1-1-1961

Science serves your farm and home.

A. H. VanLandingham

Follow this and additional works at: https://researchrepository.wvu.edu/wv_agricultural_and_forestry_experiment_station_bulletins

Digital Commons Citation

VanLandingham, A. H., "Science serves your farm and home." (1961). *West Virginia Agricultural and Forestry Experiment Station Bulletins*. 459.

https://researchrepository.wvu.edu/wv_agricultural_and_forestry_experiment_station_bulletins/434

This Bulletin is brought to you for free and open access by the Davis College of Agriculture, Natural Resources And Design at The Research Repository @ WVU. It has been accepted for inclusion in West Virginia Agricultural and Forestry Experiment Station Bulletins by an authorized administrator of The Research Repository @ WVU. For more information, please contact ian.harmon@mail.wvu.edu.

West Virginia University Libraries

3 0802 100896132 4

EVANSVILLE LIBRARY
WEST VIRG.
UNIVERSITY

Science

SERVES YOUR FARM AND HOME

OAKS
From Acorns

Page 3

BURLEY TOBACCO

Page 4

BARBECUE

Page 6

**LIVESTOCK PEST
CONTROL**

Page 8

STATION PROJECTS

Page 12

STATION STAFF

Page 14

**FINANCIAL
STATEMENT**

Page 15

AGRICULTURAL EXPERIMENT STATION

WEST VIRGINIA UNIVERSITY

JUNE 1961

BULLETIN 459

5127
EI

no. 459

Science

SERVES YOUR FARM AND HOME

ANNUAL REPORT OF A. H. VANLANDINGHAM, DIRECTOR, WEST VIRGINIA UNIVERSITY AGRICULTURAL EXPERIMENT STATION FOR THE PERIOD 1959-60

Annual Report of the
AGRICULTURAL EXPERIMENT
STATION

West Virginia University
Morgantown, W. Va.

Director

A. H. VanLandingham

Editor

JOHN LUCHOK

Assistant Editor

STANLEY J. NELS

Assistant Editor

JOHN D. BENNETT

Photographer

DAVID R. CREEP

SCIENCE SERVES YOUR FARM AND HOME

will be sent free to any resident of West

Virginia in response to a written request

to the Director, Agricultural Experiment

Station, West Virginia University, Mor-

gantown, West Virginia.

IN THIS ISSUE

ON THE CALENDAR	2
NEW PUBLICATIONS	2
OAKS FROM SMALL ACORNS GROW	3
BURLEY TOBACCO	4
BARBECUE	6
LIVESTOCK PEST CONTROL	8
STATION PROJECTS	12
STAFF OF STATION	14
FINANCIAL STATEMENT	15

on the
calendar . . .

AUGUST—

- 3-4—West Virginia Poultry Convention and Festival, Moorefield
- 7-12—State 4-H Girls' Camp, Jackson's Mill
- 13-19—West Virginia Forest Industries Boys' Camp, Camp Wood
- 14-18—West Virginia Dairy Cattle Show, Jackson's Mill
- 16—State 4-H Health Program and Coronation of King and Queen, Jackson's Mill
- 17—State 4-H Tractor Operators' Contest, Jackson's Mill
- 21-26—State Fair of West Virginia, Lewisburg
- 24-25—State 4-H Roundup, Jackson's Mill

SEPTEMBER—

- 2-8—Regional Purebred Ram Sales
- 18-21—State 4-H and FFA Livestock Roundup, Jackson's Mill
- 22-24—West Virginia Chapter Soil Conservation Society of America, Jackson's Mill
- 25-Oct. 7—Regional Demonstrational Feeder Calf Sales

OCTOBER—

- 31-Nov. 2—State 4-H and FFA Baby Beef and Market Lamb Show and Sale, Jackson's Mill

NOVEMBER—

- 7-9—Annual West Virginia Soil Conservation District Supervisors' Association Meeting, Jackson's Mill

Science

SERVES YOUR FARM AND HOME

AROUND THE STATE
BY STATE UNIVERSITY

on our cover

A caravan of moving vans, trucks of all sizes, station wagons, and overloaded automobiles headed north out of Morgantown this month. The trip was rather short, in fact the caravan didn't even have to leave the city before reaching its destination—the new Engineering-Agricultural Center

on the Evansdale Campus—just about a mile from the Main Campus. At long last the College of Agriculture, Forestry, and Home Economics had moved into new, modern facilities—the Agricultural Sciences Building, pictured on the cover (top), and the Agricultural Engineering Building (bottom).

This move marked another important milestone for West Virginia University and for the State of West Virginia. These new buildings are equipped with modern facilities—the kind of facilities so necessary to carry out the College's role in education, research, and extension in a modern world—facilities which will enable the College to give even better service to the State—facilities so necessary to help us solve some of our pressing economic and social problems.

The Agricultural Sciences Building is the new home for almost all of the Division of Agriculture, the Experiment Station, and the Extension Service. The Divisions of Forestry and Home Economics, the Department of Plant Pathology, Bacteriology, and Entomology, and some units of the Extension Service remain on the Main Campus.

Science Serves Your Farm and Home is proud to have played a small role in pointing out the need for modern facilities in agriculture at our great University.—The Editors.

new publications

Bulletins

- 433. G. E. Toben, L. T. Warman. West Virginia Farming—A Pictorial Comparison Among Counties. November 1959.

(continued on page 11)

OAKS From Small Acorns Grow--

When Conditions Are Right

by

E. H. Tryon, Silviculturist

K. L. Corvell, Associate Silviculturist

C. K. Dorsey, Entomologist

THE oaks in our forests are important to the people of West Virginia. With much of our land clothed with forest, and with oak types making up one-half of the forest area, these oaks are an important segment of the economy of the State.

Because our mature oak stands are harvested in such a way that the new seedlings are established naturally (that is, from seed borne by standing trees), knowledge of the conditions needed to increase oak seedling establishment is essential. Consequently, Experiment Station specialists are studying several phases of acorn production and oak regeneration to find the best conditions and methods of perpetuating our oak forests.

Survey Made

Initially, a survey of the amount of oak reproduction actually present under oak stands was made.

Only stands which had not been burned or grazed recently were used. The number of oak seedlings varied from 125 to over 50,000 per acre in different oak stands. Thus, with both good and poor stocking of oak reproduction found, the next step was to determine whether or not different localities and conditions influenced the number of oak seedlings in a stand. Therefore, such factors as the amount of sunlight, steepness of slope, direction of slope, soil texture, depth of humus, and past disturbances such as grazing or cutting were related to the amount of reproduction.

The greatest number of oak seedlings was found where the forest stand was open enough to allow adequate sunlight to reach the seedlings, and where past disturbances had kept down competing vegetation and opened up the stand for increased light. Heavy shade is not desirable for the establishment of

LACK of humus cover to protect the germinated white oak acorn from winter cold, and a hard, compact soil surface which the root could not penetrate made its life difficult. Here the root cannot penetrate the soil, and actually is pushing up one end of acorn.

oak regeneration; neither are open conditions with full sunlight, lack of a humus layer to protect overwintering acorns from low temperatures, and absence of a light overhead canopy to protect the seedling from spring frosts. A light crown canopy and a humus layer thick enough to completely cover the acorns are desirable for the establishment of seedlings. For good growth after establishment, however, the stand should be opened up still more by removing additional trees.

Acorns Studied

Another approach to learning about conditions that influence oak regeneration has been a study of the seed—the acorns. Great variation in

(continued on page 16)

OAK reproduction in different oak stands varied from more than 55,000 stems to the acre, as shown here, to a low of only 125 stems.

SEED TRAPS are used to help determine number of acorns produced, damage from various causes.

BURLEY TOBACCO--

proper curing can mean

MORE DOLLARS in YOUR pocket

by Harold F. Ross, Assistant Agronomist

THE production of a desirable quality of tobacco depends as much upon the curing process as it does upon field development. A tobacco farmer may grow a good crop of tobacco in the field and lose it in the shed due to faulty curing.

There are many variants in the proper curing of tobacco, and broad experience and extensive practical knowledge are necessary if curing is to be successfully conducted. Failure to control conditions properly at any stage of the procedure is apt to ruin the value of the product and may result in its complete loss.

Types of tobacco are grouped according to the three curing methods practiced: (1) air cured, (2) flue cured, and (3) fire cured. Burley tobacco (type 31) is air cured. Air curing consists essentially of opening and closing ventilating doors that are attached to the side of the tobacco barn so as to maintain the desired inside conditions in the barn.

