



MINNESOTA



University of Minnesota Agricultural Extension Service, University Farm, St. Paul

September 2, 1952

Our Soils Need Fertilizer

PAUL M. BURSON and
JOSEPH L. KEOGH*

- Use more lime if your soil needs it—and if you're using it now, use it at a higher rate.
- Suit the fertilizer to the specific crop.
- Apply more fertilizer.

These are three recommendations that we in the University Soil Testing Laboratory can make to Minnesota farmers after testing more than 30,000 fields in two years.

These samples have come from more than 11,000 farmers in all counties in Minnesota and from all parts of the world—including Japan, Iceland, New Guinea, Central America, Mexico, Hawaiian Islands, Canada, Alaska, Guam, and the Dominican Republic.

Through these thousands of tests the following general levels in various parts of the state have been found:

Phosphate

Phosphate is the key to all soil fertility, and to all plant and animal nutrition. It is essential in all grades of fertilizer and is recommended in all parts of Minnesota. It can be used alone or in a combination with nitrogen, with potash, or with both, depending on the soil test. Phosphate levels vary widely in Minnesota, probably because phosphate has been more universally used over the years than any other nutrient.

Farms which have used phosphate over a period of years have a consistently higher level of available phosphate in their soils. Many farms, however, are not getting efficient returns from phosphate fertilizer because they have built up the phosphate level and are reducing the nitrogen and potash levels.

Potash

The available potash levels over the state are highest in the western part of

the state and go downward till the soil areas around Mower and Dodge Counties are reached. The north central part of the state is another low point. From Dodge and Mower on east into the southeastern part of Minnesota potash goes up again, comparable to western Minnesota.

In western Minnesota 10 to 12 per cent of the soil tests indicate a need for potash fertilizer, in south central Minnesota 12 to 23 per cent, and in the soil area of Mower and Dodge Counties 23 to 35 per cent of the soils need potash. However, along the Mississippi River, in the southeastern part of the state, there are only 10 per cent or less of the soils in need of potash.

In north central and northeastern Minnesota the potash levels are the lowest. In some counties as high as 80 per cent of the soils tested show a need for potash. The potash requirements tend to generally follow the major soil associations of the state. In all parts of the state farms that have been heavy growers of legume crops such as alfalfa are the farms now showing need for potash.

Lime

The eastern one-third of Minnesota needs more lime than is now being used and at a generally higher rate per acre. Some soils across southern and southwestern Minnesota indicate a need for lime. In this area no lime should be used unless there is real difficulty in getting and holding good yields and stands of legume crops like alfalfa and sweet clover. Here lime should be used at the present time only as a test and not as a general practice.

Nitrogen

There is no satisfactory test at the present time for nitrogen. Nitrogen is, however, becoming a limiting factor. When fields have not had manure or

Noted Nutritionists To Speak at Animal Nutrition Course

The University of Minnesota's 13th annual Animal Nutrition Short Course will be held on the St. Paul Campus September 15-16, it has been announced by J. O. Christianson, director of Agricultural Short Courses at the University.

A series of panel discussions by noted animal nutritionists, veterinarians, and feed industry men will be featured, according to L. E. Hanson, professor of animal husbandry at the University of Minnesota and chairman of the arrangements committee for the course.

All Phases to Be Covered

To be discussed the first morning of the short course will be drugs and medicated feeds for livestock and poultry, research results, and quality control.

On the afternoon of the same day, a panel will take up the subject of milk replacers for pigs and calves. Both research and practical experience will be drawn on by panel members.

A third panel will discuss antibiotics, arsenicals, and detergents for use in livestock and poultry feeds.

Also included on the two-day program will be reports on University of Minnesota research in animal nutrition and related fields and discussions of problems in the manufacture and merchandising of feed. Supplements for home-grown feeds for dairy and beef cattle will also be discussed.

Speakers from animal nutrition research centers will headline the course, and staff members at the University of Minnesota and members of the livestock feed industry will also take part in the program.

