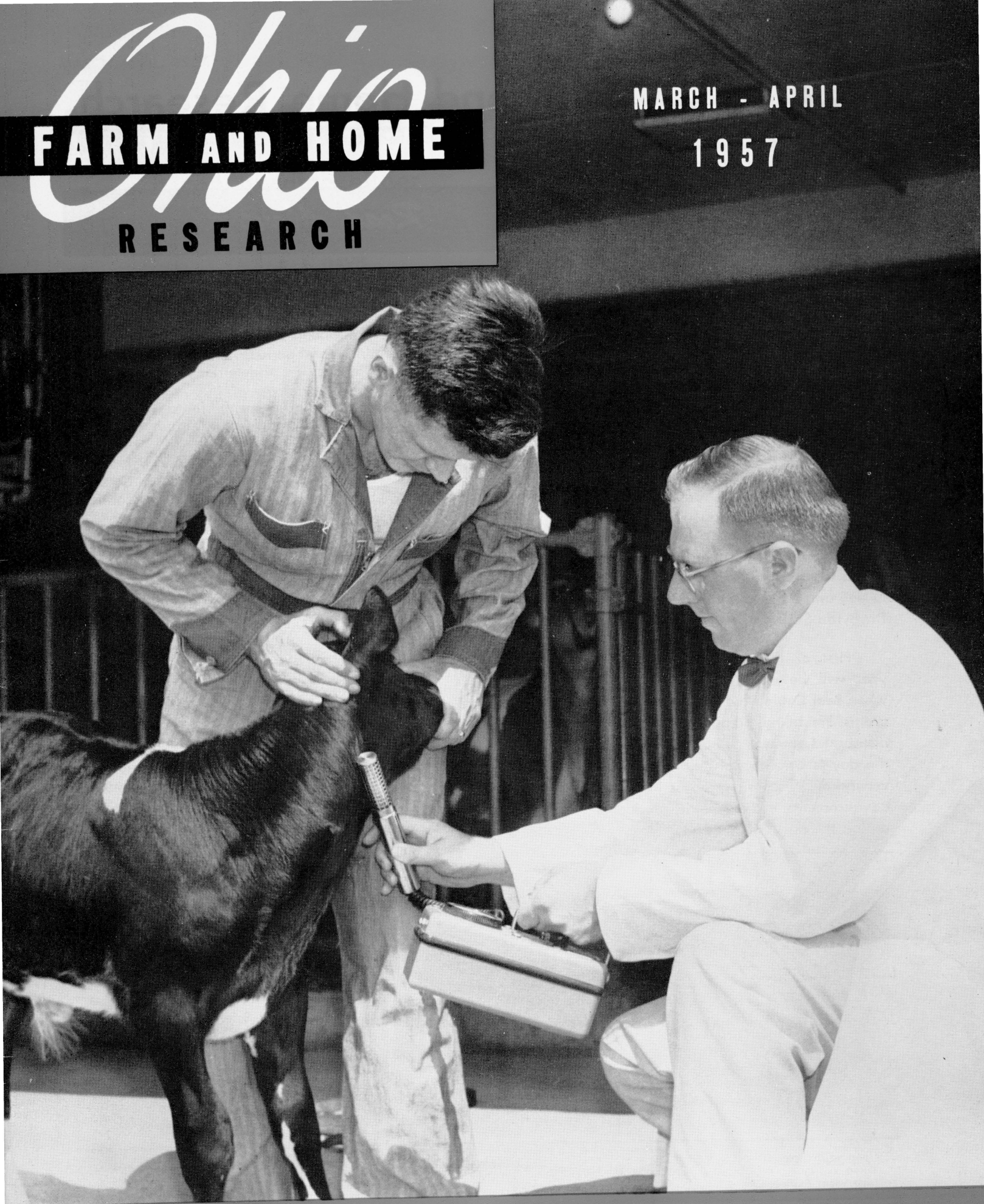
Ohio
FARM AND HOME
RESEARCH

MARCH - APRIL
1957



OHIO AGRICULTURAL EXPERIMENT STATION - WOOSTER - OHIO

OHIO Farm and Home Research

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Station Calendar

If this issue of Farm and Home Research happened to be a commercial farm magazine addicted to publicity and promotion, we might tell you that this is your Diamond Anniversary bonus issue. To a certain extent, that is true. This issue contains 24 pages instead of the usual 16. Station staff members contributed so many timely articles that we felt obligated to get them to you while the information was usable and the additional pages were added.

The 75th Anniversary observance started on March 1 with a banquet which was attended by Gov. C. William O'Neil and other important Ohioans and Dr. Byron Shaw of Washington.

First of the field days during this year will be on Wednesday, April 24 when Beef Cattle Day will be held. Programs are being prepared and will be distributed shortly. Guest speaker for the day is Dr. Gus Bohstedt of the University of Wisconsin who will discuss advancements in beef cattle production during the past 75 years.

Read About . . .

Published bi-monthly by the Ohio Agricultural Experiment Station, Wooster, Ohio

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On the Cover

Two of the Dairy Science Department staff are tracing the course of radio active iodine which has been fed to the calf. The material was fed to the calf to check its thyroid function.

Merion Blue Grass

- - - it can become either hero or villain

R. R. DAVIS

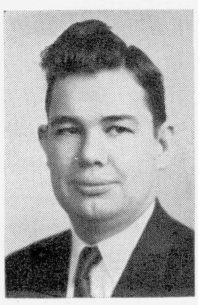
Merion bluegrass (often misspelled Marion) was introduced to the public as a high-priced "miracle" grass that would solve all lawn problems. The truth is that it is the best lawn grass available where adapted if given proper care. Without proper care, it assumes the villain's role.

Four years of study at the Experiment Station have shown Merion bluegrass to be superior to any other grass under test for lawn use. Comparisons were made with other bluegrasses, fescues, bentgrasses, and the highly advertised Meyer Zoysia. These results are not to be interpreted to mean that every one should plant Merion on their lawn. The grass is not without faults. These faults must be accepted along with its high potential for making a beautiful lawn.

Where Adapted?

The outstanding performance of Merion at Wooster does not mean it would be equally suitable for the entire State. It has not been tested under professional supervision in the four corners of Ohio. However, it should do very well from Wooster north. Observations at Columbus indicate that it is superior to common Kentucky bluegrass in the middle of the state if given the care it needs. Likewise, it has received praise in the Cincinnati area, but the indications are that its superiority may decrease south of Wooster. Like any lawn grass, Merion prefers a good loam soil. There is some doubt that it should be planted on extremely poor, droughty soils.

Don't seed Merion alone under trees. Red fescue, Chewings or creeping red, does better in heavy shade. A mixture of 40% Merion and 60% red fescue could be used in sun or shade. If the mixture is heavily fertilized Merion will take over where not shaded. Common Kentucky bluegrass may also be mixed with Merion to make a small amount of seed go further. However, pure Merion would make a superior lawn quicker. One pound of Merion seed per 1000 square feet is more than enough if evenly distributed.



R. R. Davis is an associate professor in the Agronomy Department. He contributed this story on Merion bluegrass and also another article on page 25 concerned with the control of crabgrass. He has done much research on turf and lawn problems.

Who Should Plant It?

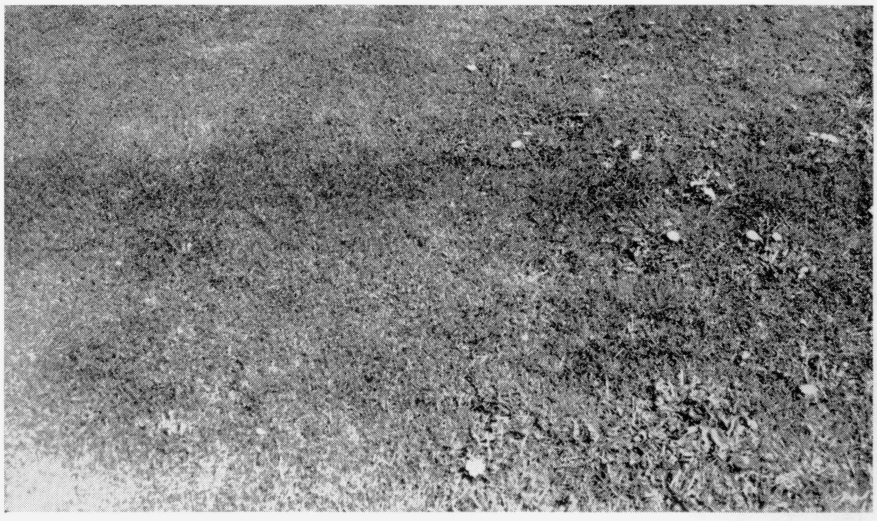
Merion bluegrass is not for the person who wants to keep grass on his lawn with a minimum of effort —mowing twice per month and fertilizing lightly once per year or not at all. It is for those who want a nice lawn and are willing to take the trouble and expense to mow it twice a week when needed and fertilize two or three times a year.

All bluegrasses are slow in germination and seedling growth as compared to other lawn grasses. Merion is the slowest of the bluegrass group. A heavy application of fertilizer high in nitrogen before planting as suggested in **Bulletin 271, Your Lawn,** will speed up seedling growth. This bulletin is available in county agricultural agent's offices. There's one in every county, usually at the county seat. When seeding Merion, expect it to be slow. It may take as much as 3 weeks to germinate.