Curing Important

Curing of burley tobacco involves more than leaf drying. It is a vital or living process in which certain physical and chemical reactions occur at a rate that will produce good quality tobacco. Any agent that will speed up or slow down the rate needed for good curing will have an adverse effect on the tobacco in the curing shed.

One of the changes in physical properties of tobacco that occurs during its curing is the loss of water by evaporation. When tobacco is first cut in the field it contains approximately 85 to 90 per cent water. At the end of the cure it will contain 15 to 20 per cent water, depending upon conditions.

There are many chemical changes that take place when the tobacco is being cured in the barn. In tobacco that is cured on the stalk (burley) there is a translocation of plant nutrients from the leaf to the stalk and from the stalk to the leaf. Burley leaf cured on the stalk was found to lose about 40 per cent of its total nitrogen and 12 per cent of its ash. Nicotine, on the other hand, proved to be essentially immobile. The loss in dry matter in the leaf web of burley cured on the stalk was found to be about 30 per cent (Kentucky Study).

Curing Losses

Estimates in recent years in Kentucky show a loss of \$15 to \$20 million between the time the tobacco was harvested and the time it was sold. In Tennessee a loss of \$5 million out of a \$50 million industry was said to have occurred due to deterioration during and after curing. In West Virginia proportionate losses have occurred.

The largest percentage of this loss is due to faulty curing and house-burn. However, thousands of dollars are lost in some years due to freezing of tobacco in the shed. More time needs to be spent in the curing operation to combat this tremendous loss.

Temperature for good curing has a rather wide range. It has been well established that tobacco can be cured at temperatures varying from 60° to 90° F., provided the relative humidity is favorable.

The temperature inside the tobacco barn tends to follow the outside temperature. On warm days the temperature inside the barn will be high and on cold days it will be low. In some seasons the temperature on the outside will be too low for good curing, and the tobacco will cure green. If temperatures go above 100° F., the leaf cells may be killed and color will be set in the leaf.

Relative humidity is more important than temperature in the curing of burley tobacco. This is because of the narrow range of humidity necessary for curing high quality tobacco—between 65 and 70 per cent. At low temperatures and low humidity the tobacco will dry without proper curing (haying down). At high temperatures and high humidity, which favor rapid curing, the tobacco will cure dark and house-burn will occur.

In the initial stages of curing burley tobacco before the green color changes to yellow, excess humidity will have no detrimental effect, but the rate of drying is reduced. After the leaves have developed a yellow color and are changing to tan colors (critical stage), excessive humidity will have a serious effect on the quality.

Air movement is very important in curing burley tobacco because of its effect upon temperature and humidity in the area of the curing leaf.

Curing Experiment at Point Pleasant

In the fall of 1958 a project was initiated by the University to study the effects of temperature, humidity, and air movement under different curing methods.

Three curing methods were selected for the experiment: (1) *Air Cured (natural-ventilation)*. Ventilators to be opened when outside humidity is below 65 per cent and inside humidity is above 70 per cent. Heat to be applied when necessary to maintain inside humidity between 65 to 70 per cent. (2) *Recirculation of Air*. Natural ventilation by opening and closing ventilator doors. Ventilators to be opened when outside humidity is below 65 per cent and inside humidity is above 70 per cent. Heat to be used and air recirculated when ventilators are closed to maintain humidity

PLASTIC was used to divide tobacco barn into sections during experiments.

between 65 and 70 per cent. (3) *Forced Ventilation.* Ventilators closed at all times. Heat to be applied as necessary to lower humidity in cases where it becomes extremely high.

Experimental Set-up

One-half of the barn at the Ohio Valley Experiment Station was used for this experiment. Sections of the barn were separated by plastic (see photo). Six stoves were installed, with each section having two stoves with automatic controls. Bottled gas was used as a source of fuel.

A multipoint precision temperature indicator and an electric hygrometer were installed for the purpose of recording temperature and humidity. Thermocouples were connected to the instrument and run throughout the barn, with 14 points being located in each of the three curing sections. Four locations were selected in each of the three lower tiers, and two in the top tier. Sensing elements were placed in approximately the same locations as the thermocouples.

Ducts and fans were installed in sections that were used for forced ventilation and recirculation of air (see Figures 1, 2, and 3).

Ten sticks of tobacco were taken from each thermocouple-sensing element location for evaluation. A total of 140 sticks of tobacco were stripped and graded for each method. Approximately 17,500 leaves were stripped and graded.

Factors used in evaluating the curing methods were: (1) houseburn, (2) mottled and piebald, (3) green, and (4) price per 100 pounds.

The tobacco was stripped and graded into U. S. Government grades. Evaluation of this tobacco was made and compared with the air-cured plots. The per cent damage due to curing, and the quality, as expressed by price per 100 pounds, were computed.

Results

Forced Ventilation (Section A): In this system, air was forced through a duct from the outside of the barn through ducts that were built on the ground level inside the curing shed. The idea was to push the air up through the tobacco and out the ridge ventilator that was built along the top of the barn. It was found that the moist-laden air could not be forced any further than the second tier level of the barn. A greater percentage of house-

(continued on page 11)

Barbecue - -

ALWAYS A WELCOME SIGHT

by James L. McBee, Jr., Animal Husbandman

MORE and more groups are discovering the enjoyment and pleasure of cooking food outdoors. There is nothing like a beef barbecue to promote enthusiasm, develop good will, and stimulate fellowship and fun. When the occasion for a barbecue arises, everyone readily responds, and plans are soon under-way to stage the event in a big way.

The management of a barbecue can be a relatively simple job. Employment of the covered-pit method insures a delicious finished product and helps decrease the labor demand at serving time. A barbecue is successful only when it is properly prepared. More specifically, careful planning and timing are essential. Appetites become ravenous when exposed to such a tantalizing aroma and delightful sight. Therefore, planning should include an accurate estimate of the number to be fed and a plentiful supply of the food to be provided. If tickets are to be sold, a deadline should be set. Various committee assignments need to be made—fuel, grounds, pit, food, serving, and clean-up, to name a few.

The Menu—

The menu for a barbecue is really quite simple. The important thing is to have food that is easy to serve, isn't too messy, and can be served

rapidly. Meats suitable for a barbecue include beef, pork, and lamb. A few suggestions on other foods are: baked beans, potato chips, potato salad, and similar dishes. Green salads, relish dishes, and slaws are a welcome addition to the menu. Don't forget a plentiful supply of good coffee and milk. For dessert, ice cream cups or bars are excellent foods to top off a delectable barbecue.

The Meat—

All three red meat species—beef, pork, and lamb—may be utilized. U. S. Good grade beef rounds are the most desirable beef cuts, but the entire carcass may be utilized. Pork hams, loins, and shoulders also may be used. Lamb legs and loins are usually the most desirable cuts in this species. The amount to purchase should vary between one-half to three-fourths pound of boneless meat per person, depending on the composition of the group to be fed. If the barbecue is to be served as sandwiches, one may figure four sandwiches to the pound. Most anyone can eat two such sandwiches; it is always well to have some extra.

Boning—

Boneless meat makes cooking and serving easier. The individual pieces should be cut so that when carved

the slices will fit the buns. The pieces should weigh 6-8 pounds, and it may be desirable to have even larger cuts in order to vary the degree of doneness. Trimmings must be kept separate and utilized in some other manner.

Wrapping—

Each piece of meat should be rubbed with a mixture of salt and pepper (1 pound salt to 2 ounces black pepper). Wrap in a heavy-duty aluminum foil and fold the ends up. Then wrap in a wet-strength parchment or freezer paper, use a "drug store" wrap, and fold the ends up so the juices will stay in the package. Over-wrap with muslin or burlap and tie securely with fine wire so that the meat will not fall apart when being retrieved from the pit. A loop in the wire will facilitate handling. Mark each package in some manner so that the folds may be kept up.

The Pit—

Select a well-drained site. The ground should be clay or heavy loam. If a permanent pit is desired, or if the soil is sandy, plan on lining it with fire brick. Dig the pit four feet deep and three feet wide with vertical sides. A six-foot pit will be long enough to hold 200 pounds of meat. Pits longer than 20 feet are hard to work with. Throw the soil

1. Boneless meat makes cooking and serving easier. Each piece of meat should be rubbed with a mixture of salt and pepper.
2. Wrap in a heavy-duty foil and fold the ends up. Then wrap in a wet strength paper and fold ends up so juices will stay in the package.
3. Overwrap with muslin or burlap and tie securely with fine wire.
4. Rake the bed of coals level (it should be 18-24 inches deep). Allow 4-6 hours for "burning" of pit.
5. Cover the bed of coals immediately with 1-2 inches of fine limestone.
6. The meat is positioned in the pit and the cover placed on rapidly.
7. A good seal is necessary to prevent heat loss.
8. Meat should be removed as needed.
9. Meat should be carved and served hot.

well back in order to have working space all around the pit. Dig a trench around the pit to drain off water in case of rain.