Cooperating with the University in conducting the short course are the Northwest Feed Manufacturers' Association and the Northwest Retail Feed Association.

* Paul M. Burson is head of the Soil Testing Laboratory and Joseph L. Keogh is research assistant in the Division of Soils, University of Minnesota.

MINNESOTA FEED SERVICE

Published by the University of Minnesota Agricultural Extension Service, University Farm, St. Paul 1, Minnesota.

Feed Service Committee—Robert Raustadt, chairman; M. L. Armour; S. B. Cleland; Cora Cooke; Ralph Crim; William Fleming; Lester Hanson; Harold Jones; Harold Searles; and Harold B. Swanson. Jean Metcalf, editorial assistant for committee.

(Continued from page 1)

have not recently been in legumes, a fertilizer containing nitrogen will generally give a profitable return. This is especially true for crops like corn, grains, hay, and pasture grasses.

Farmers should now be sending in their soils for test so they can buy their lime and spread it this fall. Testing now will enable the farmer to purchase the fertilizer early this fall and spread it before freeze-up or store it on the farm. If he waits until spring he may not get the kind he wants.

By taking the fertilizer now the farmer can help his dealer get more fertilizer because most dealers do not have adequate storage space and therefore cannot keep any great supply on hand. If farmers test their soil early and then order their fertilizer and take it home, the dealer will be able to supply his needs better.

Other Information Needed

And how do you go about taking these soil tests? Let's compare the test to a physical examination. A doctor can take your temperature, run various laboratory tests, and give you a general check-up, but in addition, he will probably need to ask you a lot of questions.

The same is true with soil testing. If you are not getting the kind of crop yields you think you should, just testing the soil does not always give enough information. To interpret the test correctly, information is needed about the crops grown, the fertilizer, manure, and lime used, and other soil-management practices.

If proper samples and complete information are supplied, testing can help the farmer do a better job of liming, fertilizing, and soil management. Tests can show where lime is needed and how much, and they can guide in the selection of the kind and rate of fertilizer to fit the soil and crops. This can mean more returns from money spent for fertilizer and lime.

Superphosphate Urged for Manure

HAROLD JONES*

The use of superphosphate on built-up litter in poultry houses and in the gutters of dairy barns has four practical and profitable advantages: (1) it reduces objectionable odors; (2) it reduces nitrogen losses from the manure; (3) it helps absorb excess liquid; and (4) it makes manure a better-balanced fertilizer for crop growth.

The strong odor in barns and particularly chicken houses is due to loss of nitrogen (as ammonia) from the manure during fermentation (rotting). To avoid this loss many farmers spread ground limestone, hydrated lime, gypsum, or superphosphate in the gutters

* Extension Specialist in Soils, University of Minnesota.

The University Soil Testing Laboratory came about because farmers throughout Minnesota were demanding such a service. The laboratory, however, does not confine its efforts to serving the individual farmer. The laboratory has set up the following objectives:

1. To provide a service to the individual farmer.
2. To guide and aid the fertilizer industry and its dealers in providing information as to proper ratios and grades of fertilizer that are suited for different soil conditions and crops in all parts of Minnesota.
3. To serve as a basic tool in finding problems more rapidly on which research studies need to be developed.
4. To provide a basis for developing a state- and county-wide educational program in soil fertility and management.

The fertilizer industry, through many of its dealers in the state, is assisting the testing program by keeping soil sample information sheets (S.T.-2) and containers on hand to make it easy for farmers to collect and send in soil samples.

Records are kept at the laboratory of all soil samples tested. Summaries are prepared by county and by soil type association to determine the fertility ranges for phosphate and potash and the pH (soil reaction) ranges for lime. Summaries are kept on a county and state basis to guide the local fertilizer dealer, the county agent, and others as to the proper grades and ratios of fertilizers for certain areas.

and on built-up litter in their poultry houses. All aid the general sanitation by absorbing some of the liquid and reducing strong odors. However, superphosphate is the most effective in decreasing ammonia losses.