Rust Problem

After it is established, Merion bluegrass may become infested with a rust disease. When serious, this disease gives the entire area a brown appearance. The

(Continued on page 39)

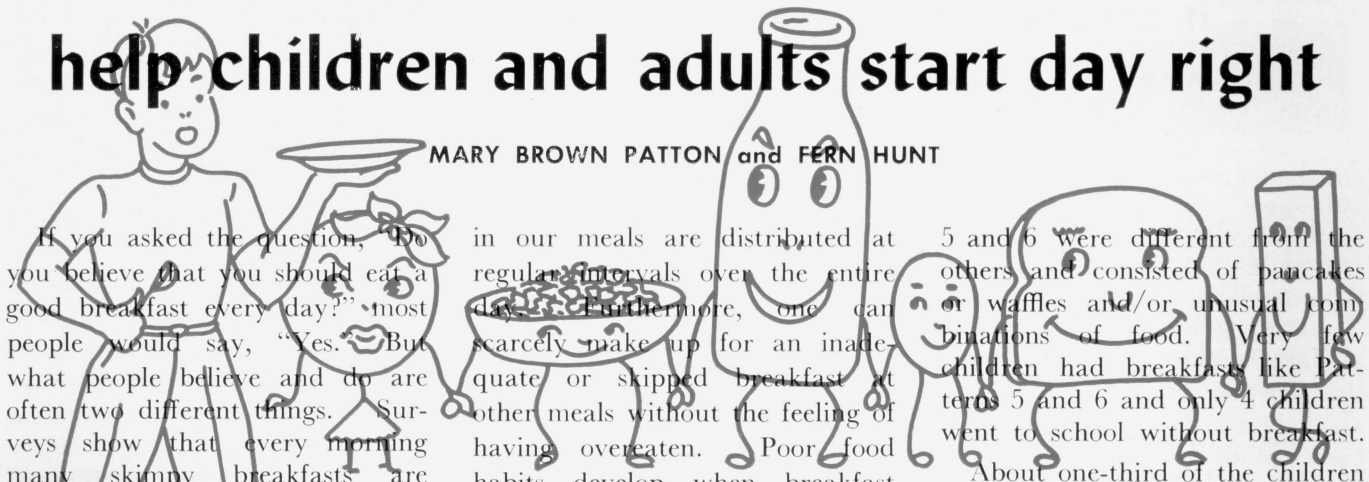


Merion bluegrass (left), when treated properly, makes a tight sod that resists invasion by weeds. The common Kentucky bluegrass (right) is badly infested with dandelions.

GOOD BREAKFASTS

help children and adults start day right

MARY BROWN PATTON and FERN HUNT



If you asked the question, "Do you believe that you should eat a good breakfast every day?" most people would say, "Yes." But what people believe and do are often two different things. Surveys show that every morning many skimpy breakfasts are downed hurriedly or skipped completely.

Teachers and industrialists have been especially aware of the effects of skimping or skipping the morning meal. Teachers often attribute cases of inattentiveness, tiredness, belligerance and poor work among students to lack of or poor breakfasts. Among industrial workers, reduced work output and proneness to accidents have been traced to poor breakfast habits.

Reason for Breakfast

There are several reasons for recommending that both children and adults eat a good breakfast every morning. In the first place, breakfast is the first "fuel stop" for the day. The quality of this first meal affects our performance and determines whether or not we get a good start and how well we keep going. Then studies have shown that our bodies make better use of food when certain nutrients in our meals are distributed at regular intervals over the entire day. Furthermore, one can scarcely make up for an inadequate or skipped breakfast at other meals without the feeling of having overeaten. Poor food habits develop when breakfast doesn't satisfy our nutritional needs. Midmorning snacks consisting of "empty" calories such as candy bars are often eaten and may dull appetite for lunch.

Dr. Mary Brown Patton is a professor and associate chairman of the Home Economics Department. Along with her administrative duties she finds time for research into such problems as the one reported here on the value of a good breakfast for school children.

The breakfast patterns of 341 children from 6 southern Ohio schools in city, village and rural areas were studied by home economics researchers at the Experiment Station. Among other things we wanted to find out how many of these children ate breakfast, what food they ate at this meal, and how much time was allowed for eating breakfast.

The children kept records of their food intake for 3 days—Tuesday, Wednesday and Thursday. A study of the records showed that the foods eaten at breakfast would fit into six patterns. The kinds and amounts of foods in these different patterns varied much like different priced breakfasts on restaurant menus. For instance, Pattern 1 consisted of bread, a beverage and sometimes fruit or juice. This one would correspond to the less expensive breakfast menu at the restaurant. Patterns 2, 3 and 4 contained either more foods or more expensive ones. In these cases, the price at a restaurant would naturally go up. Patterns 5 and 6 were different from the others and consisted of pancakes or waffles and/or unusual combinations of food. Very few children had breakfasts like Patterns 5 and 6 and only 4 children went to school without breakfast.

About one-third of the children ate breakfasts like Pattern 2 consisting of some kind of bread, a cereal, milk and sometimes fruit. About one-fourth breakfasted on bread with milk and sometimes fruit, Pattern 1. Nearly one-fifth had bread, egg, milk and sometimes fruit (Pattern 3) while one-tenth of the children ate a large breakfast—(Pattern 4) bread, egg, cereal, milk and sometimes fruit. Patterns 3 and 4 may be considered good breakfast.

Fruit Juices Vary

Citrus fruits and juices have become common foods at breakfast for many Ohio people. The children in this study from rural areas had lower intakes of these fruits at breakfast than did the children from the cities and villages. The rural children made up the difference to some extent at the other two meals.

One might think that children from rural areas would have eggs for breakfast more frequently than children from towns and cities. Among these Ohio children a larger proportion from the city than from the country had an egg for breakfast. However, the rural children had eggs more frequently at other meals than did the city children. About one-half of all the children studied ate an egg for

breakfast at least once during the 3-day period. Between a fourth and a third of the children had no eggs at any meal during the period the records were kept.

Nutritionists have recommended that breakfast furnish from one-fourth to one-third of a person's daily nutrient allowances. One-third means that you would eat as much for breakfast as at the other two meals, and one-fourth, a little less at breakfast than at the other two meals. Only 3 children of a total of 341 breakfasts that met ⅓ of the daily recommended allowances, and 17 had breakfasts that met ¼ of the allowances. All 20 children were either from the village or city schools. This means that 321 of the children had breakfast that supplied less than ¼ of their day's dietary allowances.

Sometimes lack of time is given as the reason for poor breakfast habits. Children get up and are gone from home within as little as 45 minutes, leaving no time for breakfast. Or the atmosphere may be so hurried that there is no appetite. In this study 14 minutes was the average length of time taken by the children for eating their morning meal. Some mothers reported only 8 minutes while others gave as much as 30 minutes. The children taking more time ate no better breakfasts than the others. Most of the mothers said that their children had plenty of time for eating in the morning.

Does the education of the mother make a difference? Probably not. The children of mothers having high school and college training ate no better breakfasts than did those whose mothers had only an elementary education. Other investigators have reported that level of education of mothers had little effect on nutritional level of family diets. Five mothers in the study were dietitians or nurses but their children's breakfasts all were low in at least one nutrient.

Good breakfasts like Patterns 2 and 3 help us get a good start. It is not insurance of an adequate diet for the day but it helps. At a later time we'll tell you more about the eating habits of Ohio children we have studied.

BULK TANKS

market milk producers face decision about switching

E. F. BAUMER and DALE H. CARLEY

Reports from all major milk-producing states show that more farmers are being faced with the decision about switching to bulk milk handling.

The question is a big one.

Some Ohio farmers have threatened to give up dairying if they are forced to install bulk tanks. Quite often the increased investment required by change-over is the deterring factor. Yet the trend toward bulk handling is growing steadily.

First bulk routes in Ohio started early in 1952. By December 1956 reports showed that about 2000 farmers owned bulk tanks. The percentage is rising steadily.

Several factors will have an effect on the development of bulk milk handling in Ohio. An increase in herd size will tend to expand bulk handling. A relatively favorable dairy price-cost situation or other financial incentives will undoubtedly stimulate development. Other factors affecting conversion are the attitudes of dealers, producers, haulers and credit agencies. They vary widely depending upon the community.

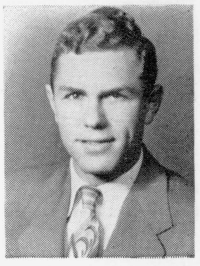
A recent study by the Department of Agricultural Economics of the Ohio Experiment Station should give some help to Ohio farmers in deciding this question intelligently. Here in question and answer fashion are the most important of the factors concerned.

Are Bulk Tanks Economical?

Yes, if certain savings are available. Savings can come from several sources: increase in weight of milk sold and butterfat test, reduction in hauling costs, possible premium payments by handlers.

Take the butterfat and weight increases, for example. Estimates place this increase around 4 cents per cwt. Loss of weight from can dumping can be ½ pint per 10 gallons or .625 lbs. per cwt. Moreover, milk sticking to lids will test as high as 8 to 10 percent butterfat. If recovered, this may amount to 1 or 2 cents per cwt.

A survey of Ohio plants indicated that two-thirds of the firms were paying premiums. About three-fourths of those paying premiums were paying 10 cents with a few paying more.



Elmer Baumer is a member of the Agricultural Economics Department of the Station. This story brings up-to-date his extensive work on the changeover to bulk milk tanks by many of Ohio's dairy farmers.

Furthermore, a recent USDA survey showed nearly half the firms reporting paid premiums for bulk milk. Nearly 69 percent of those paying premiums said it amounts to 10 cents or more. Nearly a third reported premiums of 15 cents or more.

Some firms pay this premium until three-fourths of the cost of the tank is paid. Others are paying premiums for a certain number of years. In several cases firms were making no guarantee as to the length of time such premiums would be paid.

Don't expect too great a reduction in hauling rates if your area already has relatively low rates. Reductions in hauling rates were reported by about 80 percent of the Ohio firms receiving bulk milk. Half of these firms reported reductions of 10 cents or more per cwt.

How Much Does a Tank Cost?

A 300-gallon bulk cooler (recommended for 100 gallons daily production) will cost around $2500 less any discount and trade-in of can-type cooler. Add weight, depreciation, possible changes to milk house, installation and calibration charges. Figure on spreading the cost over a 15 year period.

For more help in deciding whether you should convert, write to the Ohio Experiment Station, Wooster, and ask for a copy of the "Bulk-O-Meter Plan." This simple chart will tell you how much you may expect to save or lose in switching.

Is a Bulk System Easily Financed?

Production credit associations are usually willing to make loans at regular terms. Banks are often interested in helping farmers make the change. Producer cooperatives should be contacted too. Choose the one that best fits your situation.

Here's another way to pay it off. Assuming you get a reduced hauling rate, apply the difference to the debt. The same principle can be applied where premium payments are in effect.

What Kind of Tank Should You Buy?

There are two kinds—icebank and direct expansion. The icebank type builds up a reserve of ice over which water flows and then circulates around the walls of the tank. It requires a smaller compressor and motor, but does need a circulating pump for the water. It is impossible for the milk to freeze with an icebank type.

The direct expansion type has cooling coils placed against the bottom of the inside liner and therefore cools the milk directly, is more efficient. However, it does require a larger motor and compressor, and there is a possibility of freezing the milk.

Generally speaking, the initial investment on the icebank tank is somewhat less; however, operating costs are generally higher than for the direct expansion. In the long run there appears to be little cost difference in either.