The Fuel—

Select dry, well-seasoned hardwood cut into "stove size" chunks. Oak, maple, hickory or any hardwood gives a good bed of coals. An amount equal to about two to three times the volume of the pit is needed.

The Fire—

For starting the fire, have some dry, soft kindling. Old posts or corn cobs make good fire starters. Light the fire all along the pit. Put in larger pieces near the start of the fire so they have time to burn completely. As the burning progresses, add wood where needed. Plan ahead so that you will not have to add fresh wood during the last hour. Remember, all unburned chunks must be removed at the end of the burning period, and this is not an easy job. For tending the fire, use a garden rake and a long-handled fork or

(continued on page 10)

LIVESTOCK PEST CONTROL

Systemic insecticides, pesticides effective

by

C. K. Dorsey, Entomologist

DURING the past decade many new, highly effective insecticides have been developed and made available to farmers, stockmen, gardeners, and others that have serious insect pest problems. Even though these chemicals, when properly applied, do a good job in pest control, most of them must be applied repeatedly during the growing season if satisfactory control results are to be maintained. The variable effects of weather, growth processes of plants and activities of animals all contribute to the necessity of this expensive, repetitious application of pesticides.

The introduction and use of systemic insecticides for pest control has reduced or eliminated the effects of some of these limiting factors in practical, economical, pest control procedures. With a systemic-type pesticide it is possible to treat a plant or animal so that the chemical will be taken into the system of the organism. In plants, the chemical penetrates into the vascular system and is translocated to the various parts of the plant. In similar treatment of animals the chemical penetrates to the blood system and is distributed to the different body regions. In many situations, systemics give better pest control than other methods. They protect the plant or animal from the inside and they cannot be washed off by the rain or rubbed off mechanically. They gradually disappear due to metabolic activities of the treated organism.

In the case of livestock pest control, it is desirable to handle the animals as little as possible regardless of time of year. It has been found that the goal is more nearly achievable with the use of certain systemic insecticides.

Insecticides Effective

Research at the West Virginia University Agricultural Experiment Station, and at a number of other institutions, has demonstrated that some of the new systemic insecticides not only control serious internal parasites such as cattle grubs and round worms, but also control a number of external parasites such as lice, keds, hornflies, itch and mange mites and many others. These are additional "fringe" benefits from which the farmer profits for the price of the control activity against the internal parasites. Among range cattle in the West, for example, where cattle lice are a very serious fall and winter problem, an October application of a systemic spray (Co-Ral) for cattle grub control usually provides winter-long louse control for the herd without additional treatment.

The development and use of systemic insecticides for cattle grub control has stimulated interest and further experimentation in their use for control of other livestock pests in cattle, sheep, goats, horses, and swine. Different formulations, application procedures, timing of treatments, areas of treatments, and other improvements in livestock pest control have evolved from this experimentation. Many of these findings are so new that they have not been published as yet, but some will soon be available to agricultural interests through various sources of publication.

Formulations

Systemic insecticides are formulated as wettable powders, emulsifiable concentrates, boluses, capsules, drench concentrates, and granular forms. These various formulations

are used according to the pest control requirements at hand and they are not necessarily used interchangeably. Some of these formulations are available now only as experimental materials.

Application Methods

These systemics are usually applied either externally by spraying, dipping, or pour-on methods, or they are applied internally as boluses, capsules, drenches, feed additives, and by injection.

The means of application depend largely upon the formulation used, kind of animal to be treated, and type of pest to be controlled.

In spraying operations, wettable powders or emulsifiable concentrates are commonly used to prepare the spray mixture. A high-pressure, hydraulic sprayer capable of developing at least 200 p.s.i. with a 1- or 2-nozzle spray gun is quite satisfactory. The animals should be confined in a pen or corral for treatment so that they can be moved around and also still be easily accessible to the spray operator. For optimum results, the skin must be thoroughly wetted with the spray stream directed as nearly as possible at right angles to the body area being treated. The sprayer pressure should be at least 200 p.s.i.; however, the efficiency of parasite control will be improved by increasing sprayer pressure up to 400 p.s.i. A gallon of spray mixture, applied in this manner, will usually thoroughly wet an adult cow; about one half gallon will wet an adult sheep.

The pour-on method (experimental at present), refers to the application of a small amount of liquid, systemic mixture at a higher percentage of active ingredients than is

1. Method of collecting fecal samples from individual animals.

2. Procedure used in applying insecticides as a drench.

3. Control of internal parasites.

4. Applying insecticides as drenches in sheep for control of internal parasites.

5. Weight records are kept on all experimental animals as part of the evaluation of procedures and methods.

6. Correct spraying procedure for applying systemic insecticides to livestock. (Note right-angle impact of spray stream.) (Note protective rubber gloves, respirator, and goggles.)

7. Close-up of No. 6, which emphasizes the importance of high pressures in this type of spraying.

used in a spray mixture. The animals can best be treated by driving them through a chute. To facilitate penetration of the chemical to the skin it is sometimes advantageous to quickly brush the animal's back with a long-handled scrub brush which is wet with the mixture. The animal is then treated by pouring on its back (along back bone) a mea-

sured amount of the mixture. This method is most promising, according to research data, for the control of endoparasites, particularly in cattle. It has been observed that animals treated by this method should be forced to exercise considerably, immediately after treatment. It is necessary to determine the weights of the animals to be

treated, so that proper dosages will be administered.

Bolus (and capsule) formulations are usually applied with a balling gun of appropriate size. The bolus size (or amount) administered is determined by the weight of the animal. The animals have to be confined so that the application can

(continued on next page)

LIVESTOCK...

(continued from page 9)

be made; a chute and "squeeze" are usually necessary with larger animals. The animals should have access to feed and water before and after treatment.

Drench (liquid) formulations are applied in a similar manner except that a drenching gun is used. The rate of application (dosage) is determined and the manner of administering it to the animal is accomplished according to the way referred to in the case of bolus treatment.

Dip applications of systemic insecticides are made by forcing the animals to wade and swim through dipping vats filled with the mixture or by using a modification of this method, the spray-dip machine. This machine quickly applies a high gallonage of spray mixture to the animal as it walks through a tunnel-like enclosure. This method is used more extensively in the western United States.

Systemic insecticides used as *feed additives* (also still largely in the experimental stage) have provided satisfactory internal parasite control, especially in cattle. The insecticide is added, at low rates, to the daily rations of the animals for varying periods of time (2-15 days). Encouraging control results have also been observed when certain of these systemics are administered to the animals in salt.

The injection method (experimental at present) has proved effective in internal parasite control in several research programs, particularly against cattle grubs and as anthelmintics. In this method the systemic is commonly applied as an intramuscular or a subcutaneous injection; it is also applied as rumenal or abomasal injections. The dosage rate is based on the weight of the animal to be treated.

Available Insecticides

At the present time only two systemic insecticides have label acceptance and are available on the market for treating beef cattle for endoparasites.

Ronnel (Trolene) is available in a 40.0 per cent concentration (bolus formulation). The recommended dosage is one 37.5 gram bolus/300 lb. body weight. The bolus is applied orally with a balling gun or it can be dissolved in water and used as a drench. The animals should have

access to feed and water before and after treatment.

Co-Ral is available as a 25.0 per cent wettable powder. It is applied as a 0.5 per cent spray with at least 200 p.s.i. sprayer pressure; the skin of the animal should be thoroughly wetted. Calves under 3 months of age should not be treated. Calves 3 to 6 months of age should be treated only lightly. Adult cows may receive 1 gallon of spray mixture per treatment; smaller animals should receive no more than $\frac{1}{2}$ to $\frac{3}{4}$ of a gallon, depending upon their size (weight).

Do not treat sick animals with systemic insecticides. Do not treat animals (cattle or swine) which are to be slaughtered within 45 days, nor sheep, goats, or horses within less than 60 days. Do not repeat a full application of the insecticide on treated animals within 60 days. It is best to treat animals for cattle grub control (in West Virginia) late in July or at least by mid-October if the first date is not practicable.

Potential Gain

Actual figures on the dollars and cents gain realized by the stockman who controls the internal and external parasites on his animals are difficult to determine for various, obvious reasons. However, it is common knowledge that a healthy, vigorous animal is worth more to the farmer than one weakened from attacks by pests. Without protection from the many parasites the animals are quickly and directly affected.

