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Science serves your farm.

A. H. VanLandingham

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BULLETIN 422

AGRICULTURAL EXPERIMENT STATION

WEST VIRGINIA UNIVERSITY

Science

SERVES YOUR FARM

ANNUAL REPORT OF A. H. VANLANDINGHAM, ACTING DIRECTOR
WEST VIRGINIA UNIVERSITY AGRICULTURAL EXPERIMENT STATION
FOR THE PERIOD 1956-1957

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SERVES YOUR FARM will be sent free to any
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University, Morgantown, W. Va.

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on the
calendar . . .

SEPTEMBER—

- 24—Feeder Calf Sale, Lewisburg
- 30—Feeder Calf Sale, Point Pleasant

OCTOBER—

- 2—Regional Feeder Calf Sale, Jackson's Mill
- 4—Feeder Calf Sale, Lamberton
- 6—Feeder Calf Sale, Spencer
- 7—Feeder Calf Sale, Gassaway
- 9—Feeder Calf Sales, Jackson's Mill and Marlinton
- 13-17—Annual Extension Workers' Conference, Jackson's Mill
- 17-19—Five State Young Men and Women's Conference, Jackson's Mill
- 21—Feeder Calf Sale, Elkins
- 22—Feeder Calf Sale, Terra Alta
- 24—Feeder Calf Sale, Petersburg
- 27-30—State 4-H and FFA Baby Beef and Fat Lamb Show and Sale, Jackson's Mill
- 28—State 4-H Wool Dress Show, Jackson's Mill
- 31-Nov 2—West Virginia Folk Festival, Jackson's Mill

NOVEMBER—

- 8—W.V.U. Home Economics Alumna Tea, Morgantown

Editor's Note: Due to lack of space we were unable to carry a list of the publications recently released by the Agricultural Experiment Station. A complete listing of these bulletins and circulars will appear in a future issue of *Science Serves Your Farm*.

Science
SERVES YOUR FARM

on our cover

This year marks the 18th year of organized soil and water conservation work in West Virginia. Farmers, local agricultural leaders, and professional conservationists are quietly and proudly reviewing the progress of the first 18 years.

West Virginians today are leading a healthier, more prosperous, and enjoyable life as the result of these 18 years. This progress, leaders say, points the way to the task that lies ahead. The prosperity of our farm citizens depends upon a productive soil, and the welfare of all of our citizens is dependent upon the wise use of land and water resources. Conservation and wise land use must be the watchword of the future.

The proper use of soil and water resources has always been uppermost in the minds of those who plan and manage operations on the farm and forest lands of the West Virginia University Agricultural Experiment Station, as well as those who teach agriculture in the classroom. This view of the Reedsville Experiment Farm in Preston County shows the conservation practices used in the growing of small grains. Visitors to this farm today can see the results of many other conservation efforts, including the afforesting of unutilizable slopes and the reclamation of bottom lands.

Soil and water conservation will continue to be an integral part of the planning and carrying out of research of the Agricultural Experiment Station. As one worker put it—"An adequate conservation program is as important in today's farming as adapted hybrid seed and production-tested cattle."

NEMATODES . . .

This ancient, unseen pest is one of agriculture's toughest enemies

by Robert E. Adams, Assistant Plant Pathologist

ALL plants are subject to attack by nematodes. These little-known pests take their toll of food, fiber, and forage by feeding on the roots of plants, and by providing entrance to root-invading fungi and bacteria.

Nematodes occur everywhere in the soil. They may be found in the northern-most regions of the world if plants will grow there, and at the southern tips of the continents. They are found in river valleys and on the peaks of some of the highest mountains.

Some nematodes live free in the soil. Others spend most, if not all, of their lives within plant roots, stems, leaves, flowers, and seeds.

Evidence points to the role of nematodes in the change of land use in the South. They are apparently responsible for much of the abandonment of crop land to scrub brush and forest. They are suspected of having caused the decline and fall of the Mayan civilization in Central America. They are one of the reasons why Germans eat rye bread instead of bread made from wheat flour.

The golden nematode is responsible in part for the short food supply in Europe. It is directly responsible for the discontinuance of potato and tomato production on Long Island, as well as constituting a serious threat to vegetable production in other areas of the United States.

No production area is immune to invasion by the nematode. In Florida it causes a disease of citrus trees known as spreading decline, which is threatening to destroy the citrus industry as it is today.

Here in West Virginia, nematodes have caused a decline in the yields of fruit trees in commercial plantings, and have stunted and killed forest tree seedlings in the State Forest Tree Nursery at Parsons. They limit the yields of strawberries, and sometimes make home gardens unproductive. The cost of their damage to alfalfa and other hay crops in West Virginia has not been determined, but they probably do as much damage to the entire agricultural economy as any other pest.

Nematodes are, in most instances, microscopic worms somewhat smaller in diameter than a human hair. They are relatively short, usually less than a tenth of an inch, although some African species grow to be four feet long. Some nematodes will swell up until they are about half as big around as the head of a pin.

Nematodes have neither eyes or brains. They have a sensory system which enables them to locate food, and are particularly adept at this. Their skins are impervious to almost everything.

Nematodes cannot move backwards. On the average, under their own power, they will travel only about six inches during a lifetime. However, there are many ways in which they are moved about. They can be carried great distances in dust storms, by floods or irrigation waters, and on the feet of men and animals. Some are carried by insects.

The nematodes which attack plants are equipped with unique feeding mechanisms. Their mouths are much like hypodermic needles, and are called stylets. A stylet is so strong

DIAGRAM of a typical nematode. Actual size is about one-tenth inch in length, as big around as a human hair. Note the stylet (A) with which nematode easily pierces tough plant roots for feeding.

and sharp that it easily can pierce the epidermis of a plant root.

Piercing a plant root represents quite an accomplishment for an animal so small as a nematode. A similar task, for a man, would be to push a large spike through an oak log—by hand.

Nematodes apparently are delicate creatures in some stages of their life cycles, at which time they can be killed with soil fumigants. In general, however, they are extremely hard

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YOUNG CHERRY TREES on left grew in soil free of nematodes, those on right grew in nematode-infested soil. Nematodes, feeding on roots, have caused serious damage to numerous commercial orchards, nurseries, destroying some plantings.

AZALEA RESEARCH

Improved, better adapted varieties sought; one azalea flowered in record 14 months

by O. M. Neal, Assistant Horticulturist

AZALEAS are among the finest flowering shrubs for ornamental garden plantings and for greenhouse forcing as potted plants for the florist trade. Four very fine azalea species are native to West Virginia—the flame azalea, smooth honeysuckle, purple honeysuckle, and the rosy or early honeysuckle.

Azaleas have been bred for several hundred years. Most of the early work was done in England, Holland, Belgium, and Japan, with emphasis on forms for greenhouse forcing.

