-hardy. Turkestan has generally shown marked wilt resistance and also excellent winter-hardiness, but the yield is lower than other varieties and seed is not generally available. Hardistan, selected from Turkestan, also has considerable wilt resistance but does not yield as well as Grimm or northern grown common in Iowa.

Yields from many different alfalfa variety tests have been summarized and put on a comparative basis by expressing the relative productivity on the percent of the yield of Grimm in the same planting. These results are given in the accompanying table.

The six highest yielding are all variegated varieties. The yields obtained from Ladak and Cossack are significantly better than from Grimm. The yield of Ladak has been rather strikingly superior in almost all our tests in which it has been included. This no doubt is because in this variety extreme winter-hardiness is combined with some wilt resistance.

Ladak recovers more slowly after cutting than many other varieties. Some farmers have objected to this variety, because 1 or 2 weeks after cutting the plants appear shorter than those of Grimm or common. By the time the plants come into bloom, however, Ladak has caught up and may outyield the others. An extremely heavy first crop helps to build the high seasonal yields of this variety.

Of the regional common strains, there seems to be no significant difference in seed from Montana, Kansas, Nebraska, Oklahoma and the Dakotas. Seed from Utah in almost every test has shown some lack of winter-hardiness and has given lower average yields than seed from these other states. New Mexico, California and Arizona Common are not recommended for planting in Iowa.

Because most alfalfa seedings are likely to be ready to plow up by the end of the third year, and because new seedings are less likely to winterkill than older ones, it seems good practice for many growers to use northern grown common seed rather than to pay the higher price for Ladak, Cossack or Grimm.

But if you want to leave a seeding for 4 or more years, the increased yield expected from Ladak or Cossack would undoubtedly justly purchase of this seed.

Alfalfa Essentials

But selecting the right kind of seed is not the only essential to growing alfalfa in Iowa. The first requirement for success with alfalfa is a fertile, sweet soil. The crop responds to a soil high in organic matter and available phosphorus. Alfalfa is not a good crop for soil below average in fertility unless it is heavily fertilized. On many farms, however, the average field soil is fertile enough so that alfalfa can be grown on any part of it.

Well-drained soils. Alfalfa’s deep, extensive root system requires good drainage for normal development. On poorly drained soils plants will soon turn yellow and die. Bottom land soils may be excellent for alfalfa when they are well tiled. Such soils are usually fertile and high in organic matter.

Lime is necessary. To seed alfalfa on an acid soil is to invite failure. Many soils, particularly in eastern and southern Iowa, must be limed before alfalfa will succeed. Lime corrects acidity, supplies calcium for plant growth and creates a favorable condition for the nodule-forming bacteria. If lime is necessary, it preferably should be applied several months before seeding.

Phosphorus increases yield. Alfalfa responds wonderfully to phosphate fertilization. On many Iowa soils phosphorus limits alfalfa production. Where lack of available phosphorus is indicated, 150 to 300 pounds of 20-percent superphosphate applied per acre usually will markedly increase the crop.

Inoculate seed. Alfalfa nodule-forming bacteria are not found in most Iowa soils. The only safe procedure is to inoculate the seed, using cultures recently prepared for use on alfalfa and sweet clover. Such commercial cultures are now sold by most seed stores.

Inoculation is recommended for all seedings except on fields where a good crop of alfalfa or sweet clover has previously grown.
Fine, Firm Seedbed

Over a long period of years many experimental plantings have been made at the Iowa Station to compare different times of planting, methods and rates of seeding and especially the different kinds and sources of seed.

Alfalfa needs a firm seedbed. The better the seedbed is prepared, the better the alfalfa crop that follows. Alfalfa seedings usually follow a cultivated crop such as corn. No better seedbed can be had than one that was kept free from weeds the previous year. When alfalfa follows soybeans it is important to firm the seedbed with a cultipacker or corrugated roller, using the cultipacker both before and after seeding, if possible.

One of the best methods of seeding is to cultipack, broadcast the seed and cultipack again. This firms the soil about the seed, and places the seed at the right depth. When one seeds with a drill equipped with a grass seeder attachment, he must be careful to prevent the seed from being covered too deeply. Alfalfa seed should be covered not more than about 1/2 inch in the heavier soils and not more than an inch in the lighter soils.

When to Seed

Many experimental plantings indicate that there is no better time and method of seeding for average conditions than in the early spring with a small grain nurse or companion crop, in exactly the same way usually used for clover and grass.

Choosing a nurse crop for early spring seedings is important. Barley is satisfactory but not better than a short-strawed, early-maturing variety of oats, such as Iowa 105 or Iogold. Reducing the rate of seeding the small grain helps the alfalfa. If drouth threatens the alfalfa, cut the small grain in the milk stage and make it into hay.

In some parts of Iowa, on soils low in organic matter with poor water-holding capacity, best results are obtained when alfalfa is seeded alone. Preparing a seedbed in the early spring and cultivating at intervals until June to kill weeds is an excellent procedure. When seeding alone in June, using a cultipacker is particularly desirable.