Using the most important cattle insect pest as an example (the cattle grub), it is interesting and informative to study the data concerning the annual loss in the United States to cattle breeders and feeders caused by this pest. These figures were recently compiled by the National Cattle Grub Committee of the Livestock Conservation Incorporated which admits that these are conservative estimates. Preliminary estimates of a \$55 million annual loss to breeders, \$13 million loss at the packing plant level, and a \$32 million loss by the leather industry (tanners) presents an alarming total of a \$100 million annual loss to the cattle industry from cattle grubs alone. As the committee states in a summary, "the cattle industry can no longer afford to support cattle grubs." This is particularly true, now that control methods 85 to 100 per cent (average) efficient are available to stockmen.

If accurate data were available concerning the loss caused by other internal and external parasites to cattle, sheep, and other economically important livestock, the annual loss to the industry would, without doubt, be much more alarming.

With the advent of the new, effective insecticides and other pesticides, the stockman has weapons with which to combat these serious pest problems. He can no longer afford to support livestock pests.

BARBECUE...

(continued from page 7)

shovel. Allow about four to six hours for "burning" of the pit.

Topping the Coals—

Rake the bed of coals level (it should be 18 to 24 inches deep). Remove any unburned chunks that will not break into coals. Cover the bed of coals immediately with one to two inches of "topping" (fine limestone or coarse, dry sand). It is important to do this rapidly so that the least amount of heat is lost from the pit. Make sure all of the coals are covered, but do not cover too deeply.

Layout—

Plan the layout of the meat in the pit in advance. As one person puts on the topping, have a crew follow immediately with placing the meat. At this point, speed counts. Allow a couple of inches space between packages. Place only one layer of meat in the pit.

Pit Cover—

Start putting the cover in place as quickly as the meat is in the pit. Place steel posts, pipes, or angle iron about 18 inches apart across the pit. Cover these with sheets of galvanized roofing, sheet iron, or similar metal. As quickly as the cover is on one end of the pit, begin shoveling the soil over the top. Put about two to three inches of soil over the pit. Be sure that it is well covered and that there is no steam escaping. If rain is threatening, cover the pit with tarpaulins.

Time Schedule—

Plan on 12 to 18 hours time for cooking the meat (varying according to the amount of meat in the

pit), and four to six hours additional time for burning the pit. This would mean starting the fire 18 to 24 hours ahead of the planned serving time. The meat should be boned, seasoned, and wrapped ahead of time.

Doneness—

A meat thermometer should be used for testing doneness. Put a dial-type thermometer in one of the large packages at one end of the pit. About three to four hours before the meat is to be served, uncover this end of the pit and check the temperature. The thermometer should read about 140° F. at this time. If the temperature is somewhat higher, remove some of the soil from the pit to allow it to cool. A temperature of 140° indicates that the meat is medium, and 180° F., well done. Well-done meat is most acceptable to the largest number of people, and this should probably be the selected end point. Well-done meat may be rather hard to carve. Experience is the best guide for timing the barbecue.

Serving—

Set up one or two serving lines, depending on the number to be fed. As soon as the carvers are ready, remove the top covering from one side of the pit and take the meat to the slicing tables as needed. The outside wrapper may be removed at the pit in order to keep the serving area cleaner. Carve the meat in slices with an electric slicer or sharp knife. Don't slice too much ahead, or the meat will cool off. Have the bun makers work beside the slicers. Give the customers plenty to eat, especially thick slices of meat on the buns. The success of a barbecue depends on well-fed, happy customers.

BURLEY TOBACCO . . .

(continued from page 5)

burn and damaged tobacco was found in the first and second tiers from the ground level. However, a large percentage of the tobacco that was houseburned can be attributed to close spacing of the sticks on the rail and hanging tobacco too close to the ground. This would greatly reduce the flow of air through the tobacco. In 1959 the quality of the leaf, as expressed in price per 100 pounds, was \$61.00 as compared to \$55.80 for the check or air-cured tobacco.

In 1960 the motors on the fans were reversed and instead of forcing air into the barn, air was sucked out. This system seemed to work much better. The price per 100 pounds received for this tobacco was \$65.41 as compared to 63.48 for the air-cured tobacco (see Table 1).

Recirculation of Air (Section B): It was found that the tobacco cured in this section (1959) contained 29 per cent damaged tobacco. A breakdown of this shows that 22 per cent of the total damage was green leaves and 7 per cent was classified as piebald and showed evidence of drying too fast. The high percentage of green tobacco found in sections A, B, and C can be attributed to the following: (1) low humidity and high temperatures, (2) hanging of tobacco too close to the ground, and (3) hanging tobacco over stoves.

It was found that this section was not tight enough to hold the desired conditions for any appreciable length of time and that the fans and motors were too small to induce circulation of air. In 1960 this section was made tighter and a larger fan and motor were used.

Results for 1960 show that the tobacco cured with this system contained 16 per cent damaged tobacco as compared to 18 per cent for the air-cured plots. The quality of the leaf, as measured by price per 100 pounds, was \$64.66 as compared to \$63.48 for the air-cured tobacco. This small difference was due to good curing weather which prevailed in 1960 (see Table 1).

Air-Cured (Section C): Tobacco cured in this section always had the highest percentage of damaged tobacco and the lowest price per 100 pounds. However, due to good curing weather which prevailed in the fall of 1960, only small differences were noted in price per 100 pounds and percentage of damaged tobacco as compared to the other methods investigated.

Plans for 1961

Curing experiments will be continued in 1961. Certain changes will be made in the recirculation and forced-ventilating systems.

TABLE 1. RESULTS FOR 1959-1960 AT OHIO VALLEY

SECTION	PRICE PER 100 POUNDS		PER CENT GREEN		PER CENT DAMAGE		TEMPERATURE (DEGREES F)		HUMIDITY (PER CENT)	
	1959	1960	1959	1960	1959	1960	1959	1960	1959	1960
A	\$61.00	\$65.41	20	0.92	4	14	74	65	69	63
B	\$60.00	\$64.66	22	1.11	7	16	70	63	68	70
C	\$55.80	\$63.48	34	0.66	4	18	73	63	69	70

PUBLICATIONS

(continued from page 2)

434. K. C. Elliott, C. B. Boyles, A. D. Longhouse, G. C. Anderson. A Low-Cost Shelter and Feed Storage Unit for Beef Cattle. November 1959.
435. T. W. H. Dickerson. Pumping Tests on the Ohio Valley Substation Irrigation Well. November 1959.
436. Homer C. Evans, Ray S. Marsh. Possibilities for Reducing Apple Packing House Costs. November 1959.
437. Roger W. Pease. Foundation Plantings—Practices, Preferences, and Needs of West Virginia Homeowners. December 1959.
438. Collins Veatch. Soybean Variety Trials in West Virginia—1948-1957. December 1959.

439. William H. Metzler, W. W. Armentrout. Farming, Farm People, and Farm Expansion in Fayette, Raleigh, and Summers Counties, West Virginia, 1958. December 1959.
440. James H. Brown, E. H. Tryon. Establishment of Seeded Black Locust on Spoil Banks. January 1960.
441. T. Virgil Greene Lilly, H. L. Barnett, R. F. Krause. The Production of Carotene by *Phyromyces blakesleeianus*. January 1960.
442. H. Al. Hyre. Improving Initial Interior Egg and Egg Shell Quality Through Selective Breeding. August 1960.
443. C. B. Sperow. The Molybdenum Content of West Virginia Soils. August 1960.
444. William H. Metzler, W. W. Armentrout. Rural Development Problems and Prospects in Fayette, Raleigh, and Summers Counties, West Virginia. August 1960.
445. James H. Clarke. Producer Opinions on Seasonal Milk Production Costs and Prices. September 1960.
446. Leonard M. Sizer, Ward F. Porter. The Relation of Knowledge to Adoption of Recommended Practices. September 1960.
447. R. Franklin Dugan. Multiflora Rose in West Virginia. November 1960.
448. T. R. P. True, H. L. Barnett, C. K. Dorsey, J. G. Leach. Oak Wilt in West Virginia. December 1960.
449. A. D. Longhouse. Editor. Hay Conditions in the Northeastern United States. December 1960.
450. M. W. Johnson, C. B. Sperow, G. A. McLaren. Factors Influencing the Yield and Quality of Sorgho Sirup Produced in West Virginia. January 1961.
451. Homer C. Evans, W. W. Armentrout, Robert L. Jack. Some Effects of Price and (continued on page 14)

These station projects were active in the year 1959 - 60

Abbreviations of funds supporting projects and other abbreviations: AMS-Agricultural Marketing Service; ARS-Agricultural Research Service; H-Hatch Funds; NE-Northeastern Regional Research; NEM-Northeastern Regional Marketing Research; S-State Funds; SCS-Soil Conservation Service; USDA-United States Department of Agriculture.)

