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Science serves your farm.

H. R. Varney

Science

SERVES YOUR FARM

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WEST VIRGINIA UNIVERSITY AGRICULTURAL EXPERIMENT STATION

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Science SERVES YOUR FARM

Annual Report of H. R. Varney, Director West Virginia University Agricultural Experiment Station For the Period 1955-56

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on the calendar . . .

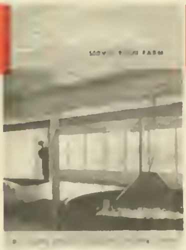
March
14 and 15—Mountaineer Chick and Egg Show

April
5—7th Annual Little Eastern National Livestock Show
12, 13—WVU Dairy Cattle Judging School
12—WVU Dairy Cattle Congress

June
14—Livestock Field Day, Reymann Memorial Experimental Farms

July
11—Agronomy Field Day, Ohio Valley Substation, Point Pleasant

on our cover



This 30 by 30-foot cinder-block poultry house is the second experimental poultry house to be constructed under the Hatch 41, NE-8 Project, "Poultry House Design for West Virginia." But unlike the first, which had no windows at all, this house features nine large insulated windows which face due South.

These windows permit the sun's rays to enter and warm the interior of the experimental house, creating a comfortable temperature for the birds and reducing the amount of artificial heat needed for brooding.

From September 1 to March 1, the sun will shine through the windows, covering the maximum amount of floor area at noon on December 21. The roof projects over the windows so as to shade them during the spring and summer months, March through August. Two 13-inch fans provide ventilation.

Housing is only a part of the research dealing with facilities for raising broilers and layers. Tests are being conducted with cleaners, roosts, feeders, and waterers that can be inexpensively constructed by the poultryman, and will serve to reduce the amount of labor needed to grow his birds.

personnel changes

The following staff members received promotions during the period July 1, 1955 to December 1, 1956: G. C. Anderson, Animal Husbandman to Animal Husbandman and Head of Animal Husbandry; K. L. Carvell, Assistant Forester to Associate Forester; H. C. Evans, Assistant Agricultural Economist to Associate Agricultural Economist; M. E. Gallegly, Assistant Plant Pathologist to Associate Plant Pathologist; C. B. Koch, Assistant in Forestry to Assistant Forester; D. A. Munro, Assistant Animal Pathologist to Associate Animal Pathologist; I. D. Porterfield, Associate Dairy Husbandman to Dairy Husbandman and Head of Dairy Husbandry; R. P. True, Associate Plant Pathologist to Plant Pathologist; and J. E. Welch, Assistant Animal Husbandman to Associate Animal Husbandman.

New appointments within our staff for the period July 1, 1955 to December 1, 1956 include R. O. Asplund, C. D. Campbell, S. B. Gross, Jean Jieh Lu, and W. E. Nutter, Assistants in Biochemistry; G. A. McLaren, Assistant Biochemist; L. M. Sizer, Assistant Agricultural Economist; Mary

(continued on page 11)

Ladino Clover-Grass Pastures--

TREAT THEM WELL

by O. J. Burger, Associate Agronomist and C. B. Speraw,
Assistant in Agronomy

LADINO CLOVER-grass mixtures properly fertilized and managed as this one will help maintain high milk flow and high beef and mutton production.

LADINO clover is one of our most important legumes in West Virginia and is usually included in pasture mixtures.

Ladino clover, as most legumes, responds to applications of phosphorus and potash, whereas grasses are especially responsive to additions of nitrogen. Whether nitrogen is of benefit to Ladino clover is still an open question. Ladino clover is usually grown with grasses. The addition of grasses to mixtures aggravates the fertilizer management problem.

A study of the response of Ladino clover-grass mixtures to the application of various ratios of fertilizers was initiated in 1951. The experimental plots replicated four times were established on Wheeling fine sandy loam at the Ohio Valley Experiment Station Farm at Point Pleasant, West Virginia. The results reported herein were obtained during the 1953 season.

Fertilizer Treatments

Ladino clover was seeded in combination with Lincoln bromegrass, reed canarygrass, Beltsville (now Potomac) orchardgrass, and Kentucky 31 fescue.

Three fertilizer treatments were applied to all mixtures in March, 1952, and were repeated in March, 1953. These treatments consisted of sufficient fertilizer to supply the following amounts of nutrients per acre: (1)—80 pounds of P_2O_5 (2)—80 pounds of P_2O_5 and 80 pounds K_2O; (3) forty pounds nitrogen, 80 pounds P_2O_5 and 80 pounds K_2O, and will be referred to at 0-80-0, 0-80-80, and 40-80-80 respectively. The same amounts of nutrients would be supplied by 400 pounds per acre of 0-20-0, 0-20-20, and 10-20-20 commercial fertilizers. Four harvests were made to simulate pasture management.

Samples were taken for estimation of dry matter. The botanical composition was determined by visual estimation of the dry matter sample. Protein analyses were made on the Ladino clover and grass fractions which were hand plucked from the individual plots.

Yield

Total and fraction yields in pounds dry matter per acre of the Ladino clover-grass mixtures during 1953 are reported in Figure 1. The total yields obtained from mixtures treated with 0-80-80 and 40-80-80 are similar and are greater across all mixtures than the yield obtained when treated with 0-80-0.

The Ladino clover in the mix-

(continued on page 11)

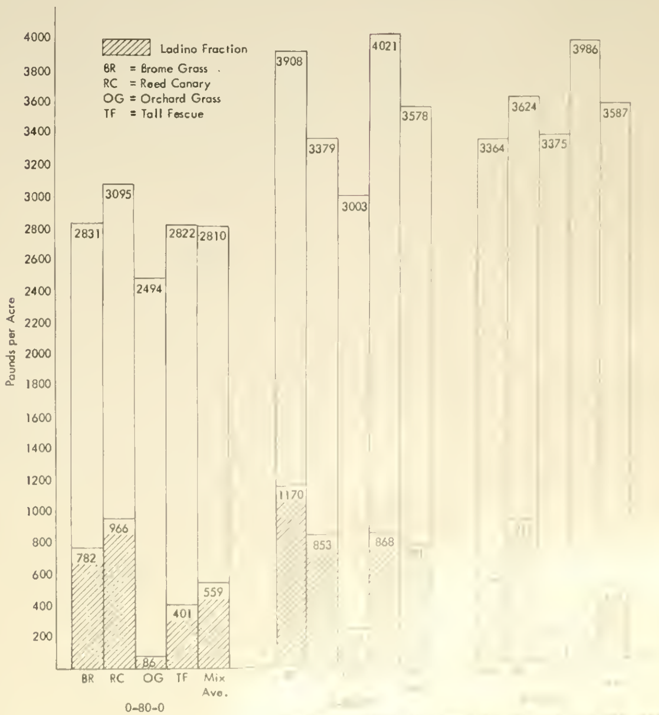


FIGURE 1. Total yields and [illegible] acre) of Ladino clover-grass mixtures tested [illegible]

DAIRY CALVES DO NOT BENEFIT FROM Cud Inoculation

by R. A. Ackerman, Assistant Dairy Husbandman

Considerable publicity has been given in the dairy press during recent years concerning the cud inoculation of dairy calves. The term "cud inoculation" is used to describe the transfer of a small portion of the cud of a healthy cow to the back of the mouth of a young calf in such manner that the calf must swallow it. In theory this inoculation places the proper microscopic organisms into the (paunch) rumen of the calf, enabling it to use roughages more efficiently at an earlier age than under normal management conditions.