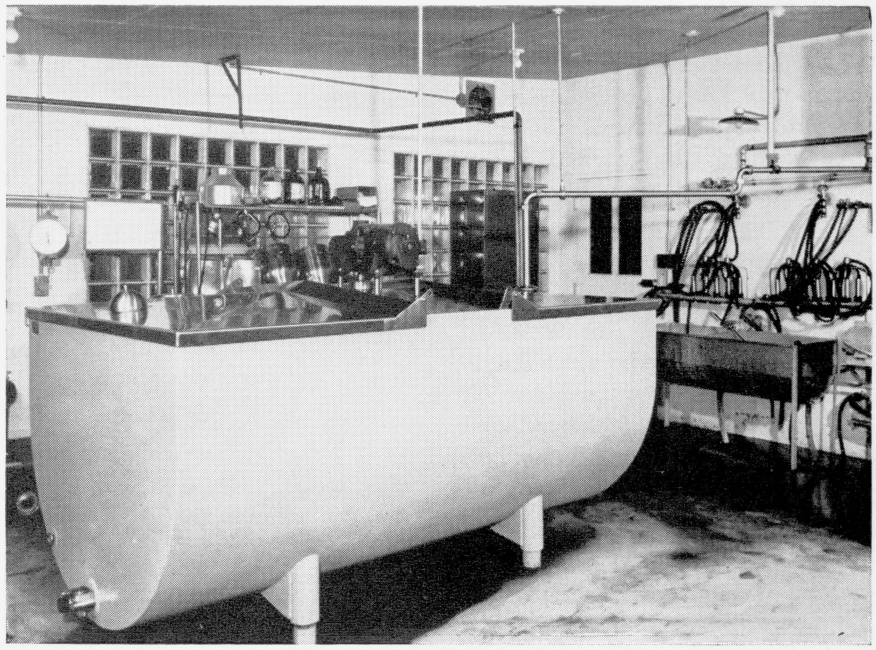
How Big a Tank Should You Buy?

Buy one big enough to hold five milkings at your peak production period. Consider also that your herd may increase later on.

Remember that when you start using a bulk tank, it's wise to strive for an even production the year around. It's too costly to buy a tank that fits the needs of the flush months, and then fill it only partly full the rest of the year. In this respect, bulk handling may result in changed production patterns on the dairy farm.

Does the Bulk Plan Improve Milk Quality?

No, but it will better protect the quality of milk placed in the tank. Reasons: rapid cooling of the milk and maintaining it at a uniform low temperature. Tanks are easier to clean too.



This is a bulk tank in use at the North Central Substation near Castalia.

One objection: Poor quality milk from any one milking may affect the overall quality of total tank holdings. Closer inspection and culling of herds, also rigid sanitation should help overcome this.

Don't worry about putting warm milk in a tank of milk already chilled. Usually the temperature of mixed milk is far below the critical point where bacteria grow rapidly.

Does It Save Labor?

Not too much unless you add a pipeline milker. However a bulk tank is most economical at higher levels of production. For this reason, many bulk producers are increasing herd size to gain efficiency. On some farms this may actually increase labor needs.

What Other Factors Should You Consider?

Your market should be ready for bulk handling and facilities should be available for hauling.

Every-other-day pickup is necessary for greatest efficiency.

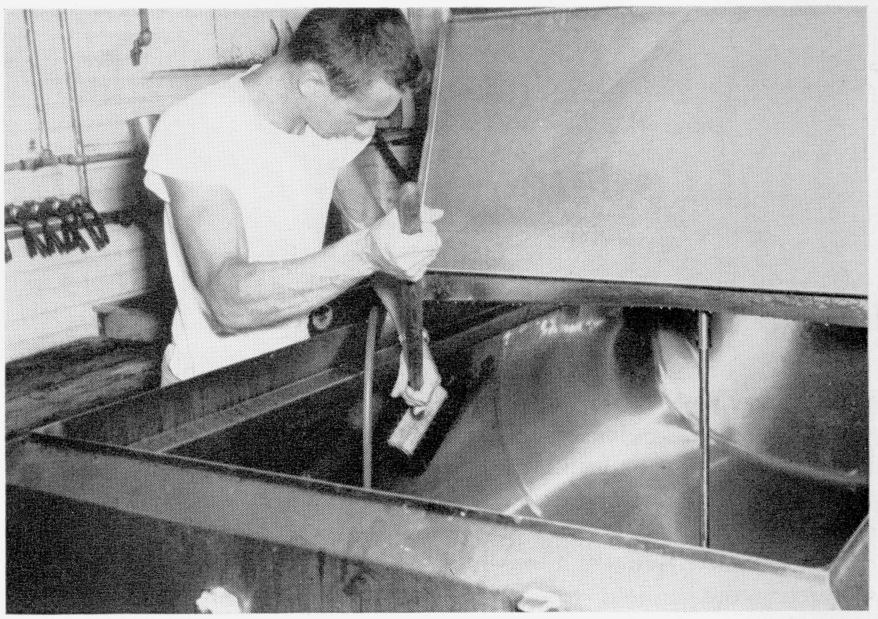
Routes should be fairly well organized, otherwise savings will be minor.

Observe Your Health Regulations

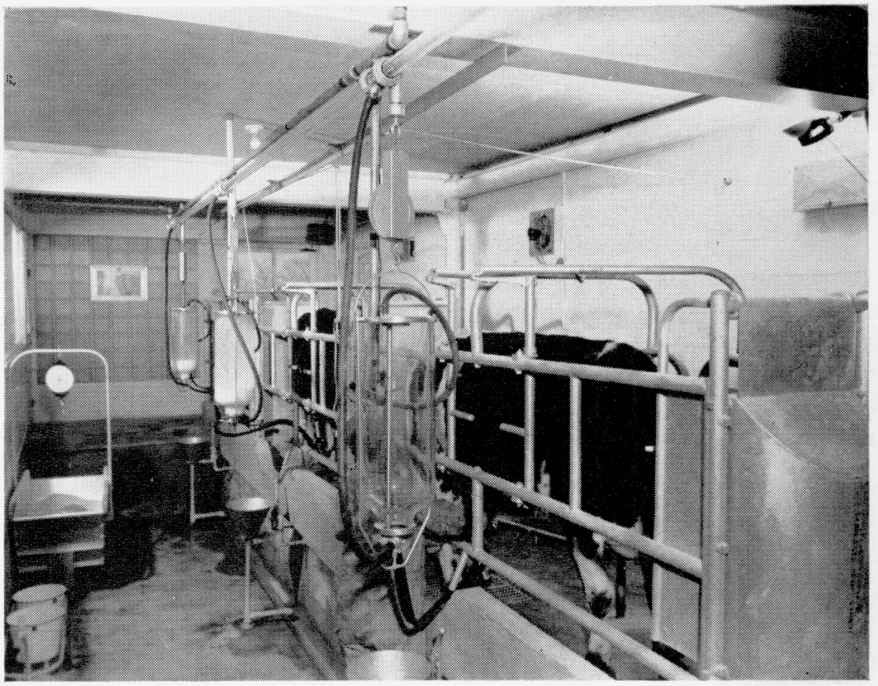
Become familiar with the health regulations in your market area. Many city boards of health require at least two feet of space around three sides of the tank, with a four foot space between the tank and other milk house equipment. With careful planning your present milk house may be adequate.

Bulk tank favors the larger producers. For instance, the estimated investment in a tank for a 40 gallon per day producer would be $170 per cwt. of capacity while the investment for the 120 gallon per day producer would be $94 per cwt. of capacity.

We can expect further development in most areas of Ohio. Dairymen should study their cost relationships and have in mind their future plans in the dairy business. In many instances sales outlets or hauling facilities may force farmers to make decisions on short notice.



Tanks are easy to clean but rigid sanitation requirements must be met.



A pine line milker in connection with a bulk tank saves labor. This milker is used on the Castalia farm of the Ohio Agricultural Experiment Station.

STILBESTROL
increases gains of pasture fed steers

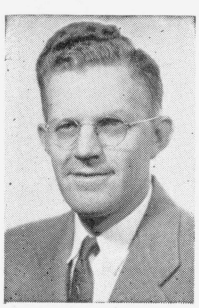
EARLE W. KLOSTERMAN and L. E. KUNKLE

Numerous dry lot feeding experiments have shown that stilbestrol, whether implanted in the ear or mixed with the feed, significantly increases the growth rate of fattening steers. The amount of information of its effect, however, is much more limited for cattle fattened on pasture. For three summers, research has been conducted at the Madison County Farm to determine the influence of stilbestrol implantation upon rate of gain and carcass quality of steers grazed for a period without grain and then fed ground ear corn on pasture.

Herefords Used

The cattle used in these experiments were heavy Hereford calves purchased in the fall and wintered to gain a pound to a pound and a quarter per head daily. They were grazed without grain for approximately 60 days and were then fed ground ear corn on pasture and marketed about October 1. The pastures used in these experiments were mixed seedings of grasses and legumes but contained a high proportion of legumes.

In the 1954 experiment, ten head of steers were implanted in the ear with 60 milligrams of stilbestrol per head on May 21st and again with the same dosage on August 9th. A comparable group of 11 steers served as controls. Ten steers were untreated in the 1955 experiment and ten were given one implantation of 60 milligrams of stilbestrol per head on April 15th. In the third experiment 12 steers served as controls and 11 steers were implanted with 36 milligrams of stilbestrol per head on April 30th.



Earle E. Klosterman is a professor on the Animal Science Staff. He has pioneered much of the work done at the Ohio Station with stilbestrol. Here he reports on another phase of the tests involving the effect of implantation.

The stilbestrol treated and untreated steers were grazed and fed together in the 1954 experiment. In the 1955 and 1956 experiments the treated and untreated steers were grazed together until corn feeding was started. They were then separated and fed in groups so that corn consumption by treatments could be obtained. Approximately 15 bushels of corn were fed per head. In 1955 the stilbestrol treated steers ate 82 pounds more, and in 1955, 35 pounds more ground ear corn per head than the untreated steers.

Legumes Pastures Grazed

Pastures high in legumes were grazed each of the three years. No difficulty from bloat was encountered in the 1954 experiment. In 1955 there were numerous cases of bloat and two steers died. Although it is not known whether there is any relationship between implantation and bloating, both of the steers which were lost had been implanted. Only a minor amount of bloating occurred in 1956. Even though the only animals lost from bloat in 1955 had been implanted, the bloating was not confined to the treated steers.

In all comparisons, stilbestrol implantation brought about a marked increase in rate of gain. These increases in growth rate are fully equal to those generally obtained from the use of stilbestrol with steers fattened in dry lot.

