CROP ROTATIONS IN CONSERVATION

Good crop rotations, supplemented where needed by soil treatment, will do much to maintain or improve soil fertility, yields, and the nutrient value of crops. Such rotations are especially important at the present time because of the need to restore to the soil organic matter and nitrogen that were lost through a wartime speed-up in the exploitation of soil resources which has not been counterbalanced by soil-conserving practices. Proper crop rotations also help the farmer to provide steady employment and a more dependable farm income for himself, as well as the fullest and best year-round use of soil, livestock, equipment, and labor. These general conclusions presented by R. E. Uhland in the Yearbook of Agriculture, 1943 - 1947, published by the United States Department of Agriculture, are supported by the results of studies and investigations of crop rotations which have been made under varying conditions of soils and climate in many sections of the United States during the last 20 or 25 years.

Scientific tests conducted by State agricultural experiment stations and the United States Soil Conservation Service have shown, first of all, that type of crop and type of cultivation are among the important factors influencing the rate of water runoff and soil erosion. The water runoff from clean, cultivated fields may be less than from fields where close-growing crops, such as small grains, are produced, but the rate of soil removal may be much higher, for the surface is more exposed and the loose topsoil less resistant to erosion. This conclusion is supported by the results of experiments at Temple, Texas, where a plot of Houston clay soil with a 2 percent slope cropped annually to corn for 11 years lost 8.8 percent of the precipitation and 22.72 tons of soil an acre each year, while an adjacent tract of land in Bermuda grass lost only a trace of water and soil. When oats followed corn, 13.4 percent of the precipitation ran off, but annual soil loss per acre was reduced to 2.06 tons. Findings were similar in experiments at Guthrie, Oklahoma, where the runoff and erosion from a tract of virgin Stephensonville fine sandy loam cropped to a rotation of cotton-wheat-sweet clover were compared with those from adjacent plots where cotton was grown annually. Runoff and erosion experiments in Ohio, Missouri, Iowa, and other states have yielded similar results.

Much of the benefit from growing sod crops, such as Bermuda grass and sweet clover, is due to the influence they have upon the binding together, or aggregation, of soil particles. A high degree of aggregation permits rapid movement of water within the soil and consequently prevents excessive runoff. Experiments have shown that lands on which alfalfa had been grown had 50 percent greater soil aggregation than lands on which corn had been grown annually. The improvement in aggregation caused by alfalfa and other hay crops may still be evident after three years of corn or other row crops. It has been found also that land generally should be kept in a hay crop two or more years at a time in order to improve aggregation and stabilize the soil.

A necessary constituent of productive soils is organic matter, and much of this can be acquired by crop rotations. Experiments have shown that the organic matter of good soils can be maintained by rotating clover and alfalfa with row crops and grains, or that the...
organic matter as a percent of the soil may be increased where alfalfa or clover is grown for a number of years in succession. Also, increased organic matter in the soil may reduce insect injury to crops and increase the resistance of crops to droughts.

As evidence of the possibility inherent in crop rotations for maintaining the soil’s organic content, Mr. Uhland cites an investigation in Harrison County, Missouri, where after 60 years of cropping to corn and oats the organic matter at plow depth of a Shelby loam area averaged 1.83 percent. On an adjacent area that remained in grass during the period, the corresponding percentage was 5.91. Similar Harrison County land cropped to a good rotation for nearly 60 years still retained 4.11 percent organic matter in the plow depth. Thus, land under rotation cropping during this 60-year period lost about 30 percent of its original supply of organic matter; without rotation, the loss averaged 69 percent, or 2.3 times as much.