Administration

General Administration of Federal-Grant Fund Research (H 1)
Planning and Coordination of Cooperative Research (H 2)

Agricultural Biochemistry and Nutrition

Identified growth factors in proteins (H 5)
Prevention of rancidity in carcass fats of turkeys and hogs (H 6; coop. Poultry Science)
Broiler rations for high efficiency (H 17; coop. Poultry Science)
Measuring the nutritive value of forage crops (H 16, NE-24; coop. Animal Science)
The influence of autoxidized fat in the diet on protein requirements (H 118, NE 37; coop. Home Economics)
Miscellaneous chemical investigations (S 5)
The hemicellulosic activity of rumen bacteria (S 125)

Agricultural Economics and Rural Sociology

The economics of broiler production on West Virginia farms (H 85; coop. Poultry Science, Agricultural Extension Service)
Effects of national production control and price support programs on incomes of farmers in the Appalachian area (H 100, IRM 1; coop. Interregional)
The influence of population change and migration upon agriculture and rural community life in West Virginia (H 102, NF 31)
The effect of advertising and promotion on milk sales (H 114, NEM 14)
Effects of market innovations on costs of and returns for poultry (H 115, NEM 21)
Manpower utilization and agricultural adjustment potentials in Fayette, Raleigh, and Summers counties, West Virginia (H 121; coop. Agricultural Extension Service, ARS, W. Va. Dept. of Employment Security, USDA)
An evaluation of the marketing information for consumers (M.I.C.) program in the Wheeling-Steubenville area (H 122; coop. Agricultural Extension Service, Federal Extension Service)
Market structure and development of floricultural products (H 124, NEM 8)
Input-output relationships of forage production on dairy farms in West Virginia (H 134, NE-13; coop. Agronomy and Genetics)
An economic analysis of the physical and monetary costs incurred in the procuring, slaughtering and distributing of livestock, meat and meat products of local and wholesale slaughtering establishments in West Virginia (H 135, NEM

7; coop. Farmer's Cooperative Service, AMS)

An analysis of specification buying and production of livestock and meat in West Virginia (H 136, NEM 7; coop. Farmer's Cooperative Service, AMS)

Improving farm income from apple sales through changes in market organization and structure (H 137)

Economics of reducing the frequency of retail milk delivery (H 138, NEM 25)

Market development of ornamental nursery products (H 139, NEM 15)

Tobacco marketing in West Virginia (Title II, ES 234; coop. AMS, Kentucky Agricultural Experiment Station)

Agricultural Engineering

Poultry house design for West Virginia (H 65, NE 8; coop. Poultry Science)
The mechanization of forage crop harvesting, processing, storing, and feeding (H 69, NE 13; coop. Animal Science, Dairy Science, Reedsville Farm)
Factors involved in the use of supplemental irrigation under West Virginia conditions (H 92, NF 22; coop. Agronomy and Genetics)
Agricultural climatology of West Virginia (H 105, NE 35)
Curing and handling of burley tobacco (H 123; coop. Agronomy and Genetics, Ohio Valley Experimental Farm)
Hydrology of watersheds on shale soils (H 130; coop. Agronomy and Genetics)
Study of the design of operating characteristics of a grain conveyor using fluidization principles (S 63; coop. Engineering Experimental Station)
Preliminary and exploratory investigations pertaining to agricultural engineering (S 97)

Agronomy and Genetics

The phosphorus and potassium supplying and fixing power of several important West Virginia soils (H 18)
The influence of fertility and management on several ladino clover-grass mixtures (H 19)
Corn genetics and breeding (H 29; coop. Reymann Farms, N.E. Corn Conference, Ohio Valley Farm, Extension Service)
Selection and breeding of superior strains of red clover for West Virginia (H 34; coop. Plant Pathology, Extension Service, USDA)
The interrelation of soil fertility, planting rate and geometry of spacing in relation to yield of various hybrid corn varieties (H 38; coop. Ohio Valley Farm)
Crop rotation experiments (H 43; coop. Ohio Valley Farm)
Maintaining profitable stands of alfalfa (H 50; coop. Plant Pathology, Reymann Farms, Ohio Valley Farm)
Weed control in corn (H 52; coop. Reymann Farms)
Alfalfa breeding and genetic investigations (H 66)
The influence of several management practices on the performance of alfalfa and ladino clover grown alone and in association with grasses (H 68)
Some chemical properties of the major soil types of West Virginia (H 81; coop. SCS, USDA)

Using nitrogen fertilizer efficiently (H 82; coop. Ohio Valley Farm)

The molybdenum status of West Virginia soils (H 104)

Nutrient availability in relation to soil structure (H 106, NE 11)

The production of burley tobacco (H 108; coop. Ohio Valley Farm)

The correlation between various laboratory methods of determining available nitrogen in northeastern soils and the responses to added nitrogen of crops grown on these soils in greenhouse and field studies (H 112, NE 39)

Studies of soil properties that affect establishment and growth of oak stands in West Virginia (H 117)

The growth and control of quackgrass *Agropyron repens* under various conditions (H 128, NE 42)

The microclimate and soil moisture regime in forested soils as affected by topography and its effect on site productivity in mixed oak stands (H 140)

The performance of several alfalfa varieties grown under different climatic conditions with emphasis on the influence of fall cutting (H 141)

The influence of cutting and fertilization treatments on the productivity and persistence of orchardgrass and timothy (H 142, NE 29)

Information that will facilitate the production of winter barley resistant to powdery mildew in the Northeast (H 143, NE 23; coop. Plant Pathology, ARS)

Field crop variety testing (S 6)

Soil survey work in West Virginia (S 8)

The establishment and testing of grass and legume species and strains for soil conservation (S 87; coop. Nursery Division, SCS)

Preliminary investigations in soil science (S 94)

Preliminary investigations in crop production and genetics (S 128)

Animal and Veterinary Science

The relation of birth weight within breeds to growth rate of purebred mutton-type lambs (H 12)
Nutritional requirements of swine for growth (H 22)
Breel as a factor in the production of ewes retained for flock replacement and for the production of market lambs and wool (H 23)
Methods to increase non-protein nitrogen utilization by ruminants (H 45; coop. Agricultural Biochemistry)
Control of chronic respiratory disease (CRD) (H 53, NE 5; coop. Reymann Farms)
Causes of sterility in cattle (H 55, NE 1; coop. Dairy Science, Artificial Breeder's Coop.)
Avian infectious anemia-synovitis (H 88, NE 5; coop. Agricultural Biochemistry)
Reproductive efficiency of beef cattle (H 90)
The pathogenicity of infectious agents for the uterine mucosa (H 127, NE 40; coop. Dairy Science)
Nutrition, soil, and herbage interrelationships in a syndrome resembling hypomagnesemia tetany in ruminants (H 131; coop. Agronomy and Genetics)
Exploratory or preliminary investigations on diseases, feeding and management of farm animals (S 89)

Fat calf versus feeder calf production in West Virginia (S 95; coop. Reymann Farms)

Hay versus hay and silage for ewes (S 103; coop. Agricultural Biochemistry)

Increasing the utilization of low quality hays by wintering beef cattle in West Virginia (S 111; coop. Reymann Farms)

Methods of feeding growing-fattening pigs for economical production of lean carcasses (S 113; coop. Agricultural Biochemistry)

Studies on infectious synovitis (S 117; coop. Agricultural Biochemistry)

The effects of two systems of selection of breeding stock on beef cattle performance (S 118; coop. Reymann Farms, Dairy Science)

Dairy Science

The transmission of milk and butterfat production and body conformation of dairy sires (H 7; coop. USDA)

Comparison of young bulls with proven bulls in artificial breeding (H 27; coop. W. Va. Artificial Breeder's Coop.)

Breeding efficiency of dairy cows (H 33; coop. Animal Science)

The use of type and production records as a basis for a dairy cattle improvement program (H 35; coop. Ayrshire Breeder's Association)

The effects of early versus delayed breeding of dairy heifers (H 107)

Improving the quality of cottage cheese in West Virginia plants (H 133; coop. Plant Pathology, Bacteriology and Entomology)

Preliminary or exploratory investigations on diseases, feeding and management of dairy cattle (S 86)

Miscellaneous investigations of dairy products (S 90)

Selecting for milk production in Jersey cattle (S 106)

Chemical inhibition as a means of preserving bovine sperm (S 114; coop. College of Arts and Sciences)

Effects of increasing the upper limit of feeding concentrates to Holstein cows (S 120; coop. Animal Science)

The effects of continuous feeding of chlor-tetracycline to dairy cows (S 127; coop. Agricultural Biochemistry, Statistics)

Forestry

Efficient forest management practices for West Virginia cut-over and burned-over hardwood forest lands (H 36; coop. W. Va. Conservation Commission)

Timber management for the market demands in southern West Virginia forests (H 56; coop. Island Creek Coal Co.)