At the close of each experiment the cattle were sold through packing plants where carcass grades and weights were obtained. The average for the three years shows that stilbestrol tended to lower the carcass grade. This reduction averaged less than one-fifth of a grade and varied from practically no difference in 1954 to one-fourth of a grade in 1955. The average dressing percentage was slightly higher for the cattle which had been implanted with stilbestrol. This average difference was 0.5 percent and varied from no difference in 1956 to 1.2 percent in 1954.

With an increase in gain and some reduction in carcass grade it is difficult to calculate the exact returns which might be realized from the implantation of stilbestrol in steers fattened on pasture. This is true because of the considerable variation in relative value of the various grades of beef which may occur in different years. In these experiments the steers implanted with stilbestrol consumed an aver-

(Continued on page 39)

CRABGRASS

problem temporarily solved by use of chemicals

R. R. DAVIS

Crabgrass had another banner year in 1956. High summer rainfall is ideal for its development. The extent of the problem in 1957 will depend on the weather, but it is safe to assume that some lawns will have crabgrass. A serious crabgrass problem can be avoided by keeping a thick sod of lawn grasses. High sowing, moderate fertilization and other practices discussed in **Extension Bulletin 271, Your Lawn,** are the most practical ways to control it. However, it takes time to improve the lawn to this extent and chemicals can be used temporarily to solve the crabgrass problem.

The Experiment Station has tested many chemicals for crabgrass control. The work has been done on areas that are predominantly Kentucky bluegrass. The results do not necessarily apply to other lawn grasses. Chemicals should not be used on newly seeded grasses. Crabgrass control chemicals are on the market under many trade names and several active ingredients. Read the fine print on the label to determine the active ingredient and don't just buy "something for crabgrass". Follow instructions on the label carefully when using a chemical.

Post Emergence Chemicals

Some chemicals are designed for use **after the crabgrass is present.** Crabgrass is in a small seedling stage in June and is not offensive. As it gets older and uglier it is harder to kill. By looking closely in open spots in the lawn, the presence of crabgrass can be discovered long before it becomes an unsightly pest. Most of the products available for sale as post emergence controls for crabgrass contains one of the following chemicals.

Phenyl Mercuric Acetate (PMA). PMA has been studied for six years. It is available in dry form for application with a spreader and in liquid form for spraying. When three or more applications are applied about a week apart starting in June, PMA has given good to excellent control. Less chemical is required when applied as a spray. Some yellowing of the lawn usually occurs but it has not been serious in Station tests.

These small crabgrass seedlings will grow up to be an unsightly lawn pest.

Disodium Methyl Arsonate (DSMA). DSMA has been tested at the Station for two years. It is available under many trade names, in both liquid and dry forms. When the temperature is high, the rate must be reduced to avoid serious injury. Two to four applications about a week apart are necessary. Some slight burning should be expected and severe injury is possible but not likely if directions are followed. Spray applications require less chemical than those made with a spreader.

Potassium Cyanate (KOCN). This material is losing ground to PMA and DSMA. It is not so selective and will burn to some degree everything it contacts. In a number of tests it has given satisfactory control.

Pre-emergence Chemicals

Other chemicals are designed to be used **before crabgrass germinates.** It germinates around May 1 on the average at Columbus. The average date is earlier south and later north of Columbus. The germination date may vary as much as two weeks either side the average date from season to season.

N-1 Napthyl Phthalamic Acid (NPA). A dry form for spreader application containing fertilizer in addition to NPA gave good control at Wooster last year. Two or three applications, the first before crabgrass germinated (May 8, 1956) and others five or six weeks apart were necessary. This material will not be generally available for use this year.

Neburon. This chemical has given good results in tests for two years. Two applications, one just before crabgrass germinates and the other six weeks later, were necessary. Neburon will not be generally available in 1957.

(Continued on page 38)

SURFACE MULCH MULCH TILLAGE

help control erosion in cornfields on sloping land

H. L. BORST and H. J. MEDERSKI

Seven years of experimental work has shown the value of two erosion control practices for corn fields on sloping land. These two practices, similar in principle but different in practical use are, (1) surface mulching the land with strawy manure or crop residues after the crop is planted, (2) mulch tillage of the meadow land which is being put to corn. Mulch tillage is done with an implement which digs up and loosens the soil without turning the soil over as plowing does. This method leaves the sod and roots on the surface as a mulch. In the present experiments a heavy field cultivator (see cut) was used as the mulch tilling implement. Both practices furnish good protection to the soil from raindrop damage, and thus are effective in controlling both erosion and rainfall loss. Manure mulch has the added advantage that it has increased corn yields. Since these two practices are quite different they are discussed in separate sections of this article.

Surface Applied Mulches

In the work with surface applied mulches three treatments were compared, (1) strawy manure plowed under at 8 to 10 tons per acre (2) no manure plowed under but 8 to 10 tons applied as a mulch when the corn was laid by (3) no manure plowed under, wheat straw applied at t2 tons per acre at layby time. The straw treatment was included to study the effect of mulching with material without all of the plant food elements found in manure. The experiment was conducted on a well drained soil with a slope of 2 to 3 percent.

Harold Borst is a USDA soil conservationist who works in collaboration with our Station staff in agronomy. He has handled much research covering the effect of mulching and tells of results gathered in a seven year period.

Yields Increase

During the seven year period of the experiment corn yields produced on either the straw or manure mulched plots were 104 bushels per acre, an average of 5 bushels per acre more than plots where manure was plowed under. The increases from mulching were most marked during four years when the spring and summer rainfall was relatively low. During these relatively dry years, the manure mulched plots produced 8 bushels more corn per acre than was produced on plots where the manure was plowed under. The straw mulched plots with no manure plowed under, produced 10 bushels more.

Periodic determination of the soil water content showed that the soil in the surface mulched plots contained more water than the non-mulched soil. The larger corn yields produced on the mulched plots appear to be related to this larger quantity of available soil water. The conclusion drawn from these yield studies is that in dry years at least strawy manure is more valuable on the surface than plowed under. While the yield study was being conducted "runoff plots" were installed during 3 summers to test erosion control and water saving value of surface mulching. Results of this test showed that erosion and runoff was materially reduced by the surface mulch.

Manure mulching may be done any time after the corn is planted, up until the corn is too tall. The recommended procedure, however, is to control weeds as early as possible and then apply the manure. An appropriate spray may be used to supplement cultivation. It is possible to cultivate through manure mulch after the corn is high enough but this decreases the efficiency of the mulch.

In some cases special planning will be necessary to have a supply of manure on hand at the proper time. The manure should contain a good amount of bedding. Although manure mulching requires a heavier application than is ordinarily plowed down for corn, 8 to 10 tons per acre is sufficient to cover the soil and increase water infiltration. (Two tons per acre of straw or other similar kinds of crop residue provides adequate protection of the soil surface.) Incomplete coverage of the soil surface with an insufficient amount or poor distribution of mulch will not protect the soil and is a waste of time and effort.

A spreader with high speed beater is desirable to insure thorough shredding of the manure to prevent damage from large chunks falling on the corn plants. To offset plant damage which may occur a somewhat heavier rate of planting is recommended for fields to be mulched. Corn rows should be spaced close enough (38-40 in.) so that the spreader will easily straddle 2 rows.

Mulch Tillage

Mulch tillage unlike manure mulching, previously discussed, has not increased yields in the Ohio experiments. In fact the average production from mulch has been about four bushels per acre less than that from plowing.

The practice is of interest because of its superior erosion control and water conserving value. Numerous tests of its conservation value show that it furnishes more complete erosion control than any other practice now in use.

Since the practice so effectively controls erosion it is conceivable that over a long period of years it might result in higher yields than conventional plowing where erosion is serious.

Mulch tillage as used in the Wooster experiments might be called sod mulching. A rotation sod was worked up with a tillage implement which is a heavy type field cultivator. This implement loosens the soil as does plowing but leaves the meadow roots and stubble mostly on the soil surface to serve as a mulch. In the semi-arid west where mulch tillage is used to conserve water and combat wind erosion it is called stubble mulching.

The chief advantage of the practice is that it can be used where other erosion control measures are not practical, i. e. on slopes too irregular for contouring, strip cropping or terracing and where insufficient manure is available for manure mulching. To offset this advantage mulch tillage has some disadvantages in addition to slightly lower production. In wet springs mulch tillage cannot be done as early as plowing so that planting may be delayed. Another small disadvantage is that preparing a mulch tilled seedbed requires more judgment than does plowing. The soil should be well loosened at least to plow depth and over working should be avoided. The soil surface may appear to be well worked up when underneath it is not sufficiently loosened. Old long-lay sods may be too tough to be mulch-tilled into a good seedbed.

Sod Should Be Killed

When using mulch tillage the meadow sod should be killed as early as possible in the spring by disking. It is desirable to go over the field in different directions with the cultivator. Usually three times over will be sufficient. After use of the tilling implement the field should be disked to cut up the clumps of sod so they will not interfere with planting and to firm the surface soil.

Ordinary Planter Used

An ordinary planter may be used on a mulch tilled seedbed. In these experiments the planter was equipped with a short iron bar projecting from the runner to push the sod from the way of the planter. The planter was weighted and adjusted to place the seed in moist soil beneath the sod mulch. During the first cultivation the shields should be carefully adjusted to prevent the sod from covering the plants.

Because mulch tilled soil has a somewhat looser surface than plowed land germination is slightly lower on it. For this reason a higher rate (10%) of planting is advised on mulch tilled fields than on plowed land.

Heavy field cultivator (equipped with "moldboard" shovels) as used in the mulch tillage experiments.

Corn yield depends upon placement of FERTILIZER

H. J. MEDERSKI

There is a right way and a wrong way to place starter fertilizer for corn. The right way will increase corn yield—the wrong way may decrease corn yield. The proper way to place starter fertilizer for corn is in a band 1½ to 2 inches to the side of the seed and about 1½ inches below seed level. The fertilizer should not be placed very close to the seed—it should not be placed in contact with the seed—it should not be placed directly under the seed. Here's why. Plants have difficulty absorbing water from soil that it in close contact with the fertilizer. If the seed is placed in contact with the fertilizer the seed itself may not be able to absorb enough water to germinate or germination may be delayed. If the seed does germinate, the young roots may enter the fertilizer band where they are unable to absorb enongh water to keep the plant alive. In either case, the plant may be stunted or it may die. This reduces the number of vigorous plants per acre and yields suffer.

Increase Distance

This problem can be avoided by placing the fertilizer a safe distance from the seed. When this is done the seed is able to germinate quickly, and the roots penetrate fertilizer free soil before passing through and developing in the region of the fertilizer band where they absorb some of the elements needed for rapid growth.