There are about 70 species of azalea native to the northern hemisphere. The evergreen types were introduced from China, Japan, Korea, and Formosa. One of the deciduous species is found in the Caucasus, two are found in China and Japan, and one on the West Coast. Sixteen are found in eastern North America, with the heaviest concentration in the Appalachian area, from West Virginia on south. There are no azaleas native to the southern hemisphere.

Some years ago a breeding project was started at the West Virginia University Agricultural Experiment Station to develop improved varieties of azaleas which would thrive under the varied climatic conditions found in the State. Experiment Station horticulturists wanted to see if plants of superior adaptability and quality could be developed by crossing the hardy native azaleas with cultivated varieties.

A collection of outstanding native azaleas, assembled by Professor and Mrs. Anthony Berg while at this

Station, is the source of native stock being used in this work. Hybrids of these azaleas, made by Mr. and Mrs. Berg, were set at the Reedsville Experiment Farm in 1948, where some flowered in 1952. Seed from the first controlled crosses with these hybrids was harvested in 1954 and planted in November of the same year.

Breeding work with many shrubs and trees is a slow-moving process because of the time required for each generation of seedlings to reach flowering size. Under normal conditions, the azalea seeds planted in 1954 would flower in 1958 or 1959, the usual four-year period required from seed to flower for native azaleas.

Breeding Takes Time

The time required for breeding many crops can be shortened by raising the plants in the field during the summer and in the greenhouse during the winter months. The advantages of this procedure have been limited with azaleas because warm greenhouse temperatures alone are not sufficient to keep plants growing during the short days of fall and winter. Plants from seed sowed in March stop growing during the short days of late summer and make little growth until the days again lengthen the following spring. Seed sowed after harvest in November germinates but makes little growth until the long days of March and April. (Right-hand plant, Figure 1.)

Workers in Holland found that increased growth of azaleas could be obtained if the plants received light

for longer periods than that provided by natural daylight—by supplementing the natural photoperiod with incandescent lamps. They found that the first seedlings of a mollis hybrid, from seeds sowed in March 1953, flowered in the fall of 1955, after growing continuously in the greenhouse under natural daylight extended to 24 hours with incandescent lamps.

This procedure was modified in our experiments to see if seedlings might be produced which would make satisfactory growth in the field after the cross was made, and which would flower in the following spring.

Seed from 70 crosses was planted immediately after harvesting in November, 1954, on sphagnum moss in a warm greenhouse. In December and January the seedlings were transplanted into three-inch bands containing a mixture of peat and shredded sphagnum mixed half and half.

Fluorescent Tubes Used

Fluorescent tubes, burning 24 hours a day, were used to augment the light intensity during the dark winter days, and to extend the photoperiod to 24 hours.

Seedlings from each cross were placed, three inches apart, in rows across a greenhouse bench. Two 40-watt fluorescent tubes in reflectors were hung lengthwise over one side of the bench so that they were sixteen inches above the plants directly beneath them.

In this arrangement, one end of each row of seedlings was directly

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FIGURE 1. These hybrid deciduous azalea seedlings received supplementary fluorescent light during winter's short days. Seedlings on left received continuous light, those on right daylight only. Second and third plantings, from left respectively, received 18 and 12 hours supplemental light daily.

FIGURE 2. These crosses of Topal Holly and English Holly also respond to supplemental fluorescent light in the greenhouse. In addition to normal daylight, the holly cross on the left received continuous fluorescent light, the center plant 18 hours extra light daily, the plant on the right 12 hours.

FOOT ROT IN SHEEP

"Whole flock" treatment is the answer . . .

by J. O. Heishman, Associate Animal Pathologist,
Reymann Memorial Farms

FOOT rot is a serious infectious disease affecting sheep in practically all countries where sheep raising is practiced. It has been recognized in the United States for more than 50 years, and in recent years it has become of major importance in West Virginia.

Foot rot is usually not fatal, but it is of considerable economic importance. This disease causes sheep to be unthrifty, reduces the wool clip, and lambs from infected ewes are slower to reach market weight and will usually grade lower. Rams affected with the disease may be practically useless at breeding time.

Severe lameness in one or more sheep is usually the first indication of foot rot in a flock. During the early stages of the disease, the skin in the cleft between the toes will be swollen, reddened, and moist in appearance. In a few days the skin in this area becomes slightly yellow or grayish in color. If not checked, the infection will spread under the soles of the feet, and may eventually undermine the walls of the hoof. All of this undermined horn becomes loose, and a foul-smelling, dirty-gray material forms between the walls of the hoof and the underlying soft tissue.

Foot rot in sheep rarely extends above the coronary band or top of the hoof. Inasmuch as the tissue from which the hoof is formed is not involved, it continues to grow, resulting in a misshapen and deformed hoof (Figure 1). The overgrown hoof tissue is harder and more brittle than normal hoof tissue.

Lameness in sheep may be caused by several other conditions, which may be mistaken for foot rot by an inexperienced person. Cracked or

torn hoofs, puncture wounds, abscesses, bruising, and mud wedges between the toes will all cause lameness. However, if it is kept in mind that foot rot is a disease caused by specific organisms, and that it is spread only by previously infected sheep, a diagnosis can often be made by considering the history of the present flock and watching for characteristic symptoms. On the other hand, if any doubt exists, a veterinarian should be consulted. Early treatment will prevent the spread of the disease within the flock.

Treat Whole Flock

Foot rot in sheep must be treated on a flock basis. For this reason it is important that all causes of lameness in the flock be determined quickly and accurately. If lameness is due to foot rot, steps must be taken to *promptly treat the entire flock*. Other causes of lameness may be removed by treatment of the affected sheep individually.

At the first sign of foot rot, each sheep in the flock should be set up

FIGURE 2. A foot bath is the most practical means of treating a large number of sheep for foot rot. This one is easily built of native materials on the farm. See page 12 for drawing, materials list.

and each foot examined. Any excessive growth of the hoof should be cut away to restore the normal shape of the foot. When evidence of foot rot is found, the paring operation must be extensive. All loose or undermined horn must be pared away until healthy pink tissue is exposed at the margin between the horn and the underlying soft tissues.

Where the paring of infected feet has been extensive, steps should be
(continued on page 7)

FIGURE 1. Overgrown hoof, resulting from chronic foot rot, must be pared and dipped in a formalin solution as the first step in treating this disease. Prompt, thorough treatment of each animal in the flock is necessary to prevent serious infections.

Editor's Note: Dr. Heishman is the author of *Foot Rot in Sheep*, West Virginia University Agricultural Experiment Station Circular 103, which is available at County Agricultural Extension offices.

Circular 103 gives complete details of the diagnosis and treatment of foot rot.