At the West Virginia University Agricultural Experiment Station dairy farm, we inoculated 27 calves during a three-year period and compared them with calves of the same age which were not inoculated. All calves received approximately 315 pounds of whole milk and were divided into three different feeding groups. Management and feeding within each group was uniform. All calves were kept in individual, tight-walled pens, and reasonable precautions were taken to prevent natural rumen inoculation of the calves.

The accompanying table shows that under every feeding method the control (uninoculated) calves made somewhat greater average gains in weight than the calves which were inoculated. Comparing all controls with all inoculated animals, we find an advantage of about 10 pounds in weight in favor of the uninoculated groups.

Rumen Samples Collected

The inoculated calves received a small cud portion at weekly intervals during the first six weeks. Rumen samples were collected by plastic tube from all calves during the first six weeks and continued each week until protozoa (which are the organisms which break down the roughage) were found. Samples were always taken prior to the cud inoculation. The samples were placed in tightly stoppered glass jars protected from the cold and examined by microscope within an hour after being drawn. Additional samples were drawn from all calves on the 9th, 14th, and 15th weeks.

Nineteen of the 27 inoculated calves showed protozoa the week following their first inoculation, and all inoculated calves showed the organism the week following the second inoculation. (It is possible that poor samples due to difficulties in securing a satisfactory rumen sample from the very young calf account for at least part of the failure to find protozoa following the first inoculation.)

Show Protozoa

Ten uninoculated calves showed protozoa by the sixth week, 16 by the eighth week, 18 by the tenth week, and 23 by the sixteenth week. The other two calves were continued under the same conditions and one showed protozoa on the 17th week and the other on the 20th week. The calves showing no protozoa until the latter part of the experimental period grew as well as those showing protozoa within a few weeks following birth. Once protozoa were found, they were always present in subsequent samples.

Records of first observed rumination failed to indicate that inoculated calves started to ruminate (chew their cud) at an earlier age than the uninoculated calves.

Summary

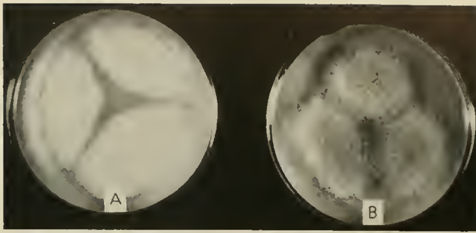
Under the conditions of the project, protozoa organisms were successfully and permanently established in the rumens of those calves inoculated with cud material from a healthy cow. The inoculation failed to improve growth or efficiency of gain under any feeding method. Most calves became naturally inoculated at an early age, even though reasonable precautions were taken to prevent it. This indicates that under our normal management conditions calves would become naturally inoculated with rumen protozoa at an early age, making the inoculation procedure of no practical benefit.

Table 1. Comparison of Growth of Inoculated and Noninoculated Calves from Birth to Sixteen Weeks of Age over a Three-Year Period

Group	Growth: Withers (Inches)	Growth: Weight (Pounds)
Group A		
Inoculated calves (9)	5.72	107.3
Control calves (8)	5.65	110.5
Average of both (17)	5.69	108.9
(Group A received hay at will, starter at will up to 4 lbs. daily)		
Group B		
Inoculated calves (9)	5.5	98.8
Control calves (8)	5.95	114.7
Average of both (17)	5.75	106.6
(Group B received starter at will up to 4 lbs. daily, limited hay starting second 8 weeks)		
Group C		
Inoculated calves (9)	4.52	77.4
Control calves (9)	4.48	87.1
Average of both (18)	4.5	82.2
(Group C received no starter first 8 weeks, limited starter second 8 weeks)		
All control calves (25)	5.36	104.1
All inoculated calves (27)	5.25	94.5

PARASITISM by FUNGI

by H. L. Barnett, V. G. Lilly and C. R. Berry*



EFFECT of host nutrition on parasitism. A Growth of host fungus on a medium containing ammonium sulfate. Parasite did not grow here. B. On medium containing glutamic acid parasite grows rapidly, covering host.

THE fungi are of interest and importance to man in many ways. They decay plant material and aid in building soil; they are used in many phases of industry: brewing, baking, production of antibiotics and some are used as food. On the other hand, many fungi cause diseases of animals or plants, killing or injuring our crop plants and reducing our supply of food and timber.

Since the fungi do not contain chlorophyll and cannot make their own food as do the green plants, they must obtain food from other organisms. Those growing on dead organic materials are generally called *saprophytes* and those attacking living plants or animals are called *parasites.*

The age-old question "what makes a fungus a parasite?" is still largely unanswered. Do parasites possess some specific powers that enable them to attack and destroy living plants? Why are some plants resistant to this attack? Answers to those questions would help greatly in understanding parasitism by these fungi.

Destructive Power Great

The destructive power of some fungus parasites is very great. Examples of this destructivness are the chestnut blight and oak wilt in our forests, and the wheat rust which has caused great reductions in yields.

Frequently it requires years of research by plant pathologists and mycologists before effective methods of control can be developed for a fungus-caused disease. It is possible that this research period could be shortened if we better understood the parasitic activity of these fungi.

The basic principles of parasitism, whether it involves a fungus on a green plant or one fungus on another, are believed to be similar. Experiments with parasites on crop plants often require much time and space for growth of the host plant and establishment of the fungus parasite. Research workers at the West Virginia University Agricultural Experiment Station believe that many of the basic questions on parasitism can be answered by studying fungi that parasitize other fungi.

The fungus hosts grow quickly, require little space, and can be grown on common media under controlled laboratory conditions. This type of research is relatively inexpensive.

Station Studies

Studies on parasitism by fungi are underway at the Experiment Station. One part of the work is being financed in part by the National Science Foundation and involves a study of the parasitism of the fungus *Piptocephalis* on other fungi. *Piptocephalis* is classified as a Phycomycete, the same group to which the common bread mold belongs. It is an *obligate parasite.* This means that it cannot grow alone on any of the usual laboratory media. It must be grown with certain other species of fungi which it attacks but causes little visible harm. The parasite obtains its nutrients by sending short sucker-like branches, called haustoria, into the cells of the host fungus. If the parasite grows well and develops normally the host is said to be *susceptible.* But if the parasite fails to penetrate the host cells or fails to develop normally after penetration, the host is *resistant.*

The work with *Piptocephalis* has shown that growth and development of the parasite may be affected in a number of ways. (1) *The species of the host fungus.* The parasite develops rapidly on some hosts under a wide range of conditions, while on other hosts that show some degree of resistance, growth is slow and the parasite may fail to spread or to produce many spores. (2) *Temperature.* The parasite may develop best on one host at 25°C, but on another its best growth may be at 20°C. The effect of temperature is believed to be on the host rather than on the parasite. (3) *Nutrition of the host.* A large number of experiments with several sources of carbon and nitrogen have shown that the degree of resistance of a given host fungus may be altered by changing either the carbon or the nitrogen source. In general, good growth of the host was accompanied by a high degree of susceptibility, but poor growth did not necessarily result in resistance. Resistance of the hosts increased as the ratio of carbon to nitrogen in the medium was increased. (4) *The acidity of the medium.* Highly acid medium was not favorable to the growth of the parasite.

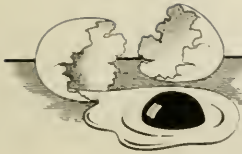
Parasites Being Studied

Another fungus parasite under study at the Experiment Station attacks certain species of fungi that cause die-back of twigs of oaks and other trees. It is also an obligate parasite, retarding the growth of its hosts but not killing them. The spores of this parasite germinate on common media but soon cease to develop in the absence of a host fungus. If a susceptible fungus chances to grow near enough it is attracted to the parasite. Contact between the two is then made and the parasite develops and sporulates quickly. The parasite is so specific in its hosts that susceptibility or resistance may be used as a secondary character in separating similar appearing fungi isolated from dying oak twigs.