Factors affecting natural regeneration in upland oak types (H 67; coop. Plant Pathology)

Production of plantation-grown Christmas trees in West Virginia (H 119; coop. Agronomy and Genetics)

Revegetating spoil banks with forest trees species (H 120; coop. SCS)

Marketing lumber in West Virginia (H 125, NEM 24; coop. U. S. Forest Service)

Quality control of lumber dimensions (H 129)

Utilization and management of sprout black cherry (H 145)

Population studies of forest small mammals in West Virginia (H 147)

Forest fire prevention through public interest in game management in southern

West Virginia (H 149; coop. Island Creek Coal Co., W. Va. Conserv. Commission)

Improvement of farm game and wild life conditions on a soil conservation district (S 42)

Plantings of forest trees and shrubs at Greenland Gap (S 56)

Determination of optimum growth of West Virginia hardwoods (S 60)

Conversion of unproductive hardwood stands to desirable forest types (S 107)

Planting forest trees in West Virginia (S 108)

Silvicultural management of Virginia pine in West Virginia (S 126)

Horticulture

Improvement of potato varieties for West Virginia (H 4; coop. Plant Pathology)

Nutrition of apple trees in West Virginia (H 16; coop. University Experiment Farm)

Improvement of apple juice (H 21; coop. Agricultural Biochemistry)

The selection, breeding and propagation of the low-bush blueberry *Vaccinium vacillans* (H 31)

The effect of certain chemicals on color, finish and maturation of apples (H 39)

Selection, breeding and propagation of nursery crops (H 59)

Effects of herbicides on tree fruits and small fruits (H 116)

Miscellaneous horticultural investigations (S 27)

Variety tests of tree and small fruits (S 29)

Variety and strain studies of vegetables (S 31)

Lily bulb production trials (S 61; coop. USDA)

The effect of new growth substances on the preharvest drop of apples (S 66; coop. University Experiment Farm)

Chemical thinning of apples and peaches (S 69; coop. University Experiment Farm)

Propagation and selection of edible nut-bearing trees suitable to West Virginia (S 98)

Testing of azaleas (S 112; coop. Reedsville Farm)

Turf trials for home lawns (S 116)

The improvement of Ceranium, *Pelargonium hortorum*, through breeding (S 121)

Plant Pathology, Bacteriology and Entomology

The relation of genetics and environmental factors to growth, physiology and reproduction of fungi (H 3)

Apple measles (H 8; coop. Horticulture)

Black rootrot of apple (H 9)

The microbiology of strip mine spoil (H 13)

Decay as a factor in sprout reproduction of yellow poplar (H 14; coop. Forestry, USDA)

The nutrition of fungi and bacteria with especial reference to substances which induce, stimulate, or inhibit growth and reproduction (H 28)

The fungicidal efficiency and phytotoxicity of orchard sprays as influenced by methods of application, timing, and environmental factors (H 30; coop. University Experiment Farm)

Testing new fungicides and insecticides for values as pesticides on small fruit and vegetable crops (H 32)

Factors influencing losses from root rots of forage legumes (H 51)

Biology and control of tree-wilt pathogens (H 57, NE 25; coop. W. Va. Dept. of Agriculture, W. Va. Conserv. Commission)

Improvement of tomato varieties for West Virginia (H 58; coop. Horticulture)

The symbiotic relationships between micro-organisms and insect vectors of plant diseases (H 62)

The structure and function of specialized tissues in insects (H 63)

Biology and control of nematodes affecting fruit trees and forest seedlings (H 72, NE 34; coop. University Experiment Farm, USDA)

Diseases of forage grasses (H 78; coop. Agronomy and Genetics, USDA)

Arthropods affecting livestock in West Virginia—their distribution and control (H 79)

Cereal and forage crop pests—their distribution, incidence and control in West Virginia (H 80)

Virus diseases of sour cherry and other stone fruits (H 89; NE 14; coop. University Experiment Farm)

The possible relationship of metallic iron toxicity to drought injury in shade and forest trees (H 109; coop. Forestry)

The cause and control of "hemlock canker" (H 113)

The microbiology of farm ponds (H 132)

Studies of psychrophilic bacteria important in the spoilage of dairy products (H 146)

Gum defects in black cherry, *Prunus serotina*, Ehrh., associated with attack by shot-hole borer, *Scolytus rugulosus* (Ratz.), and similar or related defects caused by other agents (H 148; coop. USDA Forest Service)

Miscellaneous plant disease investigations (S 19)

Miscellaneous insect and insecticide studies (S 24)

Poultry Science

Simplified methods of improving initial interior egg quality and shell quality through selective breeding (H 44)

Improving the reproduction performance of turkeys (H 49)

Breeding for efficient production of eggs and meats (H 74, NE 6; coop. Reymann Farms)

The effect on hatchability, chick viability and growth rate of fortifying chick embryos (H 111)

Evaluating crisscross breeding of poultry (H 144)

Broiler management investigations (S 104; coop. Reymann Farms)

Development of satisfactory broiler rations (S 105; coop. Reymann Farms)

Radionuclide mineral metabolism of chicks which differ genetically (S 124)

University Experiment Farm

The effect of chemical spray schedules on the quality and quantity of apples produced (H 83; coop. Plant Pathology, Entomology Research Branch of USDA)

Apple and peach insect control (S 91; coop. Bureau of Entomology and Plant Quarantine)

Delicious budspout evaluation tests (S 115)

December 1, 1960

Administration

E. J. Stahr, Jr., I.L.D.
President of the University
E. J. Nesius, Ph.D.
Dean
A. H. VanLandingham, Ph.D.
Director

Agricultural Biochemistry and Nutrition

W. R. Lewis, Ph.D., Agr. Bio.
K. M. Barth, M.S., Asst. in Bio.
Shih-chieh Chen, B.S., Asst. in Bio.
Burr Clark, Jr., B.S., Asst. in Bio.
D. G. Crow, B.S., Grad. Res. Asst.
E. E. Hill, B.S., Grad. Res. Asst.
Sang Hie Kim, B.S., Grad. Res. Asst.
W. M. Luchsinger, Ph.D., Assoc. Bio.
G. A. McLaren, Ph.D., Agr. Bio.
R. L. Reid, Ph.D., Asst. Bio.

Agricultural Economics and Rural Sociology

H. C. Evans, Ph.D., Agr. Econ.
W. W. Armentrout, Ph.D., Agr. Econ.
W. O. Champneuv, M.S., Agr. Econ.
J. H. Clarke, M.S., Agr. Econ.
K. D. McIntosh, M.S., Asst. Agr. Econ.
R. W. Peace, M.S., Asst. Agr. Econ.
L. M. Sizer, Ph.D., Assoc. Rur. Soc.
Mary E. Templeton, M.S., Asst. in Agr. Econ.
G. E. Toben, M.S., Agr. Econ.

Agricultural Engineering

A. D. Longhouse, Ph.D., Agr. Engr.
E. B. Collins, B.S., Asst. in Agr. Engr.
W. H. Dickerson, M.S., Agr. Engr.
K. C. Elliott, B.S., Asst. in Agr. Engr.
R. E. Emerson, M.S., Assoc. Agr. Engr.
H. H. Hlovenstein, Draftsman
R. A. Phillips, M.S., Asst. Agr. Engr.
L. E. Stewart, B.S., Grad. Res. Asst.

Agronomy and Genetics

G. G. Pohlman, Ph.D., Agron.
N. M. Baughman, Ph.D., Agron.
W. T. Carlson, M.S., Asst. in Agron.
Maria Cardledge, A.B., Technician
G. R. Collman, B.S., Farm Supt.
E. M. Jencks, Ph.D., Asst. Agron.
W. W. Johnson, Jr., Ph.D., Assoc. Agron.
M. W. Jung, Ph.D., Asst. Agron.
G. A. Jung, B.S., Grad. Res. Asst.
R. L. Malcomb, B.S., Grad. Res. Asst.
D. L. Ratt, B.S., Grad. Res. Asst.
C. D. Reese, M.S., Asst. in Agron.
H. F. Ross, M.S., Asst. Agron. and Tobacco Specialist
Soh Chao Shih, B.S., Grad. Res. Asst.
C. B. Spewer, Jr., M.S., Asst. Agron.
Valentin Ulrich, Ph.D., Asst. Genet.
W. A. van Eck, Ph.D., Agron.
Collins Vacker, Ph.D., Agron.
C. J. Wilson, Jr., B.S., Grad. Res. Asst.