FIGURE 1. This creep, used in the experiment, is constructed so that calves may enter and get to the supplemental ration while their dams cannot. Creep feeder is built on skids, can be easily towed from pasture to pasture with farm tractor.

DOES "CREEP FEEDING" PAY?

by C. J. Cunningham,
G. C. Anderson, and E. A. Livesay

FEEDER calves provide one of the most important sources of income to livestock producers in West Virginia. Calves of high quality have always demanded a premium in price, thus making it profitable for the producer to raise as good a calf as possible.

The feeding value and carrying capacity of many pastures in West Virginia are reduced during the latter part of July and August. Consequently cows cannot produce as much milk for their calves, and the calves cannot get as much forage from the pasture. Because of this shortage of milk and forage, many calves grade good or medium at sale time when they could be graded choice or fancy, if there had been enough to eat.

Feeding grain to such calves offers a possible solution to this problem. Six years ago, a study was started to determine what influence the feeding of grain would have on the grade and weaning weight of calves on pasture with their dams.

A "creep-feeder" was constructed for the experiment (Figure 1). This type of feeder is designed so that calves can "creep" in and eat

at the feed trough while their dams cannot.

In the spring of 1951, 30 high-grade Hereford cows were selected from the beef cattle herd at Reymann Memorial Farms, a substation of the West Virginia University Agricultural Experiment Station. The cows were divided equally into two groups—A and B. They were assigned to either group in accordance with their age, weight, parentage, reproductive efficiency, and weight of calves at birth and at weaning. These assignments were made so as to make the two lots as nearly equal as possible insofar as reproduction performance is concerned.

Two similar pastures, each supplying approximately 1.5 acres per cow and calf, were provided. The grazing season began about May 1 each year. In order to dilute the effects of possible pasture differences over the five-year period of the experiment, the two experimental groups were alternated between the two pastures at two-week intervals.

During the first summer of the experiment, the calves produced by cows in Group A were designated to receive the creep ration, whereas the Group B calves were designated

as controls and received no additional feed. The next year the procedure was reversed. This rotation was carried out during subsequent years of the experiment.

The creep-ration was made available, free-choice, to the calves that were to receive it when they were three months of age. It was discontinued when they were weaned, usually at an age of 214 days. The ration consisted of six parts cracked corn and one part soybean oil meal, placed fresh in the feeder each week.

Table 1 shows that the rate of gain was increased by creep feeding. The creep-fed steers had an average daily gain of 2.3 pounds, whereas the steers receiving no creep ration gained an average of 1.7 pounds daily. Creep-fed heifers made an average daily gain of 2.1 pounds, and non-creep-fed heifers gained an average of 1.6 pounds daily.

The greatest average daily gains in the creep-fed calves occurred during the latter part of the feeding period, whereas average gains in the non-creep-fed animals decreased as the summer progressed, showing the value of the supplemental ration.

At sale time creep-fed calves graded an average of choice plus over

C. J. CUNNINGHAM is Associate Animal Husbandman in Charge of Reymann Memorial Farms. G. C. ANDERSON is Animal Husbandman. E. A. LIVESAY was formerly Animal Husbandman.

Editor's Note: Complete details concerning this creep-feeding trial will soon be available in an Experiment Station bulletin now being prepared for publication. Plans for constructing a creep feeder, as is shown in Figure 1, are available upon request from the Experiment Station.

TABLE 1. INFLUENCE OF CREEP FEEDING ON RATE OF GAIN (FIVE-YEAR AVERAGE, 1951-55)

	NON-CREEP-FED		CREEP-FED	
	STEERS	HEIFERS	STEERS	HEIFERS
Total number of calves	36	38	42	32
Average initial weight (lbs.)	209.5	208.2	208.9	200.9
Average weaning weight (lbs.)	428.4	426.0	511.4	499.2
Average total gain per calf (lbs.)	218.9	217.8	302.5	298.3
Average daily gain from initial weight to weaning ¹	1.7	1.6	2.3	2.1

* Average age of calf was 214 days.

¹ An average of 131 days.

the five-year period. Non-creep-fed animals graded an average of good plus (Table 2).

The creep-fed steers returned an average of \$17.75 per head above feed costs during the trial, whereas the heifers lost an average of \$1.29 per head. If there had been an equal number of steers and heifers in the experiment, creep feeding would have increased the average return per calf by \$8.23. Over a period of years the calf crop in beef herds will be half male and half female.

Each of the 74 calves in the experiment consumed an average of 519.4 pounds of feed, or a daily average of 3.96 pounds. At \$3.87 per hundred pounds, the total average feed cost per calf was \$20.44. The average length of the feeding period was 131 days.

The value of creep feeding varied widely from year to year during this study. Differences in selling prices and pasture conditions influenced the results. In dry years when pastures were shorter than usual, the creep-fed calves ate more and showed a greater net return above feed costs, since grade and weight were greatly improved by this supplemental feed. In such years, creep feeding was found to be especially beneficial.

NEMATODES

(continued from page 3)

to kill. Their skins appear to be impervious to almost everything.

The life span of the nematode varies from a few weeks to a few months. A female root-knot nematode may lay as few as a hundred eggs in the course of her life, but then again, if she is industrious, she may lay 1,000 eggs.

Nematodes were probably feeding on the roots of the Tree in the Garden of Eden. But, by the nature of their way of living in the soil, they avoided discovery for centuries. In fact, even today, little is known of their biological processes in the soil. Our inability to see and observe what happens to plant roots growing in the soil has made a thorough study of nematodes impossible.

Great strides have been made in soil fertilization, selection of adapted and resistant varieties, and the use of insecticides and fungicides. Damage by plant diseases and insects has been avoided in many cases. For many years, such damage masked the damage done by nematodes. Now we are able to more successfully measure the influence of

TABLE 2. INFLUENCE OF CREEP FEEDING ON CALF GRADE (FIVE-YEAR AVERAGE, 1951-55)

GRADE	NON-CREEP-FED		CREEP-FED	
	STEERS (36)	HEIFERS (38)	STEERS (42)	HEIFERS (32)
Fancy	1	2	16	9
Choice	17	17	24	20
Good	17	18	2	3
Medium	1	1	0	0
Average grade*	2.5	2.53	3.33	3.19

*The following values were assigned to the various grades: Fancy—4, choice —3, good —2, medium—1.

nematodes on plant growth and yield, and to improve and develop measures for their control. The control of nematodes offers a means of increasing our agricultural production from land now under cultivation. It is an area of agricultural science that has not yet been exploited.

Use Crop Rotation

The least expensive method of controlling nematodes at present is by rotation of crops or garden sites. Closely related plant species should not be grown on the same site more often than once every four years. This may not afford complete control, but it will reduce nematode damage.