The results of our studies strongly suggest that after penetration of the host the growth of the parasite is affected by the nutrients available in the host cells. This may be a specific nutrient, a combination of several substances, or a favorable concentration of one or more sub-

(continued on page 15)

*H. L. Barnett is Mycologist; V. G. Lilly is Physiologist; C. R. Berry is Assistant in Plant Pathology.



WE CAN IMPROVE Initial Interior EGG QUALITY

by H. M. Hyre, Associate Poultry Husbandman

Many people associate egg quality with the age of an egg because they believe that all newly-laid eggs are of high quality. In general this is true, for most eggs are of good quality when they are laid. Even so, some hens lay eggs of a much higher quality than others. A study at this Station shows that there is a difference in the initial egg quality of individual hens, and also a difference in the average egg quality of the various Station strains. These findings are in agreement with those of other stations.

Initial Interior Quality

In the initial interior egg quality we are concerned primarily with the albumen since the yolk is nearly always of high quality in a newly-laid egg. The albumen of a high-quality egg is thick and firm and stands up around the yolk. A low-quality egg will have a weak, watery albumen that spreads out over a large area. Interior egg quality is an inherited trait and can be improved through selective breeding. The poultry breeder's problem is to find a simple method of identifying and then eliminating from the breeding flocks hens that produce low-quality eggs.

Purpose of Study

The object of this study is to ascertain whether or not a simplified method can be used to determine interior egg quality. Present methods require detailed measurements and calculations. This is time consuming and many poultry breeders hesitate to use such methods. A simple method of breaking out the egg and observing the appearance of the albumen to determine the quality has been recommended. We are comparing this method with the one which requires the taking of measurements to determine the score.

Determining Egg Quality

The hens were trapped for three consecutive days and the eggs were marked. All eggs were held overnight at a uniform temperature and broken out the following day. Each broken-out egg was viewed and given an eye score, after which the albumen height was measured with a tripod micrometer to determine a measured score for comparative purposes. The scores given were 1, 2 and 3 for high, average, and low U. S. grade AA; and 4, 5 and 6 for high, average, and low U. S. grade A. The broken-out appearance of the eggs was compared to a set of pictures which make up the U. S. D. A. chart for scoring interior egg quality. The numbered picture in the chart that most nearly matched the broken-out appearance of the egg was the one selected.

When comparing the visual score with the measured score of a group of eggs, the correlation coefficient was found to be high. This would indicate that the broken-out egg quality score can be determined by observation with a high degree of accuracy. Table 1 shows the correlations between the visual score and the measured score for some of the eggs.

This study shows that interior egg quality decreases with length of lay. This substantiates the findings of other workers. Eggs examined in December from a flock of White Leghorn pullets were found to have an average U. S. D. A. measured score of 2.55. Eggs from the same flock examined the following June after the hens had laid through the winter and spring months had an average measured score of 3.61. This was a drop from a low grade AA to a high grade A. Individual hens produce their highest quality eggs during the first few months of lay and their poorest quality at the end of their laying year. It must be remembered, however, that this is an individual trait, for some hens always produce better eggs than others.

Micrometer used to measure albumen.

Flock Differences

In general, White Leghorns have been found to lay eggs with higher interior quality than some of the heavy breeds. From the breeds examined in this study, White Leghorns produced higher quality eggs than the New Hampshires, or crosses developed from these two strains. Table 2 gives the U. S. D. A. measured score from these three flocks.

Egg consumption is infuenced by egg quality. If poultry breeders and commercial egg producers are to increase the consumption of their product, they must offer the consumer a high-quality egg. Therefore it behooves poultry breeders to improve egg quality through selective breeding. Commercial egg producers need to find strains that have been selected for high initial interior egg quality.

Table 1. Relationship Between Visual Score (Using U.S.D.A. Scoring System) and U.S.D.A. Measured Score of Eggs From White Leghorns, New Hampshires, and Reciprocal Crosses of These Two Breeds.

Breed	Correlation Coefficient
White Leghorns	.8810
New Hampshires	.8260
Reciprocal Crosses	.8398

Table 2. A Comparison Between White Leghorns, New Hampshires, and Reciprocal Crosses of These Two Breeds for Egg Quality in June 1955.

Breed	Averaged U.S.D.A. Measured Score
White Leghorns	3.61
New Hampshires	4.22
Reciprocal Crosses	4.90

DISEASES OF *Grasses*

by

Edward S. Elliott, Assistant Plant Pathologist

Orchardgrass scald

GRASSES are subject to many diseases. This fact means little unless we have some appreciation of the value of grass. To some, grass is the growth on the front lawn that requires regular cutting. To the cattleman, grass is feed for his stock. Grass means many things to many people.

Grasses are one of our most valuable assets. If it were not for these plants in many areas not covered by forests, erosion would proceed at a terrific rate. Grasses are of the greatest importance in hills such as ours because of their unequaled ability to bind and hold the soil.

Our Most Valuable Crop

The estimated farm value of the hay crop for 1953 in West Virginia was 33 million dollars.* Although this hay includes legumes, grasses probably made up considerably more than half the total. This estimate was for hay meadows and did not consider pasture land which was probably of far greater value. Grass, when everything is considered, is our most valuable farm crop.

The important part that plant diseases play in reducing the yield of grasses has been evident to trained observers for many years, yet much less research has been directed at control of grass diseases than on most other crops. The disease problem is enormous, partly because many different species of grasses are involved. Each species is often affected by several diseases, although not all are present at the same time. The appearance of each disease is often governed by weather conditions. The development of the disease depends on periods having certain temperature and humidity levels.

Each disease may destroy a part of the potential yield. As a result, the total yield reduction on a single kind of grass caused by several diseases during a growing season may be considerable.

Several different types of diseases affect grasses; there are those that kill the entire plant and thereby thin the stand; there are others that destroy or damage the seed. Leaf diseases are less spectacular in their effect but they cause most of the loss in yield. A small leaf spot which at first appears of little consequence often results in a dead leaf long before that leaf would normally mature.

Problems in Control

To be of value, a means of preventing plant disease injury must be practical. This poses a problem, for control of grass diseases in meadows and pastures is difficult. Here are some of the reasons why.

The great number of diseases to contend with has already been mentioned. In addition, pastures and meadows often are established for relatively long periods of time. Once the diseases gain a foothold, they may become more severe each year as long as the planting lasts.

There is seldom much distance between plants; in fact, many of our grasses form a tight sod. This close spacing between plants permits easy spread of diseases. The dense growth of grasses also results in a high amount of moisture in the air around the plants, particularly near the ground level. Since high air moisture is essential for some phases of disease development, the region around the plant provides a very favorable environment.

Another factor which leads to difficult control problems is that several of the disease-causing organisms

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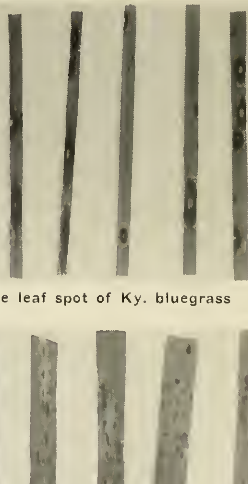
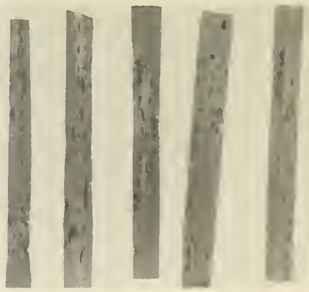
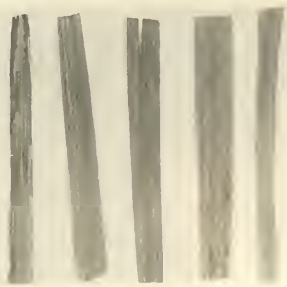
*W. Va. Agricultural Statistics.