Many excellent stands of alfalfa have been obtained from seeding in August. The success of August seeding depends on late summer rains. When seeded in June or in August no nurse crop is used. The later the seedings are made the greater the danger of winterkill.

We recommend sowing alfalfa not much later than Aug. 15 in northeastern and central Iowa and Aug. 25 in southern Iowa.

Under extremely favorable conditions 10 to 12 pounds of seed per acre may be sufficient, but under average farm conditions the larger yield to be had in the first year from 12 to 15 pounds usually pays well.

Management

Unless alfalfa stands a foot or more high by mid-August the year it is seeded, the crop should not be cut until the following season.

Three Cuttings per Year. We have compared removing one, two, three and four cuttings per year on several different seedings at the Iowa Station through a period of years. We found that when cut four times a year the growth is exceedingly weak and the stand about gone by the end of the second year. The fewer the cuttings, the more vigorous the growth and the longer the stand is maintained. Maximum yields may be had when only two crops are taken per year, cutting when in the full bloom stage. But the feeding value,

SUMMARY OF HAY YIELDS OF DOMESTIC ALFALFA STRAINS 1927—1940

<table>
<thead>
<tr>
<th>Variety or strain</th>
<th>Number of experiments</th>
<th>Average annual yields in tons per acre</th>
<th>Average yield in percent of Grimm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ladak</td>
<td>14</td>
<td>3.23</td>
<td>114</td>
</tr>
<tr>
<td>Connick</td>
<td>16</td>
<td>2.78</td>
<td>110</td>
</tr>
<tr>
<td>Ontario Variegated</td>
<td>14</td>
<td>3.05</td>
<td>103</td>
</tr>
<tr>
<td>Hardigan</td>
<td>14</td>
<td>2.89</td>
<td>101</td>
</tr>
<tr>
<td>Baltic</td>
<td>9</td>
<td>2.90</td>
<td>101</td>
</tr>
<tr>
<td>Grimn</td>
<td>16</td>
<td>2.80</td>
<td>101</td>
</tr>
<tr>
<td>Montana Common</td>
<td>14</td>
<td>2.87</td>
<td>97</td>
</tr>
<tr>
<td>Kansas Common</td>
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<td>97</td>
</tr>
<tr>
<td>Dakota Common</td>
<td>16</td>
<td>2.73</td>
<td>94</td>
</tr>
<tr>
<td>(Including Dakota 12)</td>
<td>16</td>
<td>2.73</td>
<td>94</td>
</tr>
<tr>
<td>Nebraska Common</td>
<td>8</td>
<td>3.05</td>
<td>94</td>
</tr>
<tr>
<td>Oklahoma Common</td>
<td>7</td>
<td>3.05</td>
<td>94</td>
</tr>
<tr>
<td>Idaho Common</td>
<td>7</td>
<td>3.04</td>
<td>94</td>
</tr>
<tr>
<td>Hardistan</td>
<td>4</td>
<td>2.63</td>
<td>89</td>
</tr>
<tr>
<td>Colorado Common</td>
<td>5</td>
<td>2.79</td>
<td>87</td>
</tr>
<tr>
<td>Utah Common</td>
<td>16</td>
<td>2.50</td>
<td>84</td>
</tr>
<tr>
<td>New Mexico Common</td>
<td>12</td>
<td>2.51</td>
<td>84</td>
</tr>
<tr>
<td>California Common</td>
<td>8</td>
<td>1.51</td>
<td>55</td>
</tr>
<tr>
<td>Arizona Common</td>
<td>8</td>
<td>1.11</td>
<td>37</td>
</tr>
</tbody>
</table>

1Including Canadian.

2Hay at 12-percent moisture.

pound for pound, will not be as high nor the crop as palatable as when the crop is cut at an earlier stage of maturity.

Three crops per year under Iowa conditions, especially when the hay is to be fed to dairy cattle, seems to be best. The first cutting usually comes about June 10 to 15, when the plants are one-tenth to one-fourth in bloom; the second cutting is about the last week in July and the third the first week in September.

When alfalfa is cut much after the first week in September the danger of winterkilling is greatly increased and the yield from the first cutting the following year reduced.

Are Bugs in YOUR Corn?

(Continued from page 5)

Furthermore, fumigation does not give satisfactory results at temperatures below 60 degrees unless excessive amounts of chemicals are used. It is, therefore, most economical to fumigate only the area where the temperature is above 60 degrees F.

Fumigation of the molded and crusted area will kill the insects present and thereby remove the principal source of heat and moisture. This will make it easier for the cold to penetrate throughout the bin and will result in a rapid lowering of the temperature throughout the mass of grain.

What should be done with the crust? It is always desirable to have the crusted surface broken up before the fumigant is applied. When the crust is very thin the corn will begin to dry out on the surface of the bin as soon as the insects are killed, but where the crust is heavy or where a quantity of corn is very moldy or rotting, the spoiled and wet corn should be removed. It is not desirable, however, to remove this layer until you are ready to fumigate as this would result in exposing a new surface of cold corn which would in turn become crusty.

If you are in doubt as to the proper procedure to follow in taking care of your corn, call your county agent, your county AAA organization or write the Extension Service at Iowa State College.