Rate and Analysis Makes the Difference

Years ago when only 75 to 100 pounds per acre of a low analysis 2-12-6 was used as a starter for corn, the total quantity of fertilizer salts was too small to cause much trouble. Today's application of 200 to 300 pounds of 4-16-16 or 5-20-20 requires proper placement to avoid seedling damage. Generally speaking, improper placement causes more stand trouble as the rate of fertilization increases. Also, the problem is most severe in relatively dry soils and in sandy or coarse textured soils.

Attachments Available

Equipment manufacturers recognize the importance of proper placement and a number of them are making inexpensive attachments for use on older planters with the split boot fertilizer shoe. The split boot arrangement usually places the fertilizer too close to the seed or above the seed level. With the new attachments the fertilizer can be placed at the proper distance from the seed. Some of the new planters come equipped with an adjustable single boot that does an excellent job.

Plant Stand Important

The important relation between number of plants per acre and corn yield in an experiment conducted at Wooster, Ohio is shown in the table. This experiment had nothing to do with fertilizer injury. It simply shows that corn yields increased from 72 bushels to 107 bushels as the number of stalks increased from 6.600 to 15,700 per acre. In general, a plant population of 14 to 16 thousand plants per acre is recommended for northern Ohio, while 12 to 14 thousand plants per acre is recommended for the southern half of Ohio. Obviously if plant stand is reduced by improper fertilizer placement, yields are likely to be reduced.

H. J. Mederski is a Station agronomist and an associate professor. Much of his recent work has been devoted to the effects of the applications of fertilizer and this report is concerned with the results obtained by different placements of fertilizer.

Wooster, Ohio Data Showing the Relation Between the Number of Seeds Sown per Acre, the Number of Corn Stalks and Yield

Distance between seeds in 42" row	Number of stalks remaining at harvest	Corn yield per acre
21"	6,600	72 bu.
14"	8,900	89 bu.
11"	12,800	101 bu.
8½"	15,700	107 bu.
7"	19,000	108 bu.

Amino triazole appears to give control of

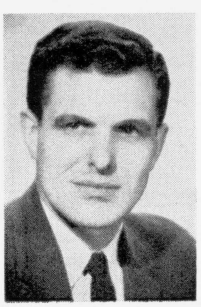
CANADA THISTLE

DONALD D. BONDARENKO and C. J. WILLARD

Ohio farmers, by a large majority, have always regarded Canada thistle as the most serious weed pest in the state. The Ohio Station has conducted tests on its chemical control for over 30 years and has recommended sodium chlorate and 2,4-D for controlling Canada thistle. Sodium chlorate will kill thistle, but sterilizes the soil for six months to three years when applied at recommended rates. 2,4-D kills the tops quite readily, but has little effect on the roots, so that repeated treatments for three years or more are necessary to eradicate Canada thistle with this chemical.

New Herbicide

However, a recently introduced herbicide, 3-amino-1,2,4-triazole, has given better results than any other chemical for treating Canada thistle. It is sold as Weedazol and Amino Triazole Weedkiller. The name is often abbreviated to ATA. Amino triazole is sold as a white powder, soluble in water, formulated to contain 50% of actual amino triazole. The recommendations in this article are in pounds of pure amino triazole per acre, so it will require just twice as much of the commercial material as these rates.



Donald S. Bondarenko conducted this work while a graduate assistant under the direction of Dr. C. J. Willard. They tell how Canada thistle responds to the use of amino triazole. Bondarenko will soon become a member of the Agronomy Department.

Amino triazole seems to owe much of its effectiveness on Canade thistle to its ready absorption by the leaves and rapid translocation to all parts of the plant, including the roots. Amino triazole is not effective when applied to the soil only, so that application to foliage is essential for control. The most striking effect of ATA on plants is the loss of chlorophyll from the leaves within a week after treatment. Plants sprayed with amino triazole become first yellow, then usually white, and then turn brown and die. If the initial dosage of ATA is low, some yellowed leaves may regain their green color and continue to grow.

The most effective method of consistently controlling Canada thistle with amino triazole remains to be discovered. Many applications have given excellent results, 95 to 100 percent reduction in stand of thistle. Others have resulted in complete failure or only partial success, under conditions that appeared to be the same as the successful ones. However, the proportion of successes is so large that many farmers undoubtedly would rather try the herbicide now than wait until more complete directions for its use can be given.

In fields to be planted to corn or soybeans the same year of treatment, excellent success has been obtained by waiting until thistles were six to eight inches tall, or a little taller, before spraying with ATA at four pounds per acre in 40 gallons of water. It is desirable to wet all the leaves rather completely, and with dense thistles, even more than 40 gallons per acre may be desirable. Four pounds per acre is about a median rate—often excellent control has been obtained with two pounds, and sometimes six pounds has been better than four.

Leave Undisturbed

The treated area should be left undisturbed for a time before plowing for corn or beans, or, if the land was fall plowed, before disking the area for these crops. Last year it was recommended that at least two weeks and preferably three should elapse before plowing or disking thistles treated with ATA. Excellent results were obtained in 1956 by plowing one week after treatment, and there is some reason to believe that this will be generally satisfactory. Since Canada thistle comes up late in the spring, any long wait after treatment will delay planting of corn and soybeans, and it appears more important to have as many as possible of the thistle shoots above ground before treatment than to wait a long time after treatment before plowing or disking. Plowing thistles sprayed at this or any other stage may not be necessary for satisfactory kill.

Under no circumstances was there amino triazole injury to any crop following this treatment of Canada thistle. However, ATA kills most crops when applied directly to the foliage; so it is not feasible to treat weeds in growing crops with this herbicide.

Other places in the rotation where amino triazole has been very effective on Canada thistle are during the summer in clipped wheat or oats stubble, in meadow after the first cutting, or in areas of thistle plowed in June. Here again the thistles should be

allowed to grow until they are at least six to eight inches high and perhaps in the bud stage before treatment. The treatment should be just the same as in the spring, but plowing after summer treatment has given no benefit.

Amino triazole is also effective on other weeds. It is the most promising herbicide so far used on curled dock and milkweed. It has often almost eradicated quackgrass treated in the spring before plowing for corn or soybeans.

It is very effective on poison ivy, and is recommended for treating poison ivy around gardens, grapevines, and other areas where 2,4-D and 2,4,5-T are dangerous or completely inadmissable. On the other hand, ATA is almost completely ineffective on several other woody plants and vines.

Mixtures of ATA and 2,4-D have not been desirable, apparently being somewhat less effective than either one alone.

Although ATA is not poisonous, even at rates considerably in excess of the recommended herbicidal rates, it may be better to treat Canada thistle in pastures with 2,4-D because ATA will kill both the thistles and the grass, while 2,4-D will kill the tops of the thistles and enable the area to begin producing pasture at once. Three treatments with 2,4-D the first year and two treatments each year thereafter for two or three years will eradicate Canada thistle, and the cost of the 2,4-D will be less than the ATA.

County agricultural agents in 25 counties in Ohio carried out demonstrations with amino triazole on Canada thistle before corn and soybeans in 1956 in accordance with directions somewhat similar to those given previously in this article. The results of 38 such tests tabulated by Extension Agronomists Gordon J. Ryder and E. P. Reed showed only eight that might be classed as unsatisfactory. Evaluation of the treated areas must be made again this year to know whether the thistles were eradicated or merely well controlled in the best plots.

Timber Management

increasing annual income from farm woods

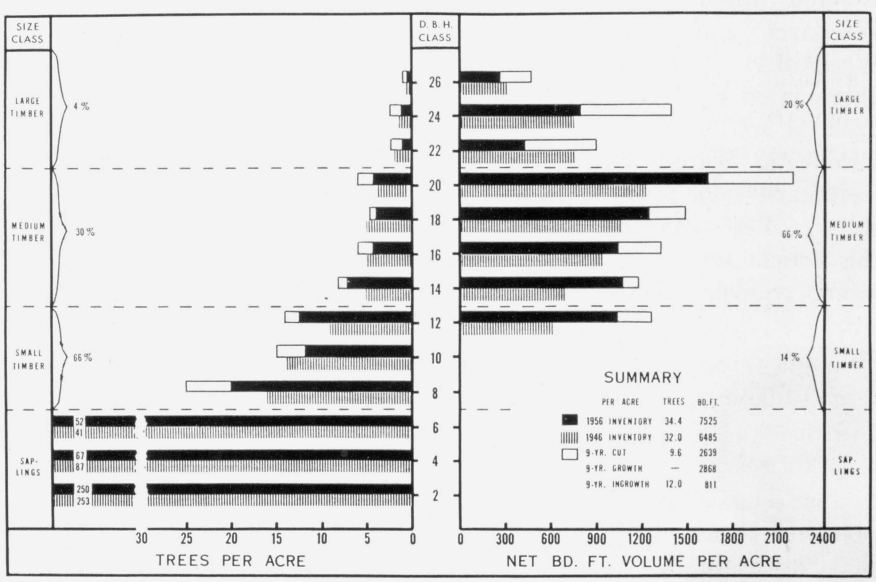
JOHN E. AUGHANBAUGH

Wood is an agricultural crop, and farm woodlands can be managed to produce an annual income just as do fields of corn, wheat or forage. This is shown by a 20-acre woodland in Columbiana County which has been protected and carefully managed by father, son, and grandson for over 70 years.

In December, 1946, this tract was made available to the Ohio Agricultural Experiment Station as an experimental woods. Since then a continuous inventory of 30 one-fifth-acre sample plots has given accurately its board foot yield by species, tree diameter, grade, and vigor classes. Through sound silvicultural management practices, including annual marking of trees for cutting, there is being built up and perpetuated an optimum stand of high-quality trees of valuable kinds.

Charted data on the reserve volume, cut and growth portray why this woods operation is a cuccess. Briefly the reasons are:

John E. Aughanbaugh is a new member of the Station staff assigned to the Forestry Department. He specializes in timber management and explains how careful management will show a profit for the operator of a farm woodlot.



This chart shows that the 1956 inventory of the woods totalled 7,525 board feet to the acre.

1. This woodland contains a select, thrifty growing stock, consisting mainly of sugar maple, beech, elm, basswood, cucumber, tuliptree, red maple, and red oak in that numerical order. Its composition by size classes, from seedlings to sawlog trees, approaches full productivity for an all-aged beech-maple stand. As shown in Figure 1, the 1956 inventory totalled 7,525 net board feet to the acre. When fully-stocked each acre should support 10,000 board feet on this fairly good site.

Selective cutting of inferior trees each year to favor those of better form and vigor has steadily improved its stocking, growth rate and value. No cull or "wolf" trees exist there. How different from the ruinous hi-grading so often done in Ohio timber lands!