Purple leaf spot of Ky. bluegrass



Orchardgrass purple leafspot



Orchardgrass stripe smut

GLAZE it's Hard on Hardwoods

FIGURE 2. Sapling-size hardwoods so heavily coated with ice for over a week, that twigs and branches were stripped from many trees. Others were badly broken or bent.

by K. L. Carvell, E. H. Tryon and R. P. True*

DURING the last week of January, 1956, a spectacular glaze storm struck the Cheat Mountain Range in northern West Virginia. Although glaze storms are of regular occurrence in this area, this one was very severe, and the ice remained on the trees for more than a week. Twigs, branches and boles of the evenaged sapling-size hardwood stands, typical of this section, were heavily coated with ice (Figures 1 and 2). Severe injury was restricted to stands located above 2,100 feet elevation. Fortunately, only mil winds occurred during the perio when the ice was on the trees, o many stands might have been com pletely devastated. This article pre sents the results of a survey con ducted the following spring to de termine the extent of damage cause by this storm.

*Respectively, Associate Silviculturist, Sil viculturist; and Plant Pathologist.

FIGURE 1. Glaze covering the twigs of northern red oak. Ice coating on many small twigs was 2 inches or more in diameter.

FIGURE 3. Large isolated crowns were most frequently broken. Smaller trees usually received sufficient protection from neighboring crowns to withstand the weight of the ice.

Glaze injures trees in various ways. Broken tops cause permanent crooks or forks in the bole. Heavy accumulations of ice strip twigs and branches from the trees, resulting in a reduction in growth for many years. Trees bent to the ground under the weight of ice may never straighten enough to be suitable for sawlogs. These injuries leave the trees more vulnerable to attack by insects and disease.

Some Species Resistant

Species vary markedly in their resistance to glaze damage. In general, conifers suffer less than hardwoods because they have small crowns and branching habits better suited for resisting weight. Shallow-rooted species, and trees growing in shallow soil, are more apt to overturn than deep-rooted trees. Hardwoods with slender boles, large brittle branches, and large crowns are most easily broken.

Glaze damage is more severe at high elevations. In many mountainous areas there is a definite contour below which glaze presents little or no problem. Although the total area hit by glaze in any one locality may be small, a strip of glaze damage, extending for hundreds of miles along a mountain range, may injure thousands of acres of timber.

In order to determine which species and crown classes were most frequently damaged, all broken trees in one 68-acre area within the glaze belt were examined and the species, crown position, and nature of injury recorded. Yellow-poplar, chestnut oak, black cherry, and northern red

(continued on page 15)

FIGURE 4. Left, many yellow-popular in this region show permanent crooks in their boles which are probably due to breakage from past glaze storms. Right, section of bole through crook. It is evident that the bend was caused when a lateral branch took the place of the broken leader.

FIGURE 5. Trees with crowns elevated above the general level of the crown canopy were heavily coated with ice and suffered severe breakage. Left, isolated chestnut oak in January, 1956. Right, same tree, May, 1956.

FIGURE 6. Sapling-size hardwoods bordering openings were frequently bent to ground. Trees within stand received enough support from neighboring trees to remain upright. Left, stand in January, 1956. Right, same stand May, 1956.

BACA PRINCE 46, outstanding Hereford Bull, is one of 101 TK Herefords presented to the University by Thorne Koblegard. In presenting these cattle to the University, Koblegard has made it possible to keep the herd intact.

PRIZE CATTLE given to University

THREE unusual gifts of registered Hereford and Guernsey cattle to West Virginia University are making it possible for the Agricultural Experiment Station and the College of Agriculture, Forestry, and Home Economics to improve their research and teaching services to the people of the State.

One of the gifts, consisting of 101 head of excellent Herefords, was presented to the University by Thorne F. Koblegard of Weston. Three bulls, 60 cows, 16 heifers, and 21 calves made up the lot.

Animals of the Koblegard herd have provided strong competition to exhibitors at major livestock shows in the East for many years. TK Herefords have won honors at such famous shows as the West Virginia and Maryland state fairs, and the Eastern National, Atlantic Rural, and Bluegrass Royal livestock shows.

The Koblegard herd has provided breeding stock for many of the outstanding Hereford herds in Ohio, Pennsylvania, Virginia, and other states, as well as in West Virginia. Their influence on the commercial cattle industry has been valuable, for West Virginia's reputation for feeder calves of quality and performance is known nation-wide.

Two bulls, "Baca Prince 46" and "TK Baca Prince 9," have won high honors in numerous livestock competitions. Another bull, "TK Letson Lad 53rd," is included in the group.

By making this gift to the University, Thorne Koblegard has made it possible for his herd to remain intact. Thus, TK Herefords will continue to be a valuable source of stock for breeders and feeders of fine Herefords. The herd will be maintained at the University Animal Husbandry Farm in Morgantown.

The second of the valuable gifts consists of 10 head of Guernsey animals from the Shawnee Guernsey herd of E. M. Johnson, prominent Lewisburg dairyman and breeder. This gift will be used as foundation stock for a University Guernsey herd, similar to the Holstein, Jersey, and Ayrshire herds now at the University Dairy Farm.

Seven cows, two heifers, and a baby calf make up Johnsen's gift. One of the outstanding cows is Clanlon Noble's Vera, a 6-year-old cow with an outstanding record. As a junior two-year-old, she produc[ed] 12,286 pounds of milk and 6[..] pounds of butterfat. At the 19[..] West Virginia State Fair, she w[as] judged second in the aged-cow cla[ss] and first in the produce-of-dam cla[ss].

Four of the group, Quincy Cav[a]lier's Ann, Quincy Cavalier's Coqu[ett], Quincy Cavalier's Karen, and Quin[cy] Cavalier's Ultra Jean, are daught[ers] of Nyala King's Cavalier, one [of] West Virginia's noted Guerns[ey] sires.

The most recent livestock cont[ri]bution to the University is Hillcr[est] Larry 52, a gift from the la[te] Mr. N. P. Reinhart. This Herefo[rd] bull is a son of the famous Hillcr[est] Larry Domino No. 12.

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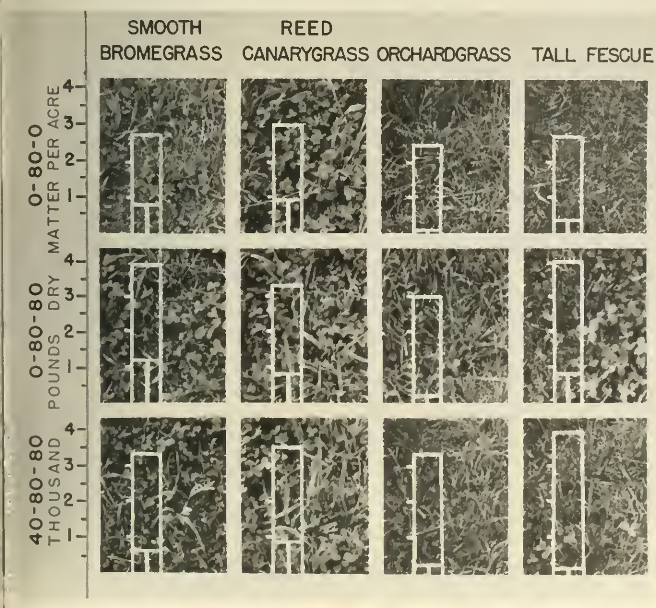
QUINCY CALVALIER'S COQUETT, Quincy Cavalier's Ann, Quincy Cavalie[r's] Ultra Jean, and Quincy Cavalier's Karen, daughters of Nyala King's Cavalier, a[re] 4 of 10 registered Guernseys presented to the University by E. M. Johns[on].