Perhaps the most effective method of nematode control is to treat the soil with chemicals. There are several effective compounds on the market today. Some of these are DD and Nemagon, manufactured by Shell Chemical Company; MC 2, Fumazone, and Dowlume, manufactured by Dow Chemical Company; Mylone, manufactured by Union Carbide Chemicals Company; and Vapam, manufactured by the Stauffer Chemical Company.

The compound selected for use will depend upon the nature of the problem, the areas to be treated, the crops to be grown, the equipment and labor available, the availability of materials, and whether or not weed control is also desired. Some of these materials control weeds as effectively as regular herbicides.

Vapam, at the present time, is one of the best materials for use in home gardens. It is easy to apply on small areas, affords control of most weeds, kills nematodes and soil fungi, and is less toxic to humans than some of the other materials.

Use Caution

Using chemicals to control nematodes, as is the case with all agricultural chemicals, must be done with care. It is necessary to carefully follow directions in order to avoid

health hazards and damage to plants. Chemical control of nematodes should not be started until after the soil has warmed up in the spring, and seeding must wait until two or three weeks after the chemical has been applied. This will prevent damage to seeds.

Specific instructions for the use of these materials may be obtained from your County Agricultural Extension Agent, or the Department of Plant Pathology, Bacteriology, and Entomology, West Virginia University, Morgantown. It is a good idea, before starting any extensive chemical nematode control program, to contact one of these specialists.

FOOT ROT

(continued from page 5)

taken to prevent infection from the paring. Dip the diseased foot in a 50 per cent solution of formalin. This can be easily done by filling a No. 2 can one-third full of the formalin solution and putting the pared foot in it. Each foot should be kept in the solution for 30 seconds. This treatment will help in checking bleeding, serve as a disinfectant, and will toughen any exposed soft tissues. To be most effective, the formalin should be applied before the exposed tissues become covered with dirt.

Following the inspection and trimming of each foot, all sheep in the flock should be walked through a suitable antiseptic solution. The flock should then be placed on ground where diseased sheep have not been for at least two weeks.

Preparing the Solution

The 50 per cent formalin solution used in treating the pared feet of individual sheep is prepared by mixing equal parts of water and a commercial grade of 36 per cent formaldehyde solution. This solution should be handled with care since it is poisonous if taken internally.

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Infectious Synovitis

In 1951 a new disease, infectious synovitis, appeared in broiler and replacement flocks in West Virginia. At the West Virginia University Agricultural Experiment Station, the causative agent was grown in embryonating chicken eggs. After this method of growing the agent was perfected, a means of conducting experimental work was available.

Part of this research effort was applied to finding a method of controlling the disease in young flocks. The findings of this portion of the study are explained by Dr. Damon Shelton, agricultural biochemist. Dr. Shelton is a member of the research team which isolated and identified the virus-like agent which causes infectious synovitis.¹ This team is still conducting an intensive study of the disease.

Although considerable progress has been made in learning about infectious synovitis and how it may be controlled, additional work is needed to determine the mode of transmission and a method of testing for it.

CONTROL STUDIES

by D. C. Shelton,
Agricultural Biochemist

IN 1954 an unidentified disease-causing agent was isolated from broiler chicks grown in West Virginia. This agent caused the disease now known as *infectious synovitis*.

This descriptive name was given the disease because the infective agent caused an inflammation of the synovial membranes which surround the joints and tendons and of the bursal membrane which is located over the keel. Usually, the disease is recognized by the swellings which occur around the joints and the presence of a breast blister. However, there have been a few cases observed where no swellings were apparent.

In live chickens, the signs of infectious synovitis generally noticed are droopiness, leg weakness, pale combs, swollen hock joints, swollen foot pads, breast blisters, emaciation and dehydration. Many of these signs are seen only in severely infected birds. When the joints are cut open, a purulent or caseous exudate is found. Upon examination of the internal organs, swollen kidneys, enlarged or discolored livers and enlarged spleens are found

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¹At about the same time Dr. F. K. Willis, animal pathologist at the Texas Agricultural Experiment Station isolated and identified the organism. His findings agreed with those of the research team at West Virginia University.

OTHER POULTRY DISEASES

by N. O. Olson,
Animal Pathologist

NEWCASTLE disease of poultry was first diagnosed in West Virginia in 1917. It soon became evident that work was needed to determine the extent of this disease in the State, how it spreads, and ways to control it. For this reason, research was initiated in 1948.

The initial work was to determine the extent of Newcastle disease in poultry flocks in West Virginia. Our laboratory found that both Newcastle and infectious bronchitis were widespread. Vaccines are now available for both of these diseases. When properly used, they have provided satisfactory control, although they have not produced complete immunity.

Numerous outbreaks of a respiratory infection appeared in 1919-50, in which Newcastle disease or infectious bronchitis was demonstrated. However, chickens in these outbreaks did not recover in one to two weeks as had been the case in previous outbreaks of these diseases. It was established in this laboratory that chronic respiratory disease (CRD), caused by pleuropneumonia-like organisms (PPLO), was complicating the attacks of Newcastle and infectious bronchitis.

The PPLO alone may not cause noticeable signs of disease in chick

(continued on page 11)

Although much has been learned about infectious synovitis, many questions remain to be answered about this serious poultry disease

ONE of the first steps taken by pathologists when a new and important disease appears is the isolation and identification of the causative agent. After this is done a thorough laboratory study of the agent can be made, and the most effective control program developed. When infectious synovitis was found in West Virginia poultry flocks in 1954, its cause was un-

known. Pathologists at the West Virginia University Agricultural Experiment Station immediately set up experiments to identify the disease. They now know that it is caused by a filterable agent which resembles a large particle virus. They have isolated it so that they can study it in controlled environments in the laboratory. The results of control studies, in both the laboratory and

with large numbers of birds in the field, are presented on the opposite page.

There are a number of questions about infectious synovitis that have not been answered, and there is much laboratory work yet to be done. The laboratory processes involved in the isolation and storage of the infectious synovitis organisms are shown below.

(1) Infective material, which carries the infectious synovitis agent, is taken from the hock joint of a chicken having the disease. (2) Fertile eggs, after 7 days in a forced-draft incubator, will be used to culture the material. (3) The eggs are painted with iodine and a hole is drilled through to the shell membrane. (4) The hock joint material is inoculated into the yolk sac. (5) This is done in a special room to prevent contamination by bacteria. After inoculation, the eggs are placed back in the incubator. (6) The yolk material is taken from each egg as soon as the embryo dies, usually 7 to 13 days following inoculation. This material contains the

infectious synovitis agent. (7) The chick embryos are examined for lesions typical of infectious synovitis. (8) The membrane that surrounded the embryo in the egg is examined for lesions. (9) The yolk material is labeled, recorded, and placed in a deep freeze for storage at -20°C . (10) For longer periods of storage, the virus material is frozen at -79°C , dried, and sealed under vacuum to preserve it. (11) Dried virus is stored in a freezing unit that maintains a temperature of -63°C . (12) The chickens used in synovitis experiments are raised in special cages in an isolated room to prevent unwanted infections and other possible hazards.