2. In general, less volume than was added by growth has been removed, except in a few instances when moderate overcutting was done to take advantage of high prices. A program of light and frequent cutting insures a profitable return from the same tract continuously. This tract is, in other words, managed on a sustained yield basis.

Records show that since 1931 over 120,00 board feet of timber, International Scale, came off this 20-acre woodlot. During the period from 1946 to 1956 the yearly harvest per acre was 293 board feet, well below the net growth of 318 board feet (4.9%). Annual ingrowth of trees to the 12-inch diameter sawlog class averaged 90 board feet to the acre.

Single trees, not always the largest, have been cut selectively with a view both to markets and to future crops. In the large timber class (over 20.9 inches diameter breast-high) none but the most vigorous trees increasing rapidly in value have been retained.

Abundant reproduction fills the openings, and natural mortality there is practically nil. The owners never hesitate to cut a tree in order to favor another of more potential value. Continued efforts at stand improvement with opportune utilization of the individual tree, result in larger, more frequent, and more profitable harvest cuts.

3. These progressive farmers have always done their own woods work, and have practiced close utilization. They have earned more and left their woods in better shape by selling sawlogs instead of stumpage. They thereby market their own labor and that of their team and tractor, as well as their timber. In one year it took 300 man-hours, 60 tractor-hours and 40 horse-hours to harvest 10,000 board feet of logs—a winter cash crop.

Each felled tree is cut into the highest quality products possible for which a market is ready or can be found. The best logs decked by the roadside go to specialty buyers, often for basket veneer. Lower grades of timber supply the farm with building material, fence posts, and fuel wood.

Unutilized tops never clutter the ground in this woods. An average of two cords per thousand board feet cut has come from topwood, defective trees and thinnings. It is buzzed into firewood for the two farm homes, the sugaring operation, and for sale locally.

Economic records kept by the owners of this farm woods for the past 26 years are as complete, perhaps, as any in the Buckeye State. That farm forestry can pay is proven by the fact that this woodland has yielded an annual net return from wood products alone of $10 or more per acre. Maple syrup sales brought an additional $5 profit from each acre yearly. These earnings were due to good methods of cutting, using, and marketing forest products. This woodland produces, as it should, its proportionate share of the farm income.

Because so few Ohio farmers have investigated the possible returns from a woods properly cared for, timber growing is too infrequently a paying part of the farm enterprise.

Careful marking and tree selection points the way to profitable wood lot operation.

Tailless Calves

studied in attempt to determine cause of abnormality

L. O. GILMORE and N. S. FECHHEIMER

During the past four years the births of more than 50 tailless calves on Ohio farms have been reported directly to the Ohio Agricultural Experiment Station. The calves were sired by 43 bulls representing 8 major dairy and beef cattle breeds. A total of 43 herds were represented by these 50 calves. In a further survey among inseminating technicians—Baldwin of the Central Ohio Breeding Association found that the frequency of tailless calves occurred second only to multiple eye defects. That this trait may be widely spread in the world is suggested by the report that one percent of the calves are being born tailless in one canton in Switzerland.

Experiment Started

Tailless calves appear in herds whether cattle are mated either naturally or artificially. This defect is of sufficient concern to those responsible for artificial breeding associations that the Central Ohio Breeding Association gave two tailless animals, a bull and a cow, as the foundation of a breeding experiment to see if taillessness is affected by inheritance and thus subject to being transmitted through the sperm and egg. Before that, however, reports of tailless calves were received from certain residents of the state who thought that the dams had been bred by deer because of the appearance and action of the calves.

Information received from herd owners indicates that cattle affected with tail abnormalities may vary from being completely tailless to a condition in which the tail is considerably shortened. Stubs three to four inches long are commonly reported. Close relatives of tailless cattle have also been found with shortened, kinky or twisted tails. The observations made to date at the Ohio Agricultural Experiment Station indicate that the tailless condition is associated with malformation and absence of some of the sacral vertebrae. The loins of tailless cattle typically are weak. This weakness results in the pin bones and adjacent genitalia being elevated higher than normal. The possibility exists that the weak loin or other adnormalities found associated with the tailless condition affects the manner of moving. If this is verified it may account for the reported observations that tailless calves run like deer. The occasional rumor that tailless cattle are the result of domestic cows being crossed with deer, elk or moose, however, appears to have no foundation in reality.

The Ohio experiment was set up to find out if this trait is inherited. The tailless bull was mated to two tailless cows and 14 normal females. From the two tailless cows three normal calves have been produced to date. This result would indicate either that the condition is not inherited as a

Dr. L. O. Gilmore is associate chairman of the Dairy Science Department. He is a geneticist and has been concerned with the problem of tailless calves. He points out several conclusions that have been gathered in the project up to now.

The normal tailed calf on the right resulted from these tailless parents. Two other normal calves have resulted from similar matings.

simple recessive trait or, if so, that the genes responsible for it in one parent are not the same as the causative factors present in the other.

The 14 normal cows produced 18 calves sired by the tailless bull, all of which were normal. This is a large enough sample to rather definitely conclude that the tailless defect carried by this bull is not caused by a single dominant gene. Otherwise approximately one-half or more of the calves would have been tailless under normal expectations.

A second phase of the experiment was undertaken to check the tentative conclusions reached above and also to test the possibility of a more complex inherited cause as indicated by the simultaneous occurrence of tailless with other rarely occurring abnormalities. Each of the three tailless animals is being mated to its offspring to produce three inbred groups. If inheritance is a causative factor in one animal but not in another, this mating plan might bring out the difference. It is too early to have the results from these matings.

The problem to be solved is whether or not taillessness in cattle is caused by inheritance. If it is, it can be predicted that many cases may appear in the future, regardless of the presently occurring frequency, because of the widespread use of bulls now made possible through the use of artificial breeding with frozen semen. If the occurrence of this trait is not inherited no discrimination should be made against a bull who may sire calves with this defect. No conclusion has yet been reached on this problem. Meanwhile it will be appreciated if births of tailless calves are reported to the Ohio Agricultural Experiment Station.

Several factors favor confinement rearing of

PULLETS

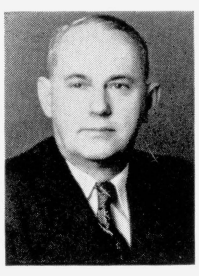
A. R. WINTER

The desirability of providing a uniform supply of eggs for market and keeping laying hens or hen batteries filled to capacity means raising two to four flocks of pullets each year.

In Ohio, there is probably little to be gained from range rearing of more than one of these groups, because of the absence of grass or its poor quality in late fall, winter, and early spring. Even during the period of good range conditions, it is doubtful if the possible saving in feed and better vitality of pullets are sufficient to justify the extra labor, land, shelters and equipment required. Moreover, a grower encounters greater disease and predatory animal risks.

Feed Costs Cut

The practice of raising pullets on range is based on the belief that the feed cost may be reduced as much as 20 percent, and that the pullets will have better vitality, as reflected in better egg production and lower mortality after housing. However, there is little or no saving in range rearing feed costs unless feed is restricted or an incomplete ration is used to force the pullets to eat grass and hunt bugs and worms on range to satisfy their nutritional needs.



A. R. Winter is chairman of the Poultry Science Department. Results from the story presented here point out that range feeding is not the ideal method of rearing pullets since modern poultry rations now supply the elements formerly obtained from the range.

It is doubtful if these practices should be followed since the pullets are retarded, at least temporarily, and possibly at times beyond complete recovery. Ranges must supply young tender grass and not be heavily populated if they are to supply the vitamin and protein needs of developing pullets. These conditions frequently do not exist, or at least not for longer than a few weeks on many Ohio poultry ranges. Vitamins are now supplied in adequate amounts at low cost in complete poultry rations. Protein costs in poultry rations have also been greatly reduced in recent years, due to the increased use of vegetable protein feedstuffs. So, the economic advantages of using incomplete rations and range during the growing period are not as great as formerly.

Today, rations can be supplied with most, if not all, of the nutrients formerly obtained from range. Some of the things formerly supplied by range which can now be supplied in the ration, and at reasonable cost are: vitamins, trace minerals, and unknown factors supplied by whey, fish solubles and fermentation products. Some poultrymen are now raising pullets in confinement and poultry research workers have cited evidence that the system is feasible and may become a general practice.

The objectives of this study were to obtain additional data on the influence of range and confine-

ment rearing of pullets on growth, feed consumption and mortality and on later egg production, egg quality and mortality.

White Plymouth Rock and Single Comb White Leghorn pullet chicks were brooded in late winter and early spring, in 1955 and 1956, under electric brooders, and fed the Ohio broiler ration (Ext. Bul. 343. 1954). When heat was no longer needed, each breed of pullets (8 to 10 weeks old), was divided randomly into two groups. One of the groups was moved to colony brooder houses on bluegrass range, and the other one kept in confinement. Both groups were fed the same complete, all-mash, high energy, laying ration (Ohio Ext. Bul. 343. 1954) with oyster shells available in separate hoppers.

Weights Checked

The birds were weighed individually at the beginning of the test, when 20 to 24 weeks old, and continued on range and in confinement until about November, or age 36 to 39 weeks. Growth, egg production and mortality records were kept. In the last two groups of the four comparisons, feed consumption records were also obtained. Egg production, egg quality and mortality records were kept on the confinement and range-reared pullets during the following winter and spring months after housing.

Here are the results of these tests:

Growth was about the same for range and confined pullets between 10 and 20 weeks. Body weights of the two groups were also similar between 21 and 36 weeks at the time of housing. This was true of both Leghorns and White Rocks.

Mortality of range-reared pullets was higher than for confinement-reared birds until time of housing. The reverse was true after housing; however, the difference was not significant. One may conclude from the four comparisons that the mortality of the confinement-reared pullets was no greater, if as great, than that of the range-reared stock.

Egg production of confinement-reared pullets was better than that of range-reared stock to time of housing. The reverse was true after housing. The difference is believed to be significant. It agrees with earlier work from this station and recent data from the Missouri Station.

Egg Size and Hatchability of fertile eggs were about the same from range and confinement-reared pullets.

Feed consumption was greater for the range-reared birds than for those in confinement. This was probably due to less activity of the confined birds and the fact that some range mash was eaten by wild birds and pigeons. Some of the range mash may also have blown out of the range trough-type feeders. The White Rocks, because of their larger size, required considerably more feed than was required by the Leghorns.