LADINO CLOVER

(continued from page 3)

ures treated with 0-80-80 made the greatest contribution to the total yield. The Ladino clover-grass ratio was lowest in the 40-80-80 treatment. This may have been the result of increased competition due to the marked response of the grass to applied nitrogen. This is shown clearly by the mixture averages and is especially true in the Ladino clover-Kentucky 31 fescue mixture.

IGURE 2. Total yields and fraction yields of protein (in pounds per acre) om Ladino clover-grass mixtures tested during 1953 (four replications).



IGURE 3

Protein

The total and fraction yield of protein in pounds per acre from Ladino clover-grass mixtures during 1953 are reported in Figure 2. The total amount of protein in the mixtures was increased by both the 0-80-80 and 40-80-80 treatments. Although on the average about equal amounts of protein were obtained from the 0-80-80 and the 40-80-80 treatments, the amount contributed by the Ladino clover under the 0-80-80 treatment was the highest of of the three. The amount of the protein contributed by Ladino clover was highest in the bromegrass mixture which received the 0-80-80 treatment. The protein contributed by the Ladino clover associated with bromegrass receiving the 40-80-80 treatment was one-half that contributed in the case of the 0-80-80 treatment.

Botanical Composition

The population of Ladino clover in the Ladino clover-grass mixtures is presented in Figure 3. The population of Ladino clover is greater in the bromegrass and reed canarygrass mixtures than in the orchardgrass and Kentucky 31 fescue mixtures. The 0-80-80 treatment effected the greatest population of Ladino clover across all grass mixtures. The 0-80-80 treatment was the only one which produced an appreciable amount of Ladino clover in association with Kentucky 31 fescue. The photographic evidence in Figure 3 gives good support to the forage and protein yield data presented in Figures 1 and 2.

PERSONNEL CHANGES

(continued from page 2)

Edith Coddington Templeton, Assistant in Agricultural Economics; H. H. Howenstein, Draftsman in Agricultural Engineering; G. T. Felbeck, Jr., Assistant Agronomist; M. W. Johnson, Assistant Agronomist; W. P. Pinnell, Jr., J. T. Raese, W. F. Rumbach, and H. S. Spencer, Graduate Research Assistants in Agronomy; H. I. Ross, Assistant Agronomist; Ann Campbell, Laboratory Technician, Animal Husbandry; K. K. Fox, Assistant Dairy Husbandman; D. D. Bishop, Forest Superintendent; W. W. Christensen, Assistant Forester, Ellen Margrethe Hansen, Assistant in Textile Research; and Anna Elizabeth Hoene, Assistant Nutritionist, W. M. Brooks, Assistant in Horticulture; W. R. Fortney, Assistant Horticulturist, T. W. Spiggle, Graduate Research Assistant in Horticulture; P. G. Calt

(continued on page 11)

These station projects were active in the year 1955-56

(Abbreviations of funds supporting projects A—Adams; BJ—Bankhead-Jones; NE—Northeastern Region Research and Marketing; NEM—Northeastern Region (marketing), Research and Marketing; RM—Research and Marketing; P—Purnell; SCS—Soil Conservation Service; S—State; USDA—United States Department of Agriculture.

Administration

Planning Cooperative Research under Title I of the Research and Marketing Act (RM 11)

Statistical characteristics of biological variables (Hatch 3)

Agricultural Biochemistry

Unidentified growth factors in proteins (A 13)

Prevention of rancidity in carcass fats of turkeys and hogs. (A 11, coop. Animal Husbandry)

Measuring the nutritive value of forage crops. (BJ 70, coop. Animal Husbandry)

Miscellaneous chemical investigations (S 5)

Broiler rations for high efficiency (P 57; coop. Animal Husbandry)

Relationship of nutrient intake to nutritional status in human subjects (RM 39, NE 16, coop. Home Economics, University Health Service)

The relationship of plasma protein-bound iodine to productive potential in dairy cattle. (RM 76, NE 30; coop. Dairy Husbandry, Animal Husbandry)

Agricultural Economics and Rural Sociology

Lime, fertilizer and barnyard manure used on W.Va. farms. (BJ 65; coop. Agronomy)

Effect of consumer choice on egg marketing (S 62 coop. USDA)

Public library service in W.Va. (S 101)

Seasonal milk production on W.Va. farms (P 48 coop. Dairy Husbandry)

Organization as a factor affecting 4-H club work (P 61, coop. Extension Service)

The diffusion of recommended farm practices in two W.Va. counties (P 65)

Inter-market price relationships for milk and dairy products in W.Va. (RM 17, NEM 1)

Marketing livestock in W.Va. (RM 28, SM 7)

Lowering milk marketing costs in W.Va. (RM 32 NEM 13)

(Title changed) Segregating and Pricing Poultry Meat and Egg Quality (RM 36, NEM 11 coop. USDA)

Marketing forest products in W.Va. (RM 38 NEM 16; coop. Forestry)

Marketing peaches (RM 42)

The rate of movement of apples and factors affecting rate (RM 41 NEM 9)

The Physical and Economic Input-Output Relationships of Forage and Other Feed Production in the Appalachian Valley. (RM 49, NE 18, coop. Agronomy and Genetics)

Rural Population Dynamics (RM 50, NE 17, coop. Home Economics, ARS, Monongahela Power Company)

Improvement of Market Procedures and Outlets for West Virginia Livestock. (RM 52, NEM 7)

The Production-Consumption Balance and Efficient Utilization of Milk for Non-fluid Uses in West Virginia (RM 51, NEM 13)

The Marketing of Lime and Fertilizer in West Virginia (RM c-701 AMS259, coop. Farmers Coop. Service)

The effect of quality factors and price on apple sales. (RM 63, NEM-9 coop. Horticulture)

The economics of broiler production on W.Va. farms. (RM 61; coop. Poultry Husbandry, Extension Service)

Marketing lambs in W.Va. (RM 66, SM-7; coop. W.Va. Dept. of Agriculture)

Marketing nursery crops in W.Va. (RM 72, 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. (RM 73, NEM-14; coop. AMS, USDA)

Membership relations of milk marketing cooperative associations in W.Va. (RM 74; coop. Pennsylvania Experiment Station, Ohio Experiment Station, Farmer's Cooperative Service, USDA)

Improved marketing for cut flowers and potted plants. (RM 75, NEM-8)

Agricultural Engineering

Study of the design and 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)

Determination of factors influencing the drying rates of grains (P 55; coop. Engineering Experiment Station)

Investigations to determine the optimum stall for dairy cows (RM 5; coop. Dairy Husbandry)

To determine the most efficient and economical methods of removing manure and litter from dairy barns (RM 6; coop. Dairy Husbandry)

Factors involved in the use of supplemental irrigation under W.Va. conditions. (RM 21; coop. Agronomy, Reymann Memorial Farms)

Poultry house design for W.Va. (RM 44, NE-8; coop. Animal Husbandry)

The Mechanization of Forage Crop Harvesting, Processing, Storing and Feeding. (RM 18, NE-13; coop. Animal Husbandry, Dairy Husbandry and Reedsville Farm)

Factors involved in the use of supplemental irrigation under W.Va. conditions. (RM 71, NE 22; coop. Agronomy, Reymann Farms)

Agronomy and Genetics

Corn genetics and breeding (BJ 3; Reymann Farms, Ohio Valley Farm, University Experiment Farm, N. E. Corn Conference, W.Va. Extension Service)