Superphosphate (0-20-0) contains large amounts of gypsum. When mixed with fresh manure this gypsum changes ammonia to ammonium sulfate, which is less active. As long as the manure is kept moist, ammonia losses will be kept down. But gypsum alone is not effective because as soon as the manure dries it begins to lose ammonia again. Superphosphate also contains calcium phosphate, which prevents the ammonium sulfate from going back to ammonia as it dries.

Phosphate fertilizers like treble superphosphate (0-45-0) and calcium metaphosphate (0-63-0) have little effect in preventing ammonia losses because they contain very little gypsum. Mixing these phosphates with gypsum will make them effective.

Likewise, mixed fertilizers using 0-45-0 or 0-63-0 as the phosphate source will not prevent ammonia losses. Ground limestone and hydrated lime actually speed up ammonia losses, except that if hydrated lime is used in heavy amounts it will temporarily slow down the loss.

Recommendations Given

In built-up litter use superphosphate at about 25 pounds for each 100 square feet of floor space. Make the first application a few days after the initial litter is put into the house and additional treatments every few inches of litter build-up. In the dairy barn spread superphosphate in the gutter and on the floor at one to two pounds per cow per day.

If you do not use superphosphate in the poultry house or barn, you should apply phosphate either for the crop at planting time or on the manure before spreading in order to balance its plant food content. From 40 to 50 pounds of 0-20-0 per ton of manure on the load before spreading will balance barnyard manure.

Poultry manures are also low in potash in relation to the amount of nitrogen they carry. From 40 to 50 pounds of 0-20-20 per ton of poultry manure will increase its value as a fertilizer. If 0-20-0 is used in the poultry house on the litter, potash at the rate of 25 to 30 pounds per ton of 0-0-60 can be applied to the manure before spreading in the field.

Diagnosis Lab Helps Fight Animal Ills

REUEL FENSTERMACHER
and CHARLES GALE*

The feed industry probably has a bigger stake in the animal diagnosis laboratory at the University of Minnesota than many of its members realize.

This is because examinations conducted in the laboratory often reveal that livestock owners have been using feed inefficiently or wasting it. Practices which waste feed often make it look as though the feed dealer is to blame. But laboratory findings may show that the feed was not at fault. Actually, livestock diagnosis over many years has revealed that faulty feed rarely is the cause of animal health troubles. Sometimes the animal may have eaten too much salt or may have vitamin deficiencies. However, if something in the feed is causing trouble, the dealer wants the facts.

Perhaps we can clarify the relationship between the feed dealer and the diagnosis laboratory by explaining the functions and history of the service.

Lab Activities Varied

The diagnosis laboratory, located on the St. Paul Campus of the University of Minnesota, diagnoses animal and poultry ailments for veterinarians and livestock owners. It is operated jointly by the University and the State Livestock Sanitary Board.

The part of the service that reaches out into the country is confined largely to the control of diseases of poultry and swine. There are two mobile units, one operating in northern and one in southern Minnesota. These units test approximately 250,000 turkeys each year for pullorum disease and paratyphoid infection. Pullorum disease is an especially important problem of chickens and turkeys.

Ever-changing conditions in agriculture are bringing many new problems to the diagnosis laboratory. The result is that the work of the lab is now expanding more rapidly than it has since it became a part of the University's Department of Agriculture in 1912.

During the year ending June 30, 1952, a grand total of 796,940 examinations were made in the laboratory. Of these, 277 were cattle, 215 dogs, 4,295 chickens, 36 horses, 101 sheep, 774 swine,

790,645 turkeys, and 597 miscellaneous. Actually, 4,713 individual turkeys were examined in the laboratory. The rest were tested and retested for pullorum disease and paratyphoid infection by the mobile units.