SYNOVITIS CONTROL

(continued from page 8)

to occur frequently. Yet, among a group of infected chicks, there may be many which appear to have none or only minor lesions of these organs.

In the blood, the hemoglobin and the number of red blood cells is usually less than normal, whereas the number of white blood cells is greater than in normal chicks. The percentage of monocytes, heterophils and immature white blood cells is greater, whereas the percentage of lymphocytes is smaller in chicks with this disease than in normal, healthy chicks.

Virus Disease

Infectious synovitis is a disease caused by a filterable agent which appears to be a large particle virus. The following observations lead to this conclusion: (1) The agent does not grow in cell-free medium; (2) the agent passes through a bacterial filter; (3) certain antibiotics prevent growth and multiplication of the agent; and (4) the particle size of the agent, as determined from electron photomicrographs, is within the range of that of a large particle virus.

PPLO Synovitis

Another agent, pleuropneumonia-like organisms (PPLO), has been found that will cause a synovitis when experimentally injected into the foot pad of the chick. The practical significance of this type of synovitis has not been fully determined. The inflammation caused by these PPLO is not as severe as that caused by the infectious synovitis agent. The chicks with PPLO synovitis do not have the caseous exudate, extreme emaciation and dehydration so frequently seen in the infectious synovitis. The other signs such as breast blisters, lesions of the internal organs and changes in the blood components are generally absent or less severe than those of infectious synovitis.

The method by which infectious synovitis spreads under field conditions is unknown. Some evidence indicates that it may be passed through the egg. Infected birds can apparently transmit the infection to other chicks in the same pen; however, under these conditions spread is usually slow.

In the laboratory, chicks have been experimentally infected by inoculation of joint fluid or embryo-grown material by the following routes: footpad, hock joint, air sac, vein or sinus. Chicks placed in the

same pen with experimentally-infected ones required 25 days or longer to develop signs of the disease. Only a small number of chicks seem to contact the disease in this manner.

Measures for the control of infectious synovitis have been investigated at the West Virginia University Agricultural Experiment Station since the disease was recognized in 1951. First, studies were made to see if any of the antibacterial drugs were promising in the prevention and treatment. Aureomycin, Terramycin, Achromycin, Chloromycetin, erythromycin, magnamycin, penicillin and streptomycin were the anti-

biotics tested. Furazolidone (NF-180) and furadantin, (NF-153) were the nitrofurant drugs tested. Of these drugs, Aureomycin, when given continuously in the feed, was the most effective. Terramycin was only slightly less effective. Achromycin and furazolidone were effective but to a lesser extent.

Laboratory results showed that best control was obtained when medication was started before the chicks were experimentally infected. If the infection became well established, Aureomycin controlled further spread of the disease and suppressed some of the symptoms, but recovery was not complete. There-

FIGURE 1. These broilers are infected with infectious synovitis. Swollen joints, breast blisters, and droopiness are some of the early symptoms of this disease.

FIGURE 2. The broilers, although inoculated with the infectious synovitis agent, were not seriously infected because they were receiving Aureomycin in their ration.

fore, medication under field conditions must start as early as possible in the life of the chick.

In studies with approximately 6,000 chicks under laboratory and controlled-field conditions, very good control of infectious synovitis has been obtained with 100 grams of Aureomycin per ton of feed when given continuously and started before the infection became established. In experiments using 50 grams Aureomycin per ton of feed, satisfactory control of the infection was obtained in most cases, however, in a few chicks a low level of infection was apparent. This concentration of Aureomycin prevented spread to uninfected pen mates. However, the presence of other infections such as chronic respiratory disease causes additional stress. Under such conditions 50 grams of the drug is inadequate. Certainly, this level of medication appears to be the minimum effective level. Considering the cost of medication, the narrow margin of profit and the efficacy against the disease, the 50 grams of Aureomycin per ton of feed fed continuously provided the cheapest means of prevention and control.

There is no cheap method of handling an outbreak of infectious synovitis. Once the disease is well established in chicks no known drug provides effective treatment. After lengthy study, it seems that the best method to handle such an outbreak is to cull the severely infected chicks and start medication for the remainder of the flock. This prevents further spread and may help the mildly infected chicks. The level of medication needed depends upon the condition of the chicks, but continuous use of 150 to 200 grams of Aureomycin per ton of feed given until the birds are marketed has been effective in a number of cases.

OTHER DISEASES

(continued from page 8)

ens unless some other disease or stress factor is present. Infectious bronchitis is the most common of these stress factors, although other diseases and even poor management practices can be the cause.

Attempts to control CRD by preventing stress factors such as Newcastle disease and infectious bronchitis by vaccination have not been entirely satisfactory. For complete control of CRD, the PLO must be eliminated from breeder flocks. This has been done on an experimental basis only; commercially, birds free of CRD are not available.

AZALEA RESEARCH

(continued from page 4)

beneath the light, and the other end 30 inches away from the light. The plants in each row that were directly under the lamps received maximum light intensity during the experiment, whereas those on the other end of the row received the minimum, and the plants in the center of the rows received varying degrees of light intensity, depending upon their distance from the lamps. This supplementary light was used day and night for eighteen months.

Light Aids Growth

It soon became apparent that the plants directly under the lights, receiving the maximum light intensity, were growing faster and had more and larger leaves and longer internodes than those plants on the other ends of the rows. During the short days of late winter these differences were marked. Then as the days grew longer in the spring, providing more sunlight, all plants made rapid growth and the differences among plants exposed to different intensities of supplementary light were less pronounced.

In June, seven months after sowing, all but three plants of each cross were moved to an irrigated field plot at the Reedsville Experiment Farm. Those plants that were retained were left in the greenhouse, still receiving supplemental light.

Good Bushy Plants

Most of the seedlings, when transplanted to the field, had a single unbranched shoot. Under field conditions, this shoot soon became dormant and the one to many branches which developed from axillary buds near ground level grew until the cold nights and short days of September. At this time the branches usually exceeded the primary stem in length by several inches, making a good bushy nursery plant.

The plants remaining in the greenhouse developed a similar number of branches, which developed poorly, probably because of crowding. The primary shoot, instead of becoming dormant, continued to grow and reached a height two to three times that of the tallest stem of the field plants.

There was no significant difference between the number and diameter of the branches of the three plants growing under continuous light and the corresponding plants in the field. The primary differences were in the type of growth, and the

readiness of the greenhouse plants to flower.