Although much of the cropland in the United States has lost a part or all of its topsoil and its fertility cannot be restored fully, the productive capacity of this land can be increased by the use of crop rotations and the application of other soil-improving practices. On badly eroded areas crop rotations may need to be supplemented by the application of large quantities of lime and mineral fertilizers. In experiments at the soil-erosion experiment station at Bethany, Missouri, on lands with all topsoil removed, a corn-oats-red clover and timothy-timothy crop rotation produced 20.5 bushels of corn per acre. This was low when compared with a yield of 43.0 bushels of corn per acre on land from which the topsoil had been eroded to about half its original depth and on which the same rotation pattern was followed. However, by crop rotation, use of lime, and application of superphosphate to the oats, the corn yield on the subsoil was raised to 34.6 bushels per acre, or 43 percent of the yield on topsoil with both rotations and soil treatments. By substituting sweet clover for the red clover and timothy in the rotation on the plot with no topsoil, by turning the clover under in the spring before corn was planted, and by applying the soil treatments, it was possible to raise the corn yield to 44.0 bushels per acre. With the addition of manure applied before corn, the yield of corn on the subsoil was raised to 64.6 bushels per acre, or about 50 percent, above the yield achieved on the land where half of the topsoil remained but on which no soil-improving practices had been applied. The yield, however, fell about 20 percent below that from land where half of the topsoil remained and lime and superphosphate had been applied.

The results of these experiments show the possibilities of increasing the productive capacity of lands where the topsoil has been lost by erosion. They show also that despite crop rotations and applications of lime, superphosphate, and manure, the productivity of subsoils cannot be brought up to that of topsoils treated in like manner. These facts emphasize the desirability of initiating good rotations and whatever other conservation practices are needed before serious erosion or deterioration of topsoil takes place.

The type of rotation that should be used on any given piece of farm land, of course, depends on the characteristics of the land. If the land is very steep, only sod crops can protect it against serious erosion. If it is gently rolling, rotations that provide a sod cover one or two years out of every three to five will keep it from deteriorating. Some level lands can be safely tilled almost every year. Any cropping system, to be fully effective, however, should be supplemented with conservation practices such as contouring, terracing, application of needed plant foods, return of crop residues and manures, and strip cropping, according to the needs of the particular farm.

AMERICAN BANKERS STRESS AGRICULTURAL PROGRAM

At the recent annual meeting of the Agricultural Commission of the American Bankers Association a program for 1948 was agreed upon which it is hoped will challenge
the interest of every banker in the country. The subjects listed in the program call for active participation by bankers in soil conservation programs in their respective localities, support of youth organizations, such as the 4-H clubs and Future Farmers, and support of such adult agricultural education programs as lectures, demonstrations, exhibits, tours, and banker-farmer meetings. Also, bankers are encouraged to keep abreast of soil conservation needs in their respective localities; to formulate a definite program, with a staff member specifically in charge, directed toward improving farm conditions and bank relations with farmers; to keep files showing credit information and to master the techniques of selling their farm credit services; to select in every county one of their number as a "county key banker" or "county contact banker" to work closely with the county agricultural agents and others of the State College Extension Service and the United States Department of Agriculture in putting their educational programs across to farm people; and to acquaint themselves with the personnel and participate in the activities of the Agricultural Advisory Committees set up in each agricultural county to render special service to veterans who desire to get into the farming business.

The Commission states that it will continue to make studies of land values and farm mortgage financing and will interest itself in the broad field of expanding present markets for farm products and especially in cooperating with agricultural colleges and experiment stations in their research work aimed at finding possible new uses for farm products and improving efficiency in processing and marketing. It also promises continuation of its studies to put commodity loans on a sound credit basis and improve techniques for supplying agricultural credit. In the effort to aid banks in competing for farm loans, it will continue to present to Congress, agricultural colleges, and farm organizations factual studies regarding the adequacy of credit being supplied to farmers by banks and government agencies.