The effect of fertilizer treatments and cropping systems on the yield and quality of tobacco (BJ 19; coop. Ohio Valley Farm, USDA)

Selection and breeding of superior strains of red clover for W.Va. (BJ 13; coop. Plant Pathology, Extension Service, USDA)

Barley breeding and testing (BJ 51)

The interrelation of soil fertility, planting rate and geometry of spacing in relation to yield of various hybrid corn varieties (BJ 58)

Crop rotation experiments. (BJ 67; coop. Ohio Valley Experiment Farm, Agricultural Economics)

Field crop variety testing (S 6)

Soil survey work in W.Va. (S 8)

Killifer furrows in eroded black shale for run-off (S 58 coop. Reymann Farms)

Characteristics of flow from a large spring (S 59; coop. Reymann Farms)

The establishment and testing of grass an legume species and strains for soil co servation (S 87; coop. Nursery Divisio SCS)

Preliminary investigations in soil scien (S 94)

The phosphorus and potassium supplyin and fixing power of several importa W.Va. soils (P 58)

The influence of fertility and manageme on several Ladino clover-grass mixtur (P 59)

The lime requirements of a number W.Va. soil types (P 60)

Maintaining profitable stands of alfal (RM 10; coop. Plant Pathology)

Weed control in corn (RM 22; coop. Re mann Farms)

Forage crops varieties, strains, and speci for W.Va. (RM 26, NE 10)

Alfalfa breeding and Genetic investig tions. (RM 45)

The Influence of Several Manageme Practices on the Performance of Alfal and Ladino Clover Grown Alone and Association with Grasses. (RM 47, N 21)

Factors Affecting the Herbicidal Activity Some Chemicals Applied to the Soil Su face (RM 55, NE-12)

Some Chemical Properties of the Maj Soil Types of West Virginia (RM 6 coop. SCS and USDA)

Using Nitrogen Fertilizer Efficiently (R 61; coop. Ohio Valley Experiment Far and University Experiment Farm)

Breeding winter barley for high yields a powdery mildew resistance. (RM 65, N 23; coop. Plant Pathology)

Animal Husbandry

Improving marketing value of turkeys cross breeding (BJ 5)

The effects of thyroid stimulants and d pressants on growth and fattening swine (BJ 47)

Effect of heredity and environment on ke deformities in White Leghorns (BJ 5

Effect of prophylactics and therapeutics f controlling coccidia in chickens (BJ 5 coop. Reymann Memorial Farms)

Nutritional requirements of the brood so (BJ 61)

Simplified Methods of Improving Initi Interior Egg Quality and Shell Quali Through Selective Breeding (BJ 68)

Methods to Increase Non-protein Nitrog Utilization by Ruminants (BJ 69; coo Agricultural Biochemistry)

Legume grass silage vs. corn silage for wi tering beef cows (S 53; coop. Agricultur Biochemistry, Reymann Farms)

Coccidiosis and Newcastle disease (S 8

Exploratory or preliminary investigatio on disease, feeding, and management farm animals (S 89)

Floor space requirements of broilers in centrally heated house (S 93; coop. Re mann Memorial Farms)

Fat calf vs. feeder calf production in W.V (S 95; coop. Reymann Memorial Farm

Hay versus hay and silage for ewes (S 10 coop. Agricultural Biochemistry)

Broiler management investigations (S 10 coop. Reymann Memorial Farms)

Development of satisfactory broiler ratio (S 105; coop. Reymann Memorial Farm

Increasing the Utilization of Low Quali Hays by Wintering Beef Cattle in We Virginia (S 111; coop. Reymann Mer orial Farms)

Studies on infectious synovitis. (S 11 coop. Agricultural Biochemistry) lethods of feeding growing-fattening pigs for the economical production of lean carcasses. (S 113; coop. Agricultural Biochemistry)

lethods of feeding growing pullets (P 39; coop. Reymann Farms)

omparison of native and western ewes for production and longevity (P 41; coop. Reymann Farms)

'he relation of birth weight within breeds to growth rate of purebred mutton type lambs (P 50)

utritional requirements of swine for growth (P 62)

reed as a factor in the production of ewes retained for flock reproduction and for the production of market lambs and wool (P 63; coop. Reymann Memorial Farms)

nproving the reproduction performance of turkeys (RM 9)

ransmission and immunity of vaccine strains of Newcastle disease in chicks following adult vaccination (RM 23, NE-5)

uses of sterility in cattle (RM 30, NE 1; coop. Dairy Husbandry, W.Va. Artificial Breeders' Coop.)

'eeding for Efficient Production of Eggs and Meat (RM 53, NE 6, coop. Reymann Memorial Farms and Dairy Husbandry)

vian infectious anemia-synovitis. (RM 67 NE-5; coop. Agricultural Biochemistry)

eproductive efficiency of beef cattle. (RM 69)

airy Husbandry

'eeding efficiency of dairy cows. (BJ 42; coop. Animal Husbandry)

ne use of type and production records as a basis for dairy cattle improvement program (BJ 45; coop. Agricultural Economics, Ayrshire Breeders Assoc.)

ethods of feeding and rumen inoculation as they affect the growth and development of young dairy calves (BJ 62; coop. Animal Husbandry)

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

iscellaneous investigations of dairy products (S 90)

lecting for milk production in Jersey cattle. (S 106)

emical inhibition as a means of preserving bovine sperm (S 114; coop. Biology Department, College of Arts and Sciences)

ie transmission of milk and butterfat production and body conformation by dairy sires (P 11; coop. USDA)

ie keeping quality of milk in home refrigerators (P 49)

ie effect of water hardness on cleaners for dairy utensils (P 66)

omparison of young bulls with proven bulls in artifical breeding. (P 67; coop. W.Va. Artificial Breeders' Coop., W.Va. Extension Service)

me chemical and physical analyses of the blood of dairy cows (RM 8, NE 1; coop. Animal Husbandry)

restry

ficient forest management practices for W.Va. cut-over and burned-over hardwood forest lands (BJ 19; coop. Conserv. Comm.)

nimal repellents on hardwood forest trees (BJ 56)

survey of multiflora rose plantings in W.Va., with special reference to growth characteristics and spreading tendencies. (BJ 66; coop. Soil Conservation Service; Conservation Commission)

provements of farm game and wild-life conditions of the soil conservation district (S 42)

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

Determination of optimum growth of W. Va. 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)

Timber management for the market demands in southern W.Va. forests (RM 31)

Factors Affecting Natural Regeneration in Upland Oak Types (RM 46; coop. Plant Pathology)

Home Economics

Qualities in blouses: The relations of those considered in selection to the satisfactions found in wear (RM 56, NE 19)

Horticulture

Improvement of potato varieties for W.Va. (A 11; coop. Plant Pathology)

Selection, breeding, and propagation of the lowbush blueberry vaccinium vaccillans (BJ 12)

Effect of certain chemicals on color, finish and maturation of apples (BJ 61)

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)

Nutrition of apple trees in W.Va. (P 56; coop. University Experiment Farm, Entomology, Plant Pathology)

Effect of new growth substances on the preharvest drop of apples (S 66; coop. University Experiment Farm, Entomology, Plant Pathology.

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

Apple and peach insect control (S 91; coop. University Experiment Farm, USDA, Bureau of Entomology and Plant Quarantine)

On-the-farm production of ornamentals suitable to W.Va. (S 96)

Propagation and selection of edible nut-bearing trees suitable to W.Va. (S 98)

Harvesting, handling, and packaging of peaches (S 100; coop. University Experiment Farm, Mt. Fruit Sales, Inc.)