Two of the mollis hybrids growing in the greenhouse reached sufficient height and maturity to form flower buds, the first of which opened normally February 2, 1956—14 months after seeding and 20 months after pollination of the parent plant.

These results indicate that it may be possible to reduce the time required for certain phases of this azalea breeding project by the use of continuous light, producing a generation every two instead of every four to five years. Spring transplanting of seedlings directly from the greenhouse to the field will conserve greenhouse space and eliminate the entire operation of transplanting into beds, and then again to the field.

Similar work is continuing with both azalea and holly breeding.

FOOT ROT

(continued from page 7)

and following prolonged contact, it will cause burning and hardening of the skin. The fumes from this mixture will irritate the eyes and nose, but will not cause definite injury unless exposure is prolonged.

Two Solutions Useful

Two solutions widely used in the foot bath for treating foot rot are 10 per cent formalin and 30 per cent copper sulphate. The formalin foot bath solution is prepared by mixing one gallon of a commercial grade of 36 per cent formaldehyde solution with nine gallons of water. The 30 per cent copper sulphate solution, also known as bluestone solution, is prepared by using 2½ pounds of the chemical, preferably in powdered form, for each gallon of water. The use of warm water will speed the dissolving of the copper sulphate. This solution should be prepared in earthenware or wooden containers because copper sulphate corrodes most metals.

These solutions, too, are dangerous and must be handled properly in order to prevent internal poisoning or injury. Care should be taken to prevent them from contacting the skin.

Foot Bath Easy to Build

A simple but satisfactory foot bath is shown in Figure 2. The trough part of this arrangement is constructed of inch oak lumber in the following inside dimensions: 10 feet long, 11 inches wide, and 6

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FOOT ROT

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inches deep. The sides, which serve to guide the sheep as they go through the trough, are 10 feet long, 2½ feet high, and are sloped outward so that they are 20 inches apart 2½ inches above the bottom of the trough. A working drawing of the foot bath is shown at right.

When using the foot bath, the trough should be filled to a depth of two inches with either of the solutions, and this solution should be replenished from time to time during use. Affected sheep should stand in the solution for one to two minutes, while apparently normal sheep can walk through the solution.

Use Weekly

The entire flock should be driven through the foot bath at weekly intervals as long as evidence of foot rot exists. Then they should be treated at two-week intervals for at least four times. Two weeks after the initial treatment the feet of each sheep should be examined again to detect and expose any pockets of infection that may have been overlooked at the first trimming.

It is essential that treatment be continued until all evidence of the disease has disappeared, if foot rot control is to be successful. Continual alertness for subsequent infections is also important.

An ounce of prevention is worth more than a pound of cure. This

certainly applies to foot rot in sheep. A few simple precautions can save a load of trouble.

Buy Clean Replacements

Buy sheep that are from clean flocks if possible. If the histories of flock additions are unknown, examine and trim each foot, put the sheep through a foot bath, and keep them in separate pens or pastures for a least a month before turning them in with the flock.

Keep in mind that foot rot is caused by germs which die in a relatively short time unless they are near infected sheep. If you have areas where infected sheep have been running, wait for at least a month before putting clean sheep there.

Special attention should be given to new rams. A ram with diseased feet can be useless, and one sheep infected with the germ of foot rot can spread the disease to an entire flock.

June 23, 1958

ADMINISTRATION

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A. H. Van Andingham, Ph.D.,
Acting Director

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C. B. Koch, M.S.E., Asst. For.
W. H. Reid, M.S.E., Assoc. For.
E. H. Tryon, Ph.D., Forester

(continued on page 14)

These station projects were active in the year 1956 - 57

(Abbreviations of funds supporting projects: H-hatch; NE-Northeastern Regional Research; NEM-Northeastern Regional Marketing Research; S-State; 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

Unidentified growth factors in proteins (H 5)
Prevention of rancidity in carcass fats of turkeys and hogs (H 6; coop. Poultry Husbandry)
Broiler rations for high efficiency (H 17; coop. Poultry Husbandry)
Measuring the nutritive value of forage crops (H 46; coop. Animal Husbandry)
The relationship of plasma protein-bound iodine to productive potential in dairy cattle (H 96, NE 30; coop. Dairy Husbandry; Animal Husbandry)
Metabolic interrelationships between protein and bound ascorbic acid (H 103, NE 37; coop. Home Economics, University Health Service)
Miscellaneous chemical investigations (S 5)

Agricultural Economics and Rural Sociology

Organization as a factor affecting 4-H Club work (H 24; coop. U. S. Extension Service)
The diffusion of recommended farm practices in two West Virginia counties (H 25; coop. U. S. Extension Service)
Lime, fertilizer and barnyard manure used on West Virginia farms (H 41; coop. Agronomy and Genetics)
Segregating and pricing poultry meat and egg quality (H 60, NEM 11; coop. USDA)
Marketing peaches (H 64)
The physical and economic input-output relations of forage and other feed production in the Appalachian Valley (H 70; NE 18; coop. Agronomy and Genetics)
Rural population dynamics (H 71, NE 31; coop. Home Economics, Agricultural Research Service)
Improvement of market procedures and outlets for West Virginia livestock (H 73, NEM 7)
The production-consumption balance and efficient utilization of milk for non-fluid uses in West Virginia (H 75, NEM 13)
The effect of quality factors and price on apple sales (H 84, NEM 9; coop. Horticulture)
The economics of broiler production on West Virginia farms (H 85; coop. Poultry Husbandry, Agricultural Extension Service)
Marketing lambs in West Virginia (H 87, SM 7; coop. Southern Region)
Marketing nursery crops in West Virginia (H 94, NEM 15)
Evaluation of the effects of retail vending machines on the sale of fluid milk, and cost and efficiency of distributing milk through vending machines (H 91, NEM 14; coop. AMS, USDA)
Improved marketing for cut flowers and potted plants (H 95, NEM 8)
Handling methods and cost in packing apples (H 97, NEM 19; coop. Horticulture)

Economics of packaging selected food (H 98, NEM 17)
Improving the usefulness of livestock marketing information (H 99, SM 20; coop. Southern Region)
Effects of national production control and price support programs on incomes of farmers in the Appalachian area (H 100, TRM 1; coop. Interregional)
An economic evaluation of the use of irrigation on West Virginia farms. (H 101, NEM 33)
The influence of population change and migration upon agriculture and rural community life in West Virginia (H 102, NE 31)
The marketing of lime and fertilizer in West Virginia (Title II, ES 259, coop. Farmer Cooperative Service, USDA)

