HOME COURSE IN SCIENTIFIC AGRICULTURE

One of a Series of Sixteen Articles by Noted Government and State Experts

FIRST ARTICLE—SOIL CONSERVATION.

By W. J. SPILLMAN, Agriculturist in Charge of Farm Management, Bureau of Plant Industry, Department of Agriculture.

HOW to restore and maintain the productivity of the soil is the most important phase of the conservation problem. In many of our older communities soil fertility has been reduced below the point of profitable production. Nation wide effort at the present time, through federal and state agency, is directed toward the restoration of fertility in these localities. In the older countries of Europe, where farming has been followed for many centuries, the problem of satisfactory yields of farm crops has been solved. The agriculture of Germany is similar to that of the United States, but the yield per acre of wheat in Germany is more than twice that in the United States, the yield of rye nearly twice as large, the yield of barley nearly a third larger and the yield of oats more than one-third larger.

The proportionate area of cereals grown in Germany is about one-fifth less than in the United States, while the proportionate area of hay and forage crops is one-half greater. In addition to that, the percentage of the total area which is planted to root crops is enormously greater in Germany than in the United States. These root crops consist largely of potatoes and sugar beets, and the best German authorities estimate that at least one-third of the products of the area of these two crops is available for stock feed. They also estimate that one-third of the products of the area devoted to cereals is devoted to the feeding of domestic animals. Germany therefore devotes very much more of her soil to the production of feed for live stock than does the United States.

On the same area of farm land the German farmer maintains on the average from 30 to 78 per cent more live stock than does the American farmer. The manure from these animals is also better cared for in all European countries than it is in this country. Not

"ANIMALS WITH GOLDEN HOOFS"—SHEEP MAKE THE SOIL FERTILE.

only that, the United States exports vast quantities of cottonseed meal, linseed oilmeal and other rich nitrogenous feeding stuffs, while Germany imports vast quantities of these materials. German farmers not only conserve their own natural resources, but they draw on other parts of the world to maintain the fertility of their lands. America has been mining her soil and shipping the products to Europe. In addition to the sources of fertility above given, Germany uses annually on her soil 550,000 tones of nitrate of soda, 275,000 tons of sulphate of ammonia, 1,200,000 tons of superphosphate and 1,400,000 tons of basic slag in addition to large amounts of potash salts.

We are now confronted by the same necessities that compelled the adoption of sound systems of agriculture in the old world. How shall we meet this problem?

The Solution of the Problem.

In the first place, we must increase the number of domestic animals on our farms. Where land is farmed by renters the leases must be made for longer terms, and where the renter has not the capital to provide the proper number of domestic animals these must be supplied by the landowner. The effect of live stock on the fertility of the soil needs no demonstration. It is well known to every intelligent farmer. Up to the present time, at least, no system of agriculture has been permanently profitable without the use of domestic animals as a means of maintaining the productiveness of the soil. Whether such systems are possible remains to be seen.

In addition to increasing the number of domestic animals on American farms our farmers must pay more attention to leguminous crops and to other crops which provide a supply of humus for the soil. Legumes, such as clover, peas, alfalfa, etc., are especially important because of the fact that with the aid of certain soil bacteria they are able to draw their supply of nitrogen from the air. Having thus an unlimited supply of this valuable plant food constituent, they become very rich in nitrogen. The stubble and roots of a leguminous crop frequently leave in the soil sufficient nitrogen for the needs of the crop that follows. Recent investigations by the department of agriculture in Kansas and Nebraska show that the average increase in the yield of corn grown after alfalfa, compared with corn grown after nonleguminous crops, is 75 per cent. A good crop of clover has a similar effect on the yield of crops which follow it. Instances are known where the practice of sowing bur clover in cotton fields in the fall of the year and turning it under in spring in time for another crop of cotton has in three years doubled the yield of cotton. Crimson clover sown in a similar manner between crops of corn has in a few years increased the yield of corn 50 per cent or more.

The reason these leguminous crops have such a marked effect on fertility in many cases on depleted soils lies in the fact that nitrogen is not a constituent of the soil proper, but only of the decaying plant and animal matter in the soil. When soils are farmed for many years without any attention to their fertility this organic matter is rotted out and the nitrogen disappears. Hence nitrogen is nearly always the first plant food constituent to become deficient in the soil.

The fact has already been referred to that we export a large proportion of our cottonseed meal, oilmeal and other rich nitrogenous feeding stuffs. These materials are all exceedingly rich in nitrogen. They should be kept at home, fed to live stock and the manure returned to the land.

Dependence on Our Own Resources.

There is this difference between our situation and that of the older countries of Europe: Hitherto we have been exporters of our feedstuffs rich in fertilizer constituents, while they have been importers. They have been drawing on the newly settled regions of the world for materials with which to feed their crops. The American farmer will be making a long step forward when he quits exporting these materials and returns them to his own soil. Whatever shortages there may be must be made up by the intelligent use of commercial fertilizers. There is no danger of a nitrogen famine. We can grow leguminous crops to supply nitrogen. We can also, by judicious use of the refuse from grain and other crops and by the use of intelligently planned crop rotations with occasional catch crops for green manure, keep up an abundant supply of humus. Even if we had no other resources for maintaining the fertility of the soil than leguminous plants and humus making crops we could on much of the land in this country maintain a much higher standard of yields than obtains at the present time.

Examples of Successful Farming.