TABLE 1.—Growth, Egg Production, Feed Consumption and Mortality of Range and Confinement-reared Pullets Before and After Housing

Observation	Year	Age weeks	Leghorns		White Rocks	
			Range	Confinement	Range	Confinement
Number started	1955	10	378	357	230	236
	1956	8	328	327	186	197
Mortality to time housed, percent	1955	39	19	16		
		23			10	6
	1956	36	15*	7		
		35			11	11
Egg production to time housed, ave.	1955	39	59	66		
		23			0.5	0.9
	1956	36	49	51		
		35			40	45
Feed per doz. eggs to time housed, lbs.	1955	8–36	8.2	7.3		
		8–35			12.7	11.9
Feed per 100 pullets daily, lbs.	1956	20–36	20.2	18.0		
		20–35			24.4	24.5
		Time weeks				
Mortality after housing	1955–56	30	28	29		
		30			12	14
	1956–57	—	—	—		
		—			—	—
Egge production after housing, %	1955–56	30	57	48		
		30			44	34
	1956–57	—	—	—		
		—			—	—

*Does not include 22 pullets killed by dogs.

FAMILY FARM

continues to maintain its economic importance

H. R. MOORE

Looking backward, Ohio's agriculture has been geared to the family size farm. By this, we mean the farm where the operator and family supply most of the labor.

Some comparisons drawn from the recent agricultural census illustrate several changes affecting the family farm.

In 1954, the total number of farms in Ohio was approximately 177,000, a decline from 199,000 in 1950 and 220,000 in 1945. In the same period, the average size of farm increased to 112.9 acres in 1954 from 105.2 acres in 1950 and 99.4 acres in 1945.

Capital Value Increases

In terms of capital, the average value of land and buildings per farm was $21,041 in 1954, up from $14,563 in 1950 and $8,470 in 1945. At the current prices, another 5 to 10 thousand dollars worth of machinery, equipment and livestock are needed to make the average farm a going concern.

The above figures result from averaging farms of all sizes. The full-time commercial family farm often is much larger than the average size farm, and the capital investment is substantially more.

H. R. Moore is our agricultural economist carrying on an extensive study of Ohio farm problems. In this story he tells about the trends of the family farm in Ohio and what may be expected to develop in that field.

As a further indication of the trend toward larger farms, the 1954 census reported a decline since 1950 in the number of Ohio farms in all size brackets from three up to 220 acres and an increase in numbers from 220 acres up to and including 1,000 acres or more. Or, to put some comparisons in round numbers, Ohio had about 7,400 farms of 200 acres or more in 1954 as compared with 5,700 in 1950 and 5,200 in 1945.

Does this trend toward larger farms signify a decline in the family size farm? Or, does it mean that the family farm is getting larger? The following tends to support the latter view.

Family Provides Labor

First, only about one in 25 Ohio farms contains 200 acres or more. And, on many of these larger farms the operator and family represent the major part of the labor force.

Second, both the number of farmers reporting the use of hired labor and their wage expenditures have declined in the past 10 years. As reported for census purposes, about 71,000 Ohio farmers hired labor in 1954 as compared with 94,000 in 1949 and 95,000 in 1945. The wage expenditures in these 3 years were $47 million, $55 million and $42 million, respectively.

Since 1935 the agricultural census has reported the number of workers employed on farms in a particular week shortly prior to the census-taking date. In 1935, 1940 and 1945 the number of workers (both hired and family) averaged 1.6 per Ohio farm; in 1950 (April) the average was 1.7 per farm; in 1954 (November), 1.8 per farm.

Looking forward, the family operated farm continues to maintain its importance. Typically, it is a larger farm—more acres, more machinery and equipment, more capital needed to farm, but about the same amount of labor, primarily that of the operator and family.

To speculate further on the future, despite the trend to larger farms, many small to medium sized commercial farms will remain. For instance, some 80 to 160 acre places considered adequate in the past, now provide less than full-time productive employment to the operators. Some may buy or rent additional land. Others will continue to farm the land they have but take another job to bolster up the family income. Currently, this accounts for the big increase of part-time farming in Ohio. In effect, an off-farm job is some operators' method of expanding their business. It is worth noting that the average size Ohio farm (112.9 acres) now provides less than full-time productive employment to many families.

In addition to the direct influence of mechanization, some other circumstances may tend to increase the number of large farms. For instance: the high price of land and the large amount of capital needed to get a start in farming. Working with dad on a temporary or permanent basis is the best way for some sons to get established. If the father is still active the resulting two-man farm business may utilize several hundred acres of land, owned or rented.

Top management needed to restore income of RUN-DOWN FARM

R. H. BLOSSER

Many studies show that soil improvement programs increase farm profits after they have been in operation for a period of time. But few studies show how such programs affect farm income during the period of establishment.

The purpose of this study was to determine whether current farm earnings from dairy cows would be sufficient to finance a major soil improvement program in Southeastern Ohio. Briefly, the results showed that financing would be difficult unless top grade management were used.

Method of Study

Annual receipts, expenses and net income were calculated for a period of 13 years which should be long enough to obtain most of the benefits from the soil improvement program. This procedure was used so that all factors could be held constant, except the ones under consideration at a particular time. Actual income data would not produce satisfactory figures because many changes in farming could occur along with the establishment of a soil improvement program. In recent years farmers have adopted many practices that have no relationship to improving soil productivity. Therefore, these practices must be held constant by designed experiments or farm budget calculations, if the economic aspects of soil improvement programs are to be evaluated properly.

H. R. Blosser is a staff member in the Agricultural Economics Department. His main field is that of determining the value of conservation practices on Ohio farms and here he tells of the hurdles involved in restoring a run-down farm.

Description of Farm in Run-Down State

Total farm area included 120 acres of hill land on which no terracing or contour strip cropping had ever been established. Fertilizer applications on grain crops never amounted to any more than about 100 pounds per acre of single strength analysis. None was used on meadows. Practically no lime had ever been applied to the cropland. Consequently, timothy was the principal meadow crop.

Muskingum and associated soils predominate on this farm. These soils, which extent over about one-half of Southeastern Ohio, are usually found on slopes ranging from 10 to 30 percent. Surveys showed that over one-half of the original topsoil had been lost from the cropland.

Approximate yields per acre were as follows: corn 35 bushels, wheat 18 bushels and hay 1.0 ton. Permanent pasture yields also were low because no lime or fertilizer had ever been applied to this crop.

With average cows (7000 pounds of milk) and manufactured milk prices ($3.00 net per hundred pounds) this system of farming gave labor only about $.50 an hour when no interest was charged on capital invested. An interest charge of 4 percent reduced this figure to about $.20 when 1950-54 prices and production costs were used.

Crop Production Data

Crops production was calculated from the following acreages: corn 12, wheat 14, meadow 34, permanent pasture 36, woods and miscellaneous 24. Yields used are shown in Table 1. These yields are based on the use of contour strip cropping and heavy applications of fertilizer and lime. Therefore, they are considerably higher than the yields obtained under the system of farming that depleted soil productivity. Fertilizer applications for improving the cropland were assumed to average 250 pounds per acre of single strength analysis. Initial

TABLE 1.—Crop Yields* Used in Calculating Production for the Soil Rebuilding Program

Crop	Rotation			
	First	Second	Third	Fourth
Corn, bu.	50	58	62	65
Wheat, bu.	22	24	25	26
Hay, tons	1.0†	2.0‡	2.5§	2.8§

*Based on studies of more than 100 hilly farms having Muskingum soils.
†Timothy only.
‡Red clover and timothy with some alfalfa.
§Alfalfa, clover and timothy.

applications of lime were 4 tons per acre; maintenance applications were one ton every 4 years.

Rotation pasture yields were based on the type and amount of hay assumed to be raised. Permanent pasture yields were determined from experimental data based on using the following amounts of lime and fertilizer: Three tons of agricultural ground limestone per acre for the initial application followed by one ton every four years; and 600 pounds of single strength fertilizer every three years.

Income With Average Cows and Manufactured Milk Prices

Calculations were made first for conditions existing on the average dairy farm. This included cows averaging 7000 pounds of milk selling at $3.00 per hundredweight after deducting hauling charges.

A financial summary is shown in Table 2. Increases in capital invested resulted from more livestock and credit given to unused lime in the soil. Increases in gross receipts came principally from doubling the number of dairy cows.

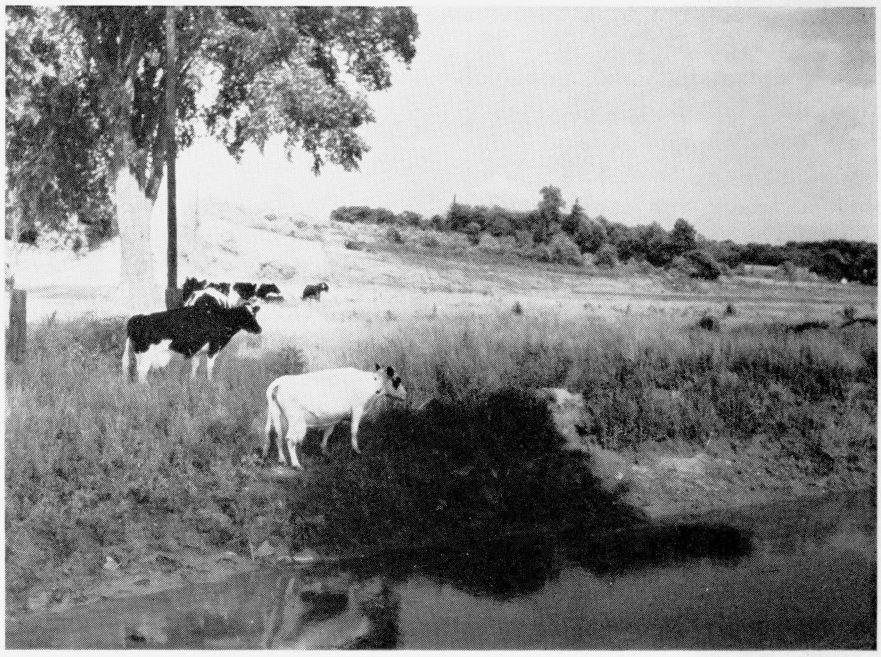
Net income figures show that about 12 years would be needed before annual cash receipts from the soil improvement program would exceed annual expenses including charges for labor and 4 percent interest on capital invested. This period of time could be reduced to seven years if the farmer owned all capital needed and charged nothing for the use of it. To repay all previous costs would require about 45 years.