Agricultural Engineering

Determination of factors influencing the drying rates of grains (H 15; coop. Engineering Experiment Station)
Investigations to determine the optimum stall for dairy cows. (H 47; coop. Dairy Husbandry)
To determine the most efficient and economical methods of removing manure and litter from dairy barns (H 48; coop. Dairy Husbandry, Agronomy and Genetics)
Poultry house design for West Virginia (H 65, NE 8; coop. Poultry Husbandry)
The mechanization of forage crop harvesting, processing, storing, and feeding (H 69, NE 13; coop. Animal Husbandry, Dairy Husbandry, Reedsville Farm)
Factors involved in the use of supplemental irrigation under West Virginia conditions (H 92, NE 22; coop. Agronomy and Genetics)
Agricultural climatology of West Virginia (H 105, NE 35)
Study of the design of operating characteristics of a grain conveyor using fluidization principles (S 63; coop. Engineering Experiment 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 (19)
The lime requirements of a number of West Virginia soil types (H 20)
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)
Forage crops, varieties, strains, and species for West Virginia (H 54, NE 10; coop. USDA)

Alfalfa breeding and genetic investigations (H 66, NE 28)

The influence of several management practices on the performance of alfalfa and ladino clover grown alone and in association with grasses (H 68, NE 29)
Factors affecting the herbicidal activity of some chemicals applied to the soil surface (H 76, NE 12)
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)
Breeding winter barley for high yields and powdery mildew resistance (H 86, NE 23; coop. Plant Pathology)
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)
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)

Animal Husbandry

The relation of birth weight within breeds to growth rate of pure-bred mutton-type lambs (H 12)
Nutritional requirements of swine for growth (H 22)
Breed as a factor in the production of ewes retained for flock replacement and for the production of market lambs and wool (H 23)
Nutritional requirements of the brood sow (H 40)
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 Husbandry, Artificial Breeder's Coop.)
Avian infectious anemia-synovitis (H 88, NE 5; coop. Agricultural Biochemistry)
Reproductive efficiency of beef cattle (H 50)
Exploratory or preliminary investigations on diseases, feeding and management of farm animals (S 89)
Lat 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 114; 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 Husbandry)

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STATION PROJECTS

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Dairy Husbandry

- The transmission of milk and butterfat production and body conformation of dairy sires (H 7; coop. USDA)
- The keeping quality of milk in home refrigerators (H 11)
- The effect of water hardness on cleaners for dairy utensils (H 26)
- 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 Husbandry)
- 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)
- The fat globule membrane protein of milk (H 110)
- Preliminary or exploratory investigations on diseases, feeding and management of dairy cattle (S 80)
- 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 Husbandry)

Forestry

- Efficient forest management practices for West Virginia cut-over and burned-over hardwood forest lands (H 36; coop. W. Va. Conservation Commission)
- Annual repellents on hardwood forest plantations (H 37)
- A survey of multiflora rose plantings in West Virginia, with special reference to growth characteristics and spreading tendencies (H 42; coop. SCS, Conservation Commission)
- Timber management for the market demands in southern West Virginia forests (H 56; coop. Island Creek Coal Company)
- Marketing forest products in West Virginia (H 61, NEM 6; coop. Agricultural Economics)
- Factors affecting natural regeneration in upland oak types (H 67; coop. Plant Pathology)
- 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 45)
- Determination of optimum growth of West Virginia hardwoods (S 60)
- Wood pins for mine roof support (S 102)
- Conversion of unproductive hardwood stands to desirable forest types (S 107)
- Planting forest trees in West Virginia (S 108)
- Strength and related properties of *Ailanthus altissima* grown in West Virginia (S 110; coop. College of Engineering)

Home Economics

- Qualities in blouses: the relations of those considered in selection to the satisfactions found in wear (H 77, NE 19)

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 (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, linish and maturation of apples (H 39)
- Selection, breeding and propagation of nursery crops (H 59)
- Low-temperature storage of prepackaged cut flowers and prepackaging materials (H 91)
- 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 trails (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)

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 seepage water in relation to plant growth and soil conditions (H 13)
- Decay as a factor in sprout reproduction of yellow poplar (H 14; coop. Forestry)
- 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)
- The cause of, and remedy for, red clover failures in West Virginia (H 51; coop. Agronomy and Genetics)
- Biology and control of tree-wilt pathogens (H 57, NE 25; coop. W. Va. Dept. of Agriculture, W. Va. Conservation Commission)
- Improvement of tomato varieties for West Virginia (H 58; coop. Horticulture)
- The symbiotic relationships between microorganisms 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 31; 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 (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)
- Miscellaneous plant disease investigation (S 19)
- Miscellaneous insect and insecticide studies (S 24)

Poultry Husbandry

- Methods of feeding growing pullets (H 10; coop. Reymann Farms)
- Simplified methods of improving initial interior egg quality and shell quality through selective breeding (H 41)
- Improving the reproduction performance of turkeys (H 49)
- Breeding for efficient production of eggs and meats (H 74, NE 6; coop. Reymann Farms)
- Broiler management investigations (S 101; coop. Reymann Farms)
- Development of satisfactory broiler rations (S 105; coop. Reymann Farms)
- Intermingled versus individual pen rearing for broiler strains (S 119; coop. Reymann Farms, Dairy Husbandry)

University Experiment Farm

- The effect of chemical spray schedules on the quality and quantity of apples produced (H 83; coop. Plant Pathology, Entomology Res. Branch of USDA)
- Apple and peach insect control (S 91; coop. Bureau of Entomology and Plant Quarantine)
- Delicious budspout evaluation tests (S 115)

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(continued from page 12)

HOME ECONOMICS

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Financial Statement for the Year July 1, 1956, to June 30, 1957

CLASSIFICATION OF RECEIPTS AND DISBURSEMENTS	HATCH	REGIONAL RESEARCH FUND	TITLE II	NON- FEDERAL FUNDS	TOTAL
RECEIPTS					
Received from the Treasurer of the U. S.	466,076.37	92,280.00	2,500.00		560,856.37
State appropriations:					
Main station .....	.....	.....	.....	257,905.00	257,905.00
Special (Oak Wilt Research) .....	.....	.....	.....	10,000.00	10,000.00
Special endowments, fellowships and grants:					
Foundations .....	.....	.....	.....	9,000.00	9,000.00
Industry .....	.....	.....	.....	8,381.99	8,381.99
Sales .....	.....	.....	.....	160,830.60	160,830.60
Balances forward July 1, 1956	269.63	.....	.....	195,618.04	195,887.67
TOTAL AVAILABLE	466,346.00	92,280.00	2,500.00	641,735.63	1,202,861.63