Animal and Veterinary Science

G. C. Anderson, Ph.D., An. Husb.
C. B. Boyles, M.S., Farm Supt.
G. J. Cunningham, M.S., Assoc. An. Husb.
Leslie Dorsa, D.V.M., Asst. An. Path.
J. O. Heishman, D.V.M., Assoc. An. Path.
D. J. Horvath, Ph.D., Assoc. An. Husb.
H. E. Kidder, Ph.D., An. Husb.
J. L. McBee, Jr., Ph.D., Asst. An. Husb.
N. O. Olson, D.V.M., An. Path.
J. A. Welch, Ph.D., An. Husb.
P. D. Whanger, B.S., Grad. Res. Asst.

Dairy Science

I. D. Porterfield, Ph.D., Dairy Sci.
R. A. Ackerman, M.S., Asst. Dairy Sci.
A. C. Allen, Supt. Dairy Sales
D. F. Butcher, B.S., Grad. Res. Asst.
C. E. Johnson, Jr., M.S., Res. Asst.
R. G. Mitchell, Ph.D., Assoc. Dairy Sci.
Charles Noiman, Ph.D., Assoc. Bio.
A. H. Rakes, Ph.D., Asst. Dairy Sci.
F. M. Smith, B.S., Supt. Dairy Processing
C. H. Taylor, Farm Supt.
R. H. Thomas, Ph.D., Assoc. Dairy Sci.
S. J. Weese, M.A., Assoc. Dairy Sci.

Forestry

W. C. Percival, Ph.D., Forester
J. F. L. Bell, B.S.E., Assoc. Forester
J. H. Brown, M.F., Asst. Silviculturist
K. L. Carvell, D.F., Assoc. Silviculturist
W. W. Christensen, Ph.D., Forester
W. W. Goodspeed, M.F., Forester
N. D. Jackson, M.W.F., Asst. in For. Utilization
R. C. Kellison, B.S.E., Forest Supt.
C. B. Koch, M.S.E., Asst. Forester
W. H. Reid, M.F., Assoc. Forester
R. L. Smith, Ph.D., Asst. Forester
E. H. Tryon, Ph.D., Forester

Home Economics

Elisabeth S. Yearick, Ph.D., Assoc. Nutritionist

Horticulture

W. H. Childs, Ph.D., Hort.
A. P. Dye, M.S., Asst. Hort.
W. R. Forney, Ph.D., Asst. Hort.
R. S. Marsh, A.M., Hort.
O. M. Neal, Jr., Ph.D., Assoc. Hort.
O. E. Schubert, Ph.D., Assoc. Hort.
J. R. Shumaker, M.S., Asst. in Hort.
L. P. Stevens, B.S., Grad. Res. Asst.
R. F. Sweetzer, B.S., Farm Supt.
K. C. Westover, Ph.D., Hort.
D. C. Zeiger, Ph.D., Asst. Hort.

Plant Pathology, Bacteriology, and Entomology

H. L. Barnett, Ph.D., Plant Path.
R. E. Adams, Ph.D., Assoc. Plant Path.
R. E. Amos, Jr., B.S., Grad. Res. Asst.
R. E. Baldwin, M.S., Grad. Res. Asst.
R. H. Bishop, M.S., Grad. Res. Asst.
C. W. Clayton, B.S., Grad. Res. Asst.
C. K. Dorsey, Ph.D., Entomologist
J. J. Eichenmuller, M.S., Asst. in Plant Path.
E. S. Elliott, Ph.D., Asst. Plant Path.
M. E. Gallegly, Jr., Ph.D., Plant Path.
J. H. Gims, B.S., Grad. Res. Asst.
D. D. Goldstrohm, B.S., Grad. Res. Asst.
Edwin Gould, B.S., Entomologist
R. A. Hager, B.S., Grad. Res. Asst.
W. N. Harnish, B.S., Grad. Res. Asst.
C. M. Howard, B.S., Grad. Res. Asst.
H. M. Kulman, Ph.D., Asst. Entomologist
J. G. Leach, Ph.D., Plant Path.
V. G. Lilly, Ph.D., Physiologist
C. E. Main, B.S., Grad. Res. Asst.
W. W. Roncadori, M.S., Grad. Res. Asst.
E. J. Savage, M.S., Grad. Res. Asst.
W. D. Schultz, Ph.D., Asst. Bacteriologist
R. J. Stipes, B.S., Grad. Res. Asst.
J. R. Sutherland, M.S., Grad. Res. Asst.
R. P. True, Ph.D., Plant Path.
W. G. Vail, A.B., Grad. Res. Asst.
J. W. Whaley, B.S., Grad. Res. Asst.
H. A. Wilson, Ph.D., Bacteriologist

Poultry Science

Homer Patrick, Ph.D., Poultry Sci.
H. M. Hyde, M.S., Assoc. Poultry Sci.
J. R. Johnson, B.S., Grad. Res. Asst.
W. G. Martin, M.S., Asst. in Poultry Sci.
K. E. Nestor, B.S., Grad. Res. Asst.
H. C. Smith, B.S., Farm Supt.

Miscellaneous

G. D. Bengtson, B.S., Asst. Editor
D. R. Creel, Photographer
R. S. Dunbar, Jr., Ph.D., Statistician
John Luchok, B.S.J., Editor
S. J. Nels, B.S.J., Asst. Editor
Martha R. Traxler, Chief Clerk

PUBLICATIONS

(continued from page 11)

- Income Support Programs on Marginal Farms. February 1961.
452. Annual Report of A. H. VanLandingham, Director. Science Serves Your Farm. February 1961.
453. T. C. McIlvaine, G. G. Pohlman, D. R. Browning. Crop Rotation Experiments in the Ohio Valley—1937-1952. February 1961.
454. T. J. C. Burchinal, W. H. Dickerson. Rainfall Probability and Its Applications. March 1961.
455. T. T. B. Clark. Crossbreeding in Turkeys. II. Summary of Studies on Hatchability, Growth, and Body Characteristics. April 1961.

Circulars

106. Collins Veatch, Oscar E. Schubert, K. L. Carvell. Weed Control—1959 Suggestions. April 1959.
107. K. L. Carvell, H. P. Berthy. A Guide to Killing Woody Plants in West Virginia. December 1959.
108. Collins Veatch, Oscar E. Schubert, K. L. Carvell. Weed Control—1960 Suggestions. February 1960.
109. E. H. Tryon, K. L. Carvell, H. P. Berthy. Planting Coniferous Forests in West Virginia. August 1960.
110. Roger W. Peace. Part-time Nurseries and the Market for Ornamental Trees and Shrubs. August 1960.
111. R. A. Ackerman, C. E. Polan, H. O. Henderson. Starting Dairy Calves on Milk Replacer Means More Milk to Market. December 1960.
112. R. P. True, W. H. Gillespie. Oak Wilt and its Control in West Virginia. January 1961.

Current Reports

22. Robert E. Adams, S. E. Famburo. A Practical Means of Reducing Storage Rots of Apple and Post-Harvest Rots of Peach. July 1959.
24. M. W. Johnson, R. J. Friant. Hybrid Corn Performance Trials in West Virginia, 1959. February 1960.
25. Leonard M. Sizer. Population Estimates for the Counties of West Virginia. July 1, 1958. February 1960.
26. James H. Brown. Fall and Winter Pruning of Pines. August 1960.
27. Oscar E. Schubert, LeRoy P. Stevens. Control Apple Storage Scald. January 1961.
28. M. W. Johnson. Hybrid Corn Performance Trials in West Virginia—1960. February 1961.

Scientific Articles

572. H. L. Barnett. A New Calcarisporium Parasitic on Other Fungi. *Mycologia*, Vol. 50, No. 4:497-500, August 1958.
574. E. H. Tryon, K. R. Carvell. Environmental Factors Affecting Yellow-Poplar Survival Under a Young Stand. *Caslatanea*, Vol. 25, pp. 69-73, 1960.