FARM MANAGEMENT
Care Advised in Choosing Ewe Lamb Replacements

The value to sheep growers of keeping their top ewe lambs for flock replacement is strongly emphasized in a recent release of the New Mexico Farm Information Service. Lamb weights and wool production, according to this report, can be increased by careful selection of ewe lambs for replacement. Breeders follow different practices in selecting their herd replacements. Some growers sell their entire lamb crop one year and retain twice the number ordinarily needed for replacements the next year. In this way many top ewe lambs go to the market for slaughter some years, and animals that will not improve the herd are kept in other years. A recommended practice is to retain each year 20-25 percent more ewe lambs than are needed for replacement. The following spring the replacements are reduced to the number needed by offering for sale those ewes which do the poorest job of growing out and have the shortest wool length. The ones for final selection are the large, smooth-bodied, long-staple lambs, since they are said to make heavy-producing ewes and transmit to their offspring desirable qualities which should be kept to improve the herd.

Sweet Potatoes Useful in Dairy Rations

Freshly chopped or dehydrated sweet potatoes are a good carbohydrate feed for dairy animals, and sweet potato vines are also of value as a feed, according to a report of the Louisiana Agricultural Experiment Station. Milk cows grazed on sweet potato vines as a supplemental pasture have shown increases in milk production averaging 19 percent over cows grazed on permanent pasture only. The L. S. U. feeding experiments indicated that freshly chopped sweet potatoes are 2.5 times as valuable as silage in the dairy ration. Dehydrated sweet potatoes contained 88 percent of the feeding value of yellow corn meal and approximately 117 percent of that of ear corn ground with cob and shuck. Also, the high carotene content of Porto Rican varieties of sweet potatoes increases the vitamin A value of the butterfat.
These findings are reported in a new experiment station bulletin, No. 423, "Utilizing Sweet Potatoes as Feed for Dairy Cattle," written by Dr. D. M. Seath and others who are members of the dairy research department. The bulletin also suggests several rations in which dehydrated sweet potatoes may be mixed with other feed concentrates for feeding to dairy cows.

**Saving Grain on Dairy Heifers**

By feeding considerably less grain to growing dairy heifers than has usually been considered necessary, dairy farmers with an abundant supply of good-quality hay and other roughage can cooperate in the Nation's grain-conservation campaign and at the same time cut down feed bills, according to reports of the Louisiana Experiment Station. From recent research studies it has been found that dairy heifers can get along without grain from the time they are 10 to 12 months of age until shortly before their calving time, provided they are given proper care and fed sufficient quantities of good hay or other roughage. Recommended practices for feeding dairy heifers from birth to 2 years of age usually call for about a ton of grain and from 3½ to 4½ tons of hay or its equivalent in other roughages. In experiments, however, heifers have been grown successfully to 2 years of age with less than half a ton of grain. Since about 5½ million heifer calves are added to dairy herds in the United States each year, it is evident that savings of large quantities of grain are possible if this system of feeding is widely adopted.

Of the 17 million tons of grain or concentrates fed to dairy cattle each year, 31 percent is corn, 20 percent oats, 27 percent commercial mixed dairy feed, 4 percent barley, 2 percent wheat, and the rest is miscellaneous protein feeds, including cottonseed and soybean meals. With a short corn crop and other grain shortages, any saving made in feeding dairy heifers will make that much more feed available for other classes of livestock and at the same time lower the cost of raising herd replacements.

**ANNOUNCEMENTS**

**Meetings**

The Southwest Exposition and Fat Stock Show will take place January 30-February 8 in Fort Worth.

The 1948 Fat Stock Show and Livestock Exposition will be held at the Sam Houston Coliseum in Houston from January 31 to February 15.

The Ninth Annual New Mexico Wool Show will be staged in Albuquerque February 3-4.

**Publications**

Louisiana State University Agricultural Experiment Station, Baton Rouge:

*Utilizing Sweet Potatoes as Feed for Dairy Cattle*, Bulletin No. 423, by D. M. Seath and others.

New Mexico Agricultural Experiment Station, State College:


Oklahoma Agricultural Experiment Station, Stillwater:


Texas Agricultural Experiment Station, College Station:

*Research Publications Available from the Texas Agricultural Experiment Station as of January 1, 1947*, Circular No. 114, by Tad Moses.


*"Ordinary" and "Special" Cottonseed Meal in Fattening Rations*, Progress Report 1101, by J. H. Jones and others.