Repayment of loans would make the program still more difficult to finance. If $2500 were used annually for family living expenses no payment of interest or principal could be made out of farm earnings before the ninth year. How then could the average farmer finance the soil improvement program just described? He might do it by using capital on which no interest had to be paid. He might use some off-farm income to help support the family during the early stages of the program. For the first year labor requirements would be only about 1900 hours compared with 3350 for the thirteenth. Also the level of family living might include only the bare

TABLE 2.—Financial Summary for 7000 Pound Cows and $3.00 Net per Hundred Pounds for Milk

Year	Capital invested	Gross receipts*	Expenses†	Returns above all costs
1st	$16200	$3132	$5375	$—2243
2nd	17280	3578	5370	—1792
3rd	17960	3578	5627	—2049
4th	18440	4279	5340	—1061
5th	18620	4663	5512	— 849
6th	18800	4895	5661	— 766
7th	18980	5057	5776	— 719
8th	19160	5233	5765	— 532
9th	19340	5513	5957	— 444
10th	19520	5890	6085	— 195
11th	19600	6078	6168	— 90
12th	19680	6252	6250	2
13th	19560	6532	6332	200

*Includes only cash receipts; does not include any increases inventory.
†Includes a charge of $.75 an hour for labor plus the use of a house and 4 percent interest on all capital invested. Farm prices and production costs used in making these calculations are averages for the period 1950-54.



Dairying helps the program of restoring a run-down farm but financing is difficult without capable management.

necessities for a few years. A slow rate of adopting needed practices would keep annual expenses down. But it also would delay the time when the program would yield the greatest income.

Income From High Producing Cows and Grade A Milk Prices

This situation exists on only a small percentage of farms. It includes cows averaging 10,000 pounds of milk selling at $4.00 per hundred pounds after deducting hauling charges.

Income figures in Table 3 show that top grade management will finance soil building operations in a few years. If labor and capital are allowed no more than customary rates, annual cash receipts will exceed annual expenses after the third year. If the farmer owned all capital needed and charged no interest for using it, farm earnings would be sufficient to pay the average farm wage rate after the first year.

If increases in inventory are included in gross income, all costs of the soil improvement program could be recovered by the end of the third year. Also, after the third year interest and principal payments on borrowed money could be made out of farm earnings if no more than $2500 were used annually for family living expenses.

Although a soil building program may be profitable with the right kind of management, returns from the same amount of labor and capital applied to a highly productive farm could often be more profitable. Also, a job in town might still be a better alternative, especially for an average farmer who does not possess the necessary skills and capital needed.

Lead Arsenate or other arsenicals. The use of this material seems to be having a revival. The Ohio Station reported results with lead arsenate for controlling crabgrass in 1938 and continued the work for several years. There have been no recent tests. Lead arsenate works well on some lawns and appears useless for crabgrass control on others. Its action depends on several elements in the soil. When used, it should be applied in the fall or at least by March 15 of the season it is to be effective.

TABLE 3.—Financial Summary for 10,000 Pound Cows and $4.00 Net per Hundred Pounds for Milk

Year	Capital invested	Gross receipts*	Expenses†	Returns above all costs
1st	$18700	$4856	$5857	$—1001
2nd	19950	5288	5869	— 581
3rd	20800	5252	6093	— 841
4th	21350	6107	5787	320
5th	21600	6683	5986	697
6th	21850	7069	6152	917
7th	22100	7347	6228	1119
8th	22350	7643	6170	1473
9th	22600	8077	6372	1705
10th	22850	8610	6508	2102
11th	23000	8956	6603	2353
12th	23150	9322	6713	2608
13th	23000	9722	6798	2924

*Includes only cash receipts; does not include any increases in inventory.
†Same method used as in Table 2.

CONTROLLING CRABGRASS

(Continued from page 25)

Hand Weeding

Hand weeding is the most practical way to remove a few crabgrass plants from an otherwise weed-free lawn. A heavy sod of lawn grasses force the crabgrass plants to stand up so that they are easy to pull. Don't blame your neighbor when the pest shows up again next year. There will always be seed around to fill any vacant spaces. It is wise to avoid treating with 2,4-D or digging dandelion, plantain and other broadleaf weeds in the spring. The space taken by the weeds will likely be filled with crabgrass. The weeds should be treated in the fall so that the lawn grasses can spread into the vacant space before the next crabgrass season.

STILBESTROL

(Continued from page 24)

age of 58 pounds more ground ear corn per head and produced 49 pounds more chilled carcass beef. The greatest reduction in carcass grade which occurred in the three years was one-fourth of a grade. Under most conditions the increased pounds of beef produced are likely to more than offset the cost of the extra corn consumed and the reduction in grade which may occur.

There was a wide range in the amount of stilbestrol implanted in these three experiments. The lower dosages used gave much the same increase in gain as the higher levels of implantation. When stilbestrol is implanted in fattening steers it is now generally recommended that one implantation of 36 milligrams be used.

Influence of Stilbestrol Implantation Upon Gains of Steers When Pastured and When Fed Corn on Pasture

	Pasture only			Entire period. Pasture and pasture plus corn		
	Days in period	Control	Stilbestrol implanted	Days in period	Control	Stilbestrol implanted
1954	35	1.82	2.94	127	1.93	2.52
1955	62	2.54	3.38	158	2.18	2.74
1956	56	2.19	2.73	131	2.29	2.80
Average		2.18	3.02		2.13	2.69

Influence of Stilbestrol Implantation Upon Slaughter Data of Pasture Fed Steers

	1954	1955	1956	Average
	Carcass grade*			
Control	7.82	9.00	9.17	8.66
Stilbestrol	7.80	8.25	8.64	8.23
	Dressing percentage			
Control	57.7	58.2	56.8	57.6
Stilbestrol	58.9	58.6	56.8	58.1
	Average chilled carcass weight			
Control	498	552	559	536
Stilbestrol	550	602	603	585

*Low, average and high good = 7, 8 and 9, respectively.

Merion Bluegrass

(Continued from page 19)

disease apparently does no permanent harm as the grass recovers when conditions are favorable for growth. That is the key to avoiding or curing the rust problem. Keep the grass growing. It is likely to need water or nitrogen or both to keep it growing during the summer. The rust does not appear until summer. If the rust starts getting serious, apply a light application of nitrogen fertilizer and water thoroughly to wet the soil 6 to 8 inches deep. If nitrogen has been applied within the last month, water alone should be sufficient. If the soil is deeply moist from rain, nitrogen alone should do the job. Never apply frequent light applications of water. In the unwatered test plots at Wooster, Merion has had rust one out of four years (1953).

Merion bluegrass should receive 3 to 4 pounds of actual nitrogen per 1000 square feet per year. Ten pounds of a 10% nitrogen fertilizer contains one pound of nitrogen. Most of the fertilizer should be applied in the fall and spring. Of course, phosphorus and potash are needed too. See Bulletin 271 for a detailed fertilizer schedule for Merion bluegrass.

Since it makes a very tight sod, Merion makes a large volume of clippings if adequately fertilized. It will look better and possibly be more likely to avoid serious rust infection if the grass clippings are caught and removed. However, the clippings do not have to be removed in order to have a nice lawn. Frequent mowing is necessary to avoid excessive accumulation of clippings. Merion has done well in the test at Wooster mowed 3/4 inch or 2 inches high. A more practical mowing height is probably about 1 1/4 inches.

PRICE and WAGE TRENDS

MERVIN G. SMITH

Farmers' costs are still increasing as indicated by the increase in prices which farmers pay (second column of table). These prices paid have increased 5 percent in the last year. Prices received by farmers in the United States have increased 3 percent. In Ohio, farm prices in February averaged 9 percent above one year previously but they declined 5 percent during the first two months of 1957. The parity ratio of all farm product prices dropped to 80 in February, equal to the lowest point since World War II or same as November 1955.

Cash farm income in Ohio in February was about 4 percent above a year ago. Since prices paid by farmers is higher than a year ago, net purchasing power of the Ohio farmer has not changed greatly in the last year.

The total cash income of Ohio farmers in 1956 was about $1,028,076,000 or 3.7 percent above 1955. Net income per farm was estimated at $2307 or 7 percent above the $2153 in 1955.

The payments to farmers in Ohio by Government in 1956 was $15,985,000 or 1.5 percent of the total as compared with $5,766,000 in 1955 or .5 percent of the total. In other words, the increased Government payments to Ohio farmers in 1956, mainly the result of the Soil Bank, accounted for about one percent of the 3.7 percent increase in total cash income of Ohio farmers.

It is estimated that the average income received by the farm family in Ohio from non-farm sources in 1956 was as large or larger than the net income of $2307 from farming.

	Wholesale prices, all commodities U. S.	Prices paid by farmers U. S.	Farm product prices U. S.	Farm product prices Ohio	Cash farm income Ohio	Industrial payrolls Ohio 1947-49 =100*	Farm wages Ohio	Farm real estate values Ohio
		(Percentages of 1910-14)						
1913-1914	100	102	102	105	104	.....	103	101
1915-1919	159	148	164	166	189	.....	147	121
1920-1924	160	168	150	148	155	.....	174	131
1925-1929	143	161	148	153	170	.....	169	101
1930-1934	107	124	87	87	100	.....	103	73
1935-1939	118	125	107	111	139	33	108	72
1940-1944	137	152	155	155	243	76	177	91
1945	154	190	207	203	342	85	268	121
1946	177	208	236	239	402	82	308	140
1947	222	240	276	291	464	97	341	158
1948	241	260	287	298	475	105	385	166
1949	226	251	250	247	403	98	384	175
1950	232	256	258	248	429	112	380	172
1951	258	282	302	298	508	134	447	200
1952	251	287	288	286	511	140	482	224
1953	247	279	258	262	490	156	514	223
1954	248	281	249	250	453	144	525	220
1955	248	281	236	219	409	158	525	234
1956	257	286	236	224	428	167	564	252
January	251	281	226	205	360	165	536	.....
February	252	280	227	203	322	161	.....	.....
March	253	282	230	206	352	161	.....	252
April	255	284	235	218	380	164	550	.....
May	257	286	242	235	395	161	.....	.....
June	257	286	247	241	391	161	.....	.....
July	256	287	244	233	504	160	571	258
August	258	288	237	238	422	168	.....	.....
September	259	287	236	226	391	174	.....	.....
October	259	287	234	228	636	177	575	.....
November	260	289	234	226	526	175	...	264 Est
December	261	290	237	232	435	181	.....	.....
1957								
January	263	292	238	230	388	171	578	.....
February	263	294	234	221	336	.....	.....	.....
Percent Change February 1956 to February 1957	+5%	+5%	+3%	+9%	+4%	+4% Est	+8% Est	+7% Est

* Source: Bureau of Business Research, O S. U.

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