One of the most powerful stimulants in expanding the work of the diagnosis laboratory has been the occurrence of Newcastle disease in poultry, a disease that was completely unknown in the state before 1946. New techniques were necessary to cope with this disease. Because of the speed with which it spreads, an overwhelming demand arose for ways to diagnose and control the disease in the state.

Laboratory workers had to be trained and special equipment purchased to meet this demand quickly and adequately.

Following on the heels of the appearance of Newcastle disease came "X-disease" (hyperkeratosis), which affects cattle, especially young animals. Here was another disease entirely new in Minnesota, and this, too, meant additional demands on the personnel and facilities of the laboratory.

More recently, anaplasmosis, a protozoan disease of cattle, made its appearance in the state. This disease, which is on the increase in the United States, requires special complicated techniques for diagnosis.

During the past few years it has been necessary to send staff members to various parts of the United States to learn new methods of diagnosing both new and old diseases. More of this education should be done, but available funds do not permit.

Research Needed

Also, more research needs to be done with diagnosis and investigation of the use of antibiotics, sulfa compounds, and other new products which may be developed by industry and the medical sciences.

Another service provided by the diagnosis laboratory is actual bacteriological examination of turkeys that react to pullorum disease test. This is necessary in order that the owners of breeding turkey flocks may qualify as to pullorum disease status. It is every breeder's aim to have a pullorum disease-free breeding flock. Before this season is ended we will have examined approximately 450 turkeys bacteriologically—a very costly and time-consuming service.

The diagnosis laboratory provides the turkey industry with the necessary test fluids used for testing birds for pullorum disease and paratyphoid infections. The turkey breeders themselves are providing the funds in order that their flocks can be tested for paratyphoid infections, and without these funds the diagnosis laboratory would not have been able to provide this service. The funds are used for employing personnel to do this additional testing.

Also adding to the lab's work load in the past two years is the increase in the number of rabies cases in the state. The laboratory has found more than 200 positive cases out of the hundreds of examinations made, and approximately half of these have been in skunks.

Rabies, of course, is a public health matter, and the State Board of Health is providing excellent service to owners of livestock and the general public in helping to identify and control it.

Seams Bursting

So it may be seen from the ever-expanding services of the diagnosis laboratory that much pressure is being placed on present personnel and space. It was believed that when the diagnosis laboratory was moved to the ground floor of the new temporary building on the St. Paul Campus in 1948, the space would be sufficient for a number of years. But expansion has already resulted in overcrowding.

There are many disease conditions affecting animals and poultry that need investigation. For example, air sac infection in breeding turkeys is becoming more and more widespread, and several turkey breeders already this year have been obliged to sell their breeding flocks. This condition will undoubtedly become more serious as time goes on, and unless some method of control is developed, the turkey industry will suffer serious economic loss.

We in the diagnosis laboratory have always had excellent cooperation from the feed industry. We are always determined as best we can to continue to inform the owner of the cause of losses he may be having in his livestock and poultry.

Feeding Grass Silage—Hay-crop silage can be fed to cattle in any quantity available to replace pasture, corn silage, or most of the hay, says H. R. Searles, Extension Dairyman at University Farm.

* Dr. Fenstermacher is professor of veterinary medicine and veterinarian-in-charge, diagnosis laboratory, and Dr. Gale, a recent graduate from the School of Veterinary Medicine, is now assisting in the diagnosis laboratory.

Law Opens Fire on Contaminated Grain

By H. L. PARTEN*

Raw material grain is the newest product to come under the critical eye of the Food and Drug Administration.

For the past several years this Administration, working under the authority of the Food, Drug, and Cosmetic Act, has been trying to reduce contamination in the products of bakeries, milling companies, and other food processors. The drive to improve sanitation in the handling of grain is simply a new phase of the same program.

This phase is directed at the country and terminal elevator operators who in turn will reflect this program back to the farm where the grain is produced and stored. As a result elevator managers will be reluctant to accept grains which have been contaminated by rodents, birds, or livestock. And if they do accept it, it will be as livestock feed and at lower prices.