In New York state there are large areas of land which formerly produced satisfactory crops but which in recent years have been reduced in fertility to the point where their cultivation is no longer profitable by the methods in vogue in that section. A few years ago a representative of the department of agriculture induced a farmer in that section to grow four acres of potatoes under his direction. This farmer had been growing potatoes for many years, using seed which had been grown for sixty years in that locality without selection to maintain its quality. His ordinary yields of potatoes were about forty bushels per acre. He was induced to secure new and improved seed and to cultivate in the most thorough manner. As a result these four acres produced a yield of 250 bushels of potatoes per acre. Similar results have since been secured by a number of other farmers in the same locality.

An Illinois farmer a good many years ago established on his farm a rotation of corn, corn, oats, clover. The corn and oats were fed to hogs, which were allowed to graze on the clover. Very little feed was purchased, but everything raised on the farm was converted into manure and returned to the land. At the beginning of this system of farming the yield of corn was about thirty-five bushels to the acre. Ten years later it had risen to eighty bushels per acre, the average yield for four consecutive years being 80.4 bushels per acre.

A Missouri farm which had been devoted to corn and wheat for seventy years and on which the yields of wheat were about eight bushels per acre and corn about twenty-five bushels was subjected to a system of farming similar to that just described for an Illinois farm. In six years the yields of this farm were more than doubled. In work of this character the following points are emphasized:

Deep fall preparation of the soil.

Planting of well selected seed.

Mainly shallow and frequent cultivation of the crop during the growing season and especially after a rain.

The judicious use of commercial fertilizers and the increased use of home produced fertilizers and the growing of leguminous crops.

WORNOUT MACHINERY.

Economy Demands That It Be Relegated to the Scrap Heap.

In the older steel plants of small and medium size and even in plants that have grown up from a modest beginning to become immense concerns employing thousands of men we find that the auxiliary power machinery has been given little consideration in modernizing the machinery in general. But with auxiliary machinery it is very different. In many cases air compressors and pumps, even such important machines as blowing engines, have been kept in service long after their days of usefulness were over, when they were using enough steam to pay for a new machine in a very short time and to make the purchase of up to date machinery a splendid investment. The reasons for this method of procedure were that the new auxiliary power machines would not show an increased output of steel, nor would they show a great saving in the cost of production of the steel.

In many localities fuel was cheap. In some cases the steel companies owned their mines close at hand and coal could be had for the digging. In a few instances byproduct gas furnished all the fuel required. In these cases there was some excuse for keeping inefficient machinery in use.

More recently, however, conditions have taken a decided change. The price of coal has advanced, making it urgent to be more careful in the use of it. Steel companies have found that it pays better to sell the coal than to burn so much of it themselves. Then, again, the supply of natural gas in some localities has become limited or has given out entirely—another reason for saving fuel.

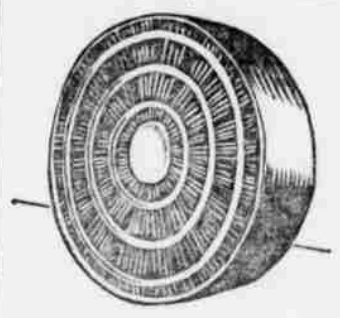
In later years competition has become keener. Large plants have been built, and the older concerns have had to conserve their resources in order to meet this competition. Engineers have been employed to look after the saving of fuel—competent, trained engineers with efficient assistants. These departments keep a sharp watch on all the power machinery, steam, air, gas and water. Their business is to make efficiency tests on the machinery, measure power used by the different mills and departments, check up the fuel consumption of the boiler houses and be ready at any time to recommend the removal of a machine as soon as it becomes a paying proposition to replace it with a machine of greater efficiency. —Engineering Magazine.

AN EFFECTIVE RADIATOR.

German Invention Said to Give a Remarkable Amount of Heat.

A remarkably effective radiator has been devised by a professor of a technical high school in Prussia. The fundamental principle of the apparatus is the use of a great number of indirect radiation surfaces made of a material that has a high conductivity of heat.

For this purpose very thin zinc covered copper bands are disposed radially in the circular body of the radiator



NEW GERMAN RADIATOR.

between the concentrically arranged hot water or steam heating coils, which are flat. By properly calculating the surfaces, cross sections and other dimensions an extraordinary heating efficiency is obtained with a minimum of material.

This efficiency is said to be so great that a radiator twenty-eight inches in diameter and fourteen inches high can raise the temperature of nearly 400,000 cubic feet of air over 100 degrees F. per hour.

A New Elixir of Life.

Dr. Frank R. Starkey of Philadelphia, in a serious report that has startled the medical world, has made known to the public some remarkable results of a series of experiments on which he has worked for several years, first on his aged mother, then on himself and fifty friends. His object was to find an extract from the various ductless glands of the body which will prolong life and make the aged look and feel much younger. Dr. Starkey says he is a living testimonial of his success, as the treatment he has taken has made him look ten years younger, and that the same is true of others. He calls his remedy the "polyglandular extract" and says it is a combination of extracts from the thyroid, pultary and other ductless glands. It is administered by injections into muscles or blood. It is said to raise the defensive power of the blood against serious poisons or disease germs.

Burial Caskets of Cement.

A burial casket or rough box made of cement has been invented by a citizen of Prescott, Ont., and a company has been formed to place the product on the market. The caskets have been used for some time and are reported entirely satisfactory. The claim is made by the inventor that fine caskets of wood or metal, as well as the body and its clothing, are preserved in this cement outer case secure from dampness, no matter what the condition of the soil.—Consular Reports.