DISBURSEMENTS					
Personal services	358,150.39	49,220.29	1,025.00	247,082.41	655,478.09
Travel	10,946.46	11,497.90	1,453.87	4,198.86	28,097.09
Transportation of things	122.45	144.75	.....	1,033.58	1,600.78
Communication service	990.94	84.98	.....	1,322.29	5,398.21
Rents and utility services	951.50	2,848.81	.....	18,173.01	21,973.32
Printing and reproduction	9,236.26	694.78	.....	1,742.90	11,674.94
Other contractual services	2,686.66	1,667.37	.....	18,483.60	22,837.63
Supplies and materials	46,061.07	15,955.35	.....	96,882.68	158,899.10
Equipment	29,066.47	8,678.09	.....	31,232.11	68,976.67
Lands and structures (cont.)	1,876.00	.....	.....	.....	1,876.00
Taxes and assessments	5,933.37	454.82	21.13	1,159.34	7,568.66
TOTAL DISBURSEMENTS	466,341.59	91,247.14	2,500.00	424,310.78	984,399.51
REVERTED BALANCES	4.41	1,032.86	.....	.....	1,037.27
NON-REVERTED BALANCES AVAILABLE FOR 1957-58				217,424.85	217,424.85

M. E. Gallegly, Jr., Ph.D., Assoc. Pl. Path.
 Edwin Gould, B.S., Entomologist
 H. L. Hansen, Ph.D., Asst. Entom.
 V. G. Lilly, Ph.D., Physiologist
 E. J. Savage, B.S., Grad. Res. Asst.
 A. L. Shigo, B.S., Grad. Res. Asst.
 S. E. Tamburo, M.S., Grad. Res. Asst.
 R. P. True, Ph.D., Pl. Path.
 Phyllis I. Vannoy, B.S., Tech.
 H. A. Wilson, Ph.D., Bacteriologist
 K. J. Kessler, Grad. Res. Asst.
 F. S. Chu, B.S., Grad. Res. Asst.
 R. W. Roncadori, B.S., Grad. Res. Asst.

POULTRY HUSBANDRY

Homer Patrick, Ph.D., Poul. Husb.
 M. D. Alt, B.S., Grad. Res. Asst.
 L. F. Cassell, B.S., Asst. in Poul. Husb.
 T. B. Clark, M.S., Assoc. Poul. Husb.
 Anthony Ferrise, B.S., Grad. Res. Asst.
 H. M. Hyre, M.S., Assoc. Poul. Husb.

MISCELLANEOUS

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

Insect Surveys . . . an important crop protection service

by C. K. Dorsey, Entomologist

INSECT pest surveys, which are an important part of the crop protection service provided for the agricultural interests in West Virginia, are comparatively new.

In the past there has been a form of insect pest reporting by farmers, county agents, experiment station workers, and others, but at best it was inadequate largely because of lack of organization and consistency.

The principal source of information about the status of crop pests throughout the nation comes from collaborators, experiment station entomologists, state entomologists, and state universities. The United States Department of Agriculture has been responsible for the survey of insect pests since 1921. The agency directly responsible for this work has acted as a type of clearing house for information concerning pest conditions throughout the country. At the present, this work is

done by the Plant Pest Survey Section, Plant Pest Control Division Agricultural Research Service, Washington 25, D. C.

The Plant Pest Survey Section receives, analyzes, and abstracts this information. Data considered to have permanent value are filed so that they are readily available. This includes data pertaining to the occurrence, distribution, ecology, host plant relationships, and other pertinent biological facts of nearly 25,000 species of insects that occur in the United States.

A current index file is maintained of the host plants from which each insect species has been collected, and of the pests recorded as attacking certain plants of economic importance. This information is also abstracted and published weekly in the *Cooperative Economic Insect Report*. This valuable service (continued on next page)

Insect Surveys (con'td)

ENTOMOLOGISTS go to the field to find species, number, of crop pests.

enables workers in agriculture and related fields to keep informed about the status of pests of economic importance throughout the nation.

State Coordinator

Most states have a coordinator of pest information.¹ The county agents, entomologists, extension workers, experiment station personnel, farmers, and property owners supply pest information to the State Coordinator. He in turn analyzes and abstracts the data and each week forwards the pertinent facts to the Plant Pest Survey Section in Washington.

During the winter season special surveys are conducted to get information concerning pests of stored grain and other stored products, forest insects, livestock pests and pests of many other commodities. From November until June, William Gillespie devotes his time to insect survey work in the State.

From time to time, state workers will be assisted by specialists from the United States Department of Agriculture. For example, in 1956

U.S.D.A. specialists helped in conducting a survey of Khapra beetle in both commercial and on-farm grain storage facilities. Similar surveys were conducted for the spotted alfalfa aphid and the alfalfa weevil. There is a full-time U.S.D.A. entomologist at the Kearneysville Substation whose duties are to survey and conduct research with those insect pests which damage fruit.

Insect Research

Interest in crop protection in West Virginia is being stimulated greatly at present by the research of entomologists of the West Virginia University Agricultural Experiment Station. Their work pertains to the control of important insect pests on economically important crops and animals. The workers began the present program by first conducting special surveys over the state to determine the progress, distribution, and importance of principal pests of crops. These surveys have provided the basis for planning experimental control studies and developing actual control methods. They help the farmers, stockmen, home owners,

fruit growers, and others to know how numerous their insect enemies are and the extent of the damage they are causing.

Weevil is Serious

Recently two important pests of alfalfa, new to West Virginia, were detected through these surveys. One, the Alfalfa Weevil, has done thousands of dollars worth of damage in the Eastern Panhandle (see Map). When the weevil was found, experiments were immediately set up to find the control procedures that would do the best job for West Virginia farmers. A very effective control method has been worked out, and has been published in Experiment Station Circular 104, entitled "Alfalfa Weevil Control in West Virginia." This circular gives a complete description of the weevil and its life cycle, recommendations for its control, and comparative results of the various control procedures tested.²

Aphid Damage Slight

The other pest revealed by the survey was the spotted alfalfa aphid. This insect was found in two southern counties. Fortunately, it has not as yet spread to other areas in sufficient numbers to cause economic damage. It must be watched closely, however, for if it does begin to threaten West Virginia hayfields, appropriate research will be necessary and effective control methods will have to be developed as soon as possible.

¹The State Coordinator of Insect pest information in West Virginia is Dr. C. K. Dorsey, entomologist of the West Virginia University Agricultural Experiment Station. His address is: Department of Plant Pathology, Entomology and Bacteriology, Room 316, Brooks Hall, West Virginia University, Morgantown, W. Va.

²This circular is available at County Agricultural Extension offices in the State, and will be mailed upon request from the Experiment Station in Morgantown. Other circulars published by Experiment Station entomologists are *Meadow Spittle Bug Control in West Virginia*, *Southern Corn Root Worm Control in West Virginia*, and *Termites and Carpenter Ants in West Virginia*. These circulars are also available at County Agricultural Extension offices.