Little if any insect infestation in Minnesota grains comes from the field but usually originates in storage, either on the farm or in the elevator.

Farm Bins Are Insect Havens

Grain that is stored on the farm is likely to become infested unless the farmer takes precautions to protect it. On many farms wooden bins are used to store grains, and they have been used for many, many years. The walls and the floors have become honeycombed by the burrows of the cadelle beetles and the gnawing of rodents, and thousands of insects find food and shelter in this type of bin.

Waste grain and feed in surrounding

* Extension Entomologist, University of Minnesota.

farm structures also harbor insects that may find their way into the grain stored in bins. It is to the elevator operator's advantage to see that farmers in his vicinity know how to prevent infestation in their farm-stored grains. The farmer should follow these rules:

1. Store only grain that is dry, preferably not more than 11 per cent moisture.

2. Store in weather-tight rodent-proof bins, preferably steel.

3. Clean out all bins before loading them with grain, spray walls and floors of wooden bins and around door frames of metal bins with methoxychlor, DDT, allethrin, or pyrethrum. Chlordane is not recommended as a bin spray at the present time.

4. Clean up and dispose of litter, waste grain, and feed that have accumulated in and around farm buildings. Insects cannot live on premises that are clean.

5. Fumigate grain as soon as you think it is infested.

6. Inspect grain frequently in order to detect infestation of insects, rodents, or birds, or heating of the grain. Because of the extremely high relative humidity of the past several months in this state, we are finding grain in bins heating because of excessive moisture which has been absorbed from the atmosphere. Grain in this condition should be turned and dried in order to prevent spoilage due to molds.

What About the Farmer Who Stores His Grain on His Farm?

The Federal Statute deals with products in interstate commerce only, so grain stored on the farms does not come under the Federal Food, Drug, and Cos-

metic Act. However, when the farmer delivers contaminated grain to a country elevator which does interstate business, that grain may be subject to the law.

The first thing to remember about the law is that if any amount of your product is introduced into interstate commerce by truck, train, airplane, or any other means, then you are doing an interstate business. If your product is sold and used entirely within the state where it is produced, you are not subject to the federal law, but you are subject to comparable state laws.

University Testing Soil Conditioners

Several of the chemical "soil conditioners" now widely advertised are being tested this summer at University Farm and University of Minnesota branch agricultural experiment stations.

Paul Burson, professor of soils at the University, stated that experimentation with these materials is at an early stage. No definite results will be known until after this fall.

Burson referred to a statement from the Agricultural Research Administration of the United States Department of Agriculture advising purchasers of soil-conditioning chemicals to buy the products at present only with an experimental point of view.

UNIVERSITY FARM, ST. PAUL 1,
MINNESOTA

Cooperative Extension Work in Agriculture and Home Economics, University of Minnesota, Agricultural Extension Service and United States Department of Agriculture Cooperating, Paul E. Miller, Director. Published in furtherance of Agricultural Extension Acts of May 8 and June 30, 1914.

In This Issue . . .

- *Our Soils Need Fertilizer* by Paul M. Burson and Joseph L. Keogh
- *Superphosphate Urged for Manure* by Harold Jones
- *Diagnosis Lab Helps Fight Animal Ills* by Reuel Fenstermacher and Charles Gale
- *Law Opens Fire on Contaminated Grain* by H. L. Parten

UNIVERSITY of MINNESOTA
Department of Agriculture
Agricultural Extension
University Farm, St. Paul 1, Minn.

PAUL E. MILLER, Director
Minn. 9-8-52-2100
Permit No. 1201

Agriculture Library
Univ. of Minn.
St. Paul Campus

PENALTY FOR PRIVATE
USE TO AVOID PAYMENT
OF POSTAGE, \$300

fd

FREE—Cooperative Agricultural Extension
Work, Acts of May 8 and June 30, 1914.