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

Turf trials for home lawns. (S 116)

Improvement of apple juice (P 61; coop. Agricultural Biochemistry)

Selection, Breeding, and Propagation of Nursery Crops (RM 35)

Low-temperature storage of prepackaged cut flowers and prepackaging materials. (RM 70)

Plant Pathology, Bacteriology, and Entomology

The relation of genetics and environmental factors to growth, physiology and reproduction of fungi (A 6, revised, 1952)

Nutrition of fungi and bacteria with special reference to substances which induce, stimulate, or inhibit growth and reproduction (BJ 2)

Testing new fungicides and insecticides for value as pesticides on small fruit and vegetable crops (BJ 32) Revised 1954

Forest tree diseases. Sub-2, chestnut blight (S 18; coop. Forestry, Horticulture)

Miscellaneous plant disease investigation (S 19)

Miscellaneous insect and insecticide studies (S 24)

Apple measles (P 19)

Black rootrot of apples (P 21)

Microbiology of strip mine seepage water in relation to plant growth and soil conditions (P 53; coop. Agronomy)

Decay as a factor in spront reproduction of yellow poplar (P 54; coop. Forestry)

Cause and remedy for red clover failures in W.Va. (RM 14; coop. Agronomy)

Oak Wilt (RM 33; coop. SCS)

(Revised and title changed) The fungicidal efficiency and phytotoxicity of orchard sprays as influenced by methods of application, timing, and environmental factors. (BJ 6; coop. University Experiment Farm, USDA)

Improvement of tomato varieties for W.Va. (RM 34; coop. Horticulture)

The symbolic relationships between micro-organisms and insect vectors of plant diseases (RM 40)

The structure and function of specialized tissues in insects (RM 41)

Nematodes Injurious to Fruit Trees (RM 51; coop. University Experiment Farm and USDA)

Diseases of Forage Grasses (RM 57; coop. Agronomy and Genetics and USDA)

Arthropods Affecting Livestock in West Virginia—Their Distribution and Control (RM 58)

Cereal and Forage Crop Pests—Their Distribution, Incidence and Control in West Virginia (RM 59)

The Effect of Chemical Spray Schedules on the Quality and Quantity of Apples Produced (RM 62; coop. USDA)

Virus diseases of sour cherry and other stone fruits. (RM 68, NE-14; coop. University Experiment Farm)

University Experiment Farm

Delicious budsport evaluation tests. (S 115)

staff of station

December 1, 1956

ADMINISTRATION

Irvin Stewart, LL.B., Ph.D., LL.D.,
President of the University

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Director

A. H. VanLandingham, Ph.D.,
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(continued on page 14)

STAFF

(continued from page 13)

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M. D. Alt, B.S., Grad. Res. Asst.
H. M. Hyre, M. S., Assoc. Poul. Husb.

MISCELLANEOUS

G. D. Bengtson, B. S., Asst. Editor
D. R. Creel, Photographer
John Luchok, B.S.J., Editor
Martha R. Traxler, Chief Clerk

GRASSES

(continued from page 7)

are very persistent and of a type that are difficult to control on any crop. Rusts, smuts and also the root rot type pathogens which persist in the soil are good examples.

Wild Grasses Hinder Control

The fact that many of our "cultivated" grasses are also a part of the wild or natural flora is still another factor. We have some chance of regulating the grasses that we plant but far less control over those that occur naturally. Thus the wild grasses in our fence rows and pastures may serve as a reservoir for diseases which spread to the planted meadows or lawns. Kentucky bluegrass is most common throughout this State as a wild grass. It is also seeded in our lawns and pastures. The bluegrass that we plant, no matter how clean, has little chance escaping the diseases which occur on its nearby wild counterparts.

A number of different grasses may be attacked by the same disease organism. The fungus causing the ergot disease is one of many of these; it finds many different grass hosts equally suitable.

Certain grass diseases are important in still another way. Numerous diseases of grasses are the same diseases that destroy our grain crops. For example, the ergot disease, in addition to attacking many grasses, also attacks many grains. Thus we have some diseases spreading from grasses to the grain fields.

Considerable loss in yield can be avoided with some grasses if the development of leaf diseases i watched and a cutting made before extreme injury occurs. This would be effective if the grower could recognize some of the importan diseases and if he appreciated wha those diseases could do to th amount and quality of the hay.

Another Reason for Cutting Early

Farmers know that meadow should be cut when the nutrier level is at the highest peak, and tha after grass is mature, the nutrier level drops sharply. Possibly fe farmers realize that the older an more mature the grass growth b comes, the greater will be tl amount of dead tissues due to di ease invasion. An additional reaso then for a properly-timed cutting to avoid these increasing losses i quality from diseases.

Control with Resistant Varieties

Some progress has been mac toward selecting and producing pa ture and meadow grasses resistant t certain important diseases. A notab example is the resistance of Meric bluegrass to *Helminthoporium* le spot and foot rot. It is a difficu problem to find or produce strai of grasses with the desired disea resistance and the other agronom characteristics which are necessai

At least one thing is obvious, gra research is a field needing more a tention. Proof of this is the fact th one can seldom find a clump or tu of any grass that is not in some w injured by a disease.

Personnel Changes

(continued from page 11)

rider, Paul Chi Li, A. L. Shigo, and S. Tamburo, Graduate Research Assistants Plant Pathology; Ruthann S. Folmer a Ferne F. Haught, Technicians in Pla Pathology; M. D. Alt, Graduate Resea Assistant in Poultry Husbandry.

During the same period the follow resigned: P. R. Datta, Graduate Resea Assistant in Biochemistry; J. W. Gillesp Assistant in Biochemistry; O. L. Voth, sistant Biochemist; J. D. Bane and J. Reid, Assistants in Agricultural Engine ing; A. L. Bolvard, Assistant in Genet C. C. Dowler, Graduate Research Assist in Agronomy; W. L. Haltiwanger, Assist Agronomist; D. A. Ray, Assistant Gen cist; J. K. Bletner, Assistant Poultry H bandman; K. G. McDonald, Graduate sistant in Animal Husbandry; Olga W liams, Laboratory Technician in Anin Husbandry; J. E. Fike and R. L. Ste Assistants in Dairy Husbandry; N. D. Ja son, Assistant in Forestry; C. A. Mys Assistant Forester; D. C. Alderman, As

Financial Statement for the Year July 1, 1955, to June 30, 1956

Classification of Receipts and Disbursements	Hatch	Regional Research Fund	Title II	Non-Federal Funds	Total
RECEIPTS					
eived from the reasurer of the U. S.	397,887.59	72,360.00	2,500.00		472,747.59
e appropriations:					
lain station	....	....	....	153,495.00	153,495.00
ıbstations	....	....	....	55,005.00	55,005.00
:ial endowments, fellow-ıips and grants:					
ɔundations	....	....	....	1,650.00	1,650.00
ıdustry	....	....	....	4,500.00	4,500.00
s	....	....	....	200,855.35	200,855.35
ınces forward July 1, 1955	7.44	....	....	159,149.48	159,156.92
Total Available	397,895.03	72,360.00	2,500.00	574,654.83	1,047,409.86
DISBURSEMENTS					
onal services	308,339.05	31,852.05	1,238.10	206,460.12	547,889.32
vel	11,643.02	6,614.47	1,007.25	4,914.76	24,179.50
ısportation of things	148.83	86.55	....	1,018.38	1,253.76
ımunication service	1,169.08	7.44	....	4,145.33	5,321.85
ts and Utility services	394.27	764.92	....	20,477.17	21,636.36
ting and binding	4,226.88	2,882.70	190.69	1,485.57	8,785.84
:r contractual services	3,840.40	795.48	....	26,091.26	30,727.14
›lies and materials	43,093.45	15,586.98	45.11	85,101.71	143,827.25
ıpment	20,891.40	13,494.65	....	28,235.72	62,621.77
ls and structures (contr.)	635.00	....	....	709.64	1,344.64
:s and assessments	3,244.02	....	18.85	414.50	3,677.37
Total Disbursements	397,625.40	72,085.24	2,500.00	379,054.16	851,264.80
Reverted Balances	269.63	274.76		1,899.37	2,443.76
Non-reverted Balances Available for 1956-57				193,701.30	193,701.30

Horticulturist; Lorraine Yu Lu, luate Assistant in Horticulture; M. E. vel, Assistant in Horticulture; E. R. son, Assistant Horticulturist; F. L. n, Graduate Assistant in Plant Patho- Robert Pristou, Assistant in Plant ology; R. L. Oxier, D. O. Quinn, and Wilson, Graduate Research Assistants Plant Pathology; G. C. Harris, Jr., luate Research Assistant in Poultry ›andry.