Financial Statement for the Year July 1, 1959 to June 30, 1960

Classification of Receipts and Disbursements	Hatch	Regional Research Fund	Title II	Non-Federal Funds	TOTAL
RECEIPTS					
Received from the Treasurer of the U. S.	\$495,888.00	\$93,425.00	\$2,000.00	....	\$591,313.00
State appropriations:					
Main Station .....	....	....	....	319,266.00	319,266.00
Special (Oak Wilt Research) ...	....	....	....	10,000.00	10,000.00
Special endowments, fellowships and grants:					
Foundations .....	....	....	....	8,096.36	8,096.36
Industry:					
Private corporations .....	....	....	....	16,141.39	16,141.39
Farm and trade associations .....	....	....	....	1,500.00	1,500.00
Sales .....	....	....	....	188,621.25	188,621.25
Balances Forward July 1, 1959 .....	....	....	....	188,135.00	188,135.00
Total Available	\$495,888.00	\$93,425.00	\$2,000.00	\$731,760.00	\$1,323,073.00

DISBURSEMENTS

Personal services	\$438,385.56	\$63,092.85	\$ 631.20	\$317,627.00	\$819,736.61
Travel	6,720.88	5,827.43	1,066.94	10,006.00	23,621.25
Transportation of things	367.83	71.08	....	557.00	995.91
Communication services	215.41	134.65	....	6,672.00	7,022.06
Rents and utility services	3,487.66	4,516.84	....	28,267.00	36,271.50
Printing and reproduction	6,375.97	156.09	....	3,628.00	10,160.06
Other contractual services	1,819.15	685.29	....	21,243.00	23,747.44
Supplies and materials	23,965.95	14,117.00	101.86	127,660.00	165,844.81
Equipment	4,536.52	4,646.23	200.00	40,148.00	49,530.75
Land and structures (contr.) .....	....	....	....	2,245.00	12,258.07
Taxes and assessments	10,013.07	....	....	....	....
Total Disbursements	\$495,888.00	\$93,247.46	\$2,000.00	\$558,053.00	\$1,149,188.46
Reverted Balances .....	....	177.54	....	....	177.54
Non-reverted Balances Available for 1960-61 .....	....	....	....	\$173,707.00	\$173,707.00

575. William H. Reid. This Particle Board Industry. *The Lumberman*, July 1958.
576. Robert Adams, K. J. Kessler, Jr. Rosette or Pfeifferkrankheit Montmorency Sour Cherry in West Virginia. *U.S.D.A. Plant Disease Reporter*, Vol. 42, No. 5:568-570.
577. V. G. Lilly, H. A. Wilson, J. G. Leach. Bacterial Polysaccharides. III. Some Chemical Properties of *Xanthomonas phaseoli* Polysaccharide. *Proceedings, West Virginia Academy of Science*, Vol. 31, pp. 27-32, 1959.
578. G. C. Anderson, G. A. McLaren, J. A. Welch, C. D. Campbell, G. S. Smith. The Comparative Effects of Urea, Uramite, Biuret, Soybean Protein, and Creatine on Digestion and Nitrogen Metabolism in Lambs. *Journal of Animal Science*, Vol. 18, No. 1:134-140, February 1959.
579. Alex L. Shigo. Fungi Isolated from Oak-Wilt Trees and Their Effects on *Ceratocystis Fagacearum*. *Mycologia*, Vol. 50, No. 5:757-769, September-October 1958.
580. G. S. Smith, J. A. Welch, G. A. McLaren, G. C. Anderson, C. D. Campbell. The Effects of Dietary Vitamin B₂ and Diethylstilbestrol upon the Utilization of Nonprotein Nitrogen by Lambs. *Proceedings, West Virginia Academy of Science*, Vol. 30, pp. 133-138, 1958.
581. V. G. Lilly, H. L. Barnett, R. F. Krause, F. J. Lotspeich. A Method of Obtaining Pure Radioactive Beta-carotene Using *Phycomyces blakes-*

- leeanus*. Abstract in *Proceedings, West Virginia Academy of Science*, Vol. 30, p. 144, 1958.
582. M. E. Galleghy and J. J. Eichenmuller. The Spontaneous Appearance of the Potato Race IV. Character in Cultures of *Phytophthora Infectiosa*. *American Potato Journal*, Vol. 36, No. 2:45-51, 1959.
583. Charles L. Wilson. The Columbian Timber Beetle and Associated Fungi in White Oak. *Forest Science*, Vol. 5, No. 2:114-127, June 1959.
585. G. P. Lynch, G. C. Anderson, W. R. Lewis. Stabilization of Hog Carcass Fats by Addition of the Antioxidants Antiozonant 288, Santokuin, Quercetin, and Dihydroquercetin to the Ration. Abstract in *Animal Science*, Vol. 16, No. 4:1071-1072, November 1957.
586. K. L. Carvell, E. H. Tryon. Herbaceous Vegetation and Shrubs Characteristic of Oak Sites in West Virginia. *Castanea*, Vol. 24, No. 1:39-43, March 1959.
587. N. O. Olson, D. C. Shelton. Infectious Synovitis Control 10: Chlorotetracycline in Chicks Inoculated at One Day of Age. 62nd Annual Proceedings, United States Livestock Sanitary Association, pp. 201-209, November 1958.
589. D. C. Shelton, N. O. Olson. Control of Infectious Synovitis. 5. Continuous and Intermittent Feeding of Chlorotetracycline and Furagadone. *Phytracy Science*, Vol. 38, No. 3, May 1959.
590. Control of Infectious Synovitis. 11. The Potentiating Effect of Tereph-

- thalic Acid and Chlorotetracycline. *Avian Diseases*, Vol. 2, No. 4:450-455, 1957.
591. C. D. Campbell, G. A. McLaren, G. C. Anderson, J. A. Welch, G. S. Smith, J. Brooks. Sarcosine and Creatine as Nitrogen Sources for the Ruminant and the Influence of Supplemental Vitamin B₂. *Journal of Animal Science*, Vol. 18, No. 2:780-789, May 1959.
592. N. O. Olson, W. R. Seymore, A. D. Booth, L. Doza. Characteristics of PPLO Isolated from the Genital and Respiratory Tract of Cattle. *New York Academy of Science*, Vol. 79, Art. 10, pp. 667-685, January 15, 1960.
593. R. E. Adams, S. E. Tamburo. The Treatment of Field Boxes for the Control of Post-Harvest Rots of Peaches and Storage Rots of Apples. *U.S.D.A. Plant Disease Reporter*, Vol. 43, No. 3, March 15, 1959.
594. N. O. Olson. Transmissible Synovitis of Poultry. *Laboratory Investigation*, Vol. 8, No. 6:1384-1393, November-December 1959.
595. Edward S. Elliott. A Report of Grass Diseases Observed in West Virginia. *U.S.D.A. Plant Disease Reporter*, Vol. 43, No. 4:461-463, April 15, 1959.
596. W. H. Gillespie and R. P. True. Three Factors Which Influence the Local Spread of Oak Wilt in Five Northeastern Counties of West Virginia. *U.S.D.A. Plant Disease Reporter*, Vol. 43, No. 5:588-593, May 14, 1959.

SPRING frosts often damage, deform oak seedlings. Seedling on right was damaged by frost soon after growth started in spring. The seedling on the left was not damaged. A light forest canopy protects seedlings from frost.

OAKS...

(continued from page 3)

acorn yield occurs from one tree to another and from one year to the next. For example, one of the best acorn-producing white oaks bore only 500 acorns in a poor year but over 15,000 in a good year.

Damage to acorns also has been studied in much detail. The amount of damage to mature acorns is great. Animals and insects together were found to damage or destroy about 80 per cent of the acorns. High acorn loss occurred in both good and poor seed years, and from high- and low-yielding trees. With such a great amount of damage to the acorn crop, and with such year-to-year variation in size of the crop, the forester must depend largely on good seed years to establish oak reproduction where needed.

An intensive study of insect damage to acorns was made during a three-year period. Over 8,000 mature acorns from 63 separate collections were dissected and studied. Insects were found to be a major cause of damage and destruction. Six different species of acorn weevils (*Cureulio* spp.) caused the greatest amount of insect damage; acorns in

ANIMALS cause heavy damage and loss of acorns. Damaged acorns often give clues as to the animal causing the damage. The acorns in (A) were damaged by gray squirrels, those in (B) by the white footed mouse.

every collection were infested. Next in importance were the acorn caterpillars (*Melissopus* sp.) and (*Valentia* sp.) which affected 39 per cent of the collections. The severity and importance of insect damage to acorns varied from light damage to total destruction of the seed, depending on the kind of insect attacking the acorn.

Another phase of this work involved studies on the control of insects damaging the acorns of mature oak trees through the use of granular, systemic insecticides (Thimet and Di-syston) applied around the base of the tree. Present indications are that these two insecticides are effective in reducing weevil damage to the acorn. Such weevil control will be of importance for those superior quality oaks which are selected for seed production.

A—A healthy acorn. The solid, fleshy portion filling the shell is made up of the cotyledons.

B—This acorn has been completely destroyed by the acorn weevil larvae.

C—This acorn has been destroyed by the acorn caterpillar.