FUNGI

(continued from page 5)

ces. It is possible that the para- lacks a necessary enzyme system ch it must "borrow" from its ..

resent studies using paper chro- ography have revealed differ- :s in the amino acid content of ost fungus grown on different lia. This and other new techni- s now available may prove to be useful in determining the dif- nces between susceptible and re- nt hosts.

e Studies Needed

Iany other fungi exist in nature parasites on other fungi but few cal studies have been made of n. Interesting examples are the ısites on the rust fungi and powdery mildews, two important diseases of crop plants. Little is known about the nutrition of these parasites and it is not known whether they would offer any measure of control of these diseases under any conditions. Each parasite is probably different and must be studied as a separate problem, although certain similarities are expected to be found.

The information obtained in these studies should lead to a better understanding of the complex host-parasite relationship. The general principles of parasitism may apply equally well to parasite-host relationships involving a pathogenic fungus and a crop plant, although the details of the relationship are certain to differ.

PRIZE CATTLE

(continued from page 10)

Dr. H. R. Varney, Dean of the College of Agriculture, Forestry, and Home Economics, and Director of the University's Agricultural Experiment Station, stated "these fine gifts represent very valuable contributions to the teaching and research facilities of the College and the Experiment Station."

GLAZE

(continued from page 9)

oak were most commonly broken, although some breakage was observed among sassafras, white oak, and cucumbertree. This study showed that the tallest trees were most frequently broken (Figure 3).

Previous Storms Damaging

A large number of yellow-poplars throughout the Cheat Mountain Range show a definite crook in their butt log at a height of approximately 12 feet (Figure 4). Several of these stems were cut and sectioned to determine whether this could be traced to breakage in a previous glaze storm. Ring counts indicate that this damage occurred during the winter of 1938-39. Meterological records show frequent glaze storms which might have been responsible for this damage reported in West Virginia during that winter.

Striking injury occurred where scattered white oaks and chestnut oaks had been left from previous logging operations (Figures 5, and 6). The crowns of these "culls" were elevated well above the general level

(continued on next page)

GLAZE

(continued from page 15)

> Management practices within glaze areas should be designed to make forests more resistant to ice injury. Evenaged stands are less likely to suffer breakage and bending than unevenaged stands. Frequent light thinnings increase the stand's resistance to glaze; however, heavily thinned stands suffer severe damage. Most sapling-size hardwood stands in glaze areas need a series of light improvement cuttings to remove those stems which have forks, crooks, and disease.

of the crown canopy formed by the evenaged second-growth sprout stand. Large limbs were stripped from the trunk, leaving only small branches intact. Examination of these trunks showed many old scars where previous glaze storms had removed other branches.

A dense cover of broken twigs and small branches covered the litter throughout the glaze area. Branches smaller than ¾ inch in diameter had snapped readily under the heavy weight of the ice. Twigs of sassafras, yellow-poplar, black cherry, oaks, and red maple were most severely damaged. Hickory, beech, pines, red spruce, and hemlock were not injured.

Watch Heavy Thinning

Thinning plots, established during 1954 and 1955, were studied to determine whether stands opened up by cutting were more subject to breakage than uncut stands. Trees on heavily thinned plots were apparently much more subject to injury. The percentage of damaged trees increased with the intensity of thinning. Those stands in which less than 30 per cent of the volume had been removed had suffered much less than those thinned more heavily.

Forest management practices within areas hit by frequent glaze should be designed to make stands more resistant to ice injury. Evenaged management is apparently more desirable than unevenaged management, as trees in evenaged stands receive beneficial support from neighboring trees, and are less likely to be broken or bent by heavy accumulations of ice.

Light Thinning May Help

Heavy thinnings open up the stand and isolate individual tree crowns, greatly increasing the danger of breakage from glaze. Frequent light thinnings which remove not more than 30 per cent of the volume would not open the stand excessively, and would tend to strengthen the dominant and codominant trees.

Most sapling-size hardwood stands in glaze areas need a series of light improvement cuttings to remove those stems which have forks, crooks, and disease which would lower their value for sawlogs. Where there is a ready market for small products, improvement cuttings may be made at a profit, and greatly increase the future value of the stand for sawtimber. However, care must be taken not to remove too much volume in any one cutting, as this isolates the remaining trees and increases their susceptibility to damage from future glaze storms.

LOW FAT MILK HAS GOOD KEEPING QUALITIES

by S. J. Weese, Associate Dairy Husbandman

DAIRY researchers at the West Virginia University Agricultural Experiment Station have completed a study on the keeping qualities of "one plus two" milk in family refrigerators under actual use conditions.

"One plus two," commonly called "low-fat" milk, is a skim milk product to which has been added 1 per cent butterfat and 2 per cent nonfat milk solids, as well as vitamins A and D. The result is a nutritional product without the fat content of whole milk. The West Virginia State Department of Agricultural approved the manufacture of such a product July 1, 1954. No figures are available at present that show how much of the "one plus two" milk is being marketed in West Virginia, although such a product, under various trade names, is available in the larger cities of the State. The cost to the consumer is about tw cents less per quart than for regula pasteurized milk. The savings a not sufficient to interest very man consumers in buying the low-f milk, according to one dairy proce sor. It does provide, however, palatable low-fat milk for tho calorie-conscious consumers, but does not take the place of relative fat-free skim milk that could be sol at a much lower price.

Comparisan with Whole Milk

From the nutritional standpoin the "one plus two" product has protein content of 4.24 per cent compared to 3.5 per cent for mi of average composition. The calor content of "one plus two" milk approximately 491 per quart, compared to whole milk which h approximately 674 calories p quart.

During the summer months 1954, 237 quart samples of "one pl two" milk were distributed to families that served as cooperato in this project. Each of the pa ticipating families received thr quarts of the milk on Saturday. was used and stored in the fami refrigerator and a sample from ea quart was retained for sending ba to the laboratory. The first sam was returned to the laboratory o Tuesday, the second on Wednesd and the third on Thursday. Th the keeping qualities of the low-f milk were studied until the produ was five days old.

Keeping Quality Good

The three-and four-day-old mi maintained good keeping quali but there was a decided drop in t quality of the five-day-old sampl The keeping quality of the low-f milk compared favorably with p viously tested pasteurized-homoge ized milk.

A questionnaire was given ea of the 18 cooperators to fill out the conclusion of the experiment see how they liked the low-fat mi In answer to the question, "Did y like the low-fat milk?" Fourte said yes, two said fair, and two s no. In answer to the question, "D you like the low-fat milk as well your regular milk?" ten said and eight said no.

Editor's Note: Due to lack space we were unable to carry t list of publications recently publi ed by the Agricultural Experime Station. A complete list of rece publications will be carried in t Spring issue of *Science Serves Yo Farm.*