

STORRS  
Agricultural Experiment Station

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Report of the Director  
for the  
YEAR ENDING JUNE 30,  
1930

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CONNECTICUT AGRICULTURAL COLLEGE  
STORRS, CONNECTICUT

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(as of June 30, 1930)

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## Report of the Director

For the Year Ending June 30, 1930.

To President Charles C. McCracken:

In the usual manner, I submit herewith a brief account of the activities of the Storrs Experiment Station. The Report of Progress does not include a statement on all projects, but only those in which results of special interest have developed. A complete list of all projects will be found on page 29. Following this are the changes in staff, the publications issued during the year, and the financial statement.

Of special importance was the completion and dedication of the Atwater Laboratory. It is difficult to express the great satisfaction we are finding in the facilities this new building provides. For years our staffs in Animal Diseases and in Genetics have been handicapped by inadequate space and equipment and while we will outgrow these quarters, they afford ample space for the present. The dedication exercises, held on June 12, were attended by about 100 guests from other stations and colleges. The papers presented have been published as a bulletin of the Station under the title, "Dedication of Atwater Laboratory."

The need of broadening the animal disease program by the appointment of a pathologist has been recognized for the past seven years, but heretofore means have been lacking. Through the active interest of Dr. Works certain funds were reallocated and the appointment made, thus strengthening the work in this field.

### Needs of the Station

The College campus is gradually encroaching on the land set aside for experimental purposes and very soon we will be forced to abandon these plots. A suitable tract should be acquired at once.

A greenhouse for soil and plant research is needed to strengthen our program in pasture and forage crop investigations. The lack of this equipment has greatly handicapped our work for many years. The expense is not great, \$8000 being ample for our purposes.

A moderate increase in the maintenance appropriation will be necessary if we are to meet the increasing demands for help in the state's marketing problems. Some of these are local but many involve thorough studies of the entire industry, as in the case of vegetables and fruit.



## REVIEW OF THE YEAR

The program of the Station is organized under 49 formal projects or subprojects distributed among the several departments. Obviously it is impossible to make the titles completely descriptive and further many minor researches are always involved as necessary contributing or preliminary steps. Research is a process of exploration which inevitably involves pauses and side trips on the route to the final objective.

In the following pages no attempt has been made to review the present status of all of the work under way, but there are presented the more definite and more useful results obtained during the past year.

### Agronomy

**Factors that may affect the vigor of seed potatoes.** This investigation dates back to 1915 when it was begun as an attempt to learn why potatoes "run out" in a climate such as is found in Connecticut. Very shortly thereafter the virus diseases were recognized in this country. The opinion is now widely held that they are the cause of all run-

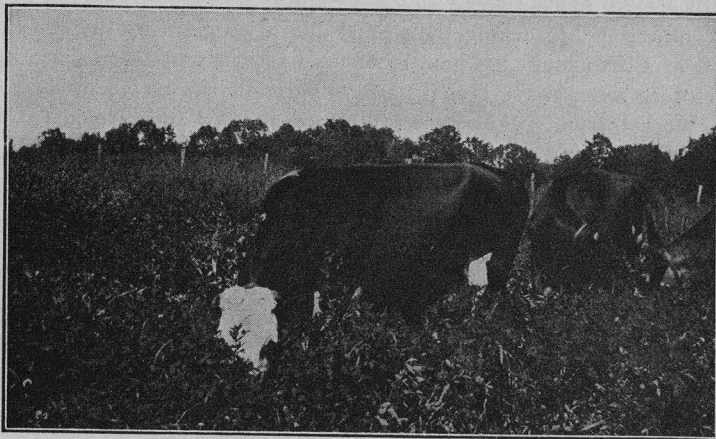


FIGURE 1. Sweet clover seeded in April furnished abundant grazing on July 16.

ning out or degeneration irrespective of climate. However this may be, these diseases so masked any results obtained in our investigations that it became necessary to learn first how to grow potatoes free from the virus diseases. These efforts were quite successful and the problem of

determining the effects of climatic or other environmental factors was again taken up. The factors studied are *maturity*, *plane of nutrition*, and the *effect of individual nutrient elements*.

(a) *Maturity of seed.* Up to the present the only indication is that early dug (immature) seed produces a larger yield when planted the following spring than seed dug later. It is quite probable that any increase in vigor is due to the removal of the crop from the field before infection has proceeded very far. Therefore we are again dealing with the problem of disease rather than the direct physiological effect of climate.

(b) *The effect of plane of nutrition and nutrients.* Again the virus diseases have interfered and masked any possible results although the plots have been severely rogued every year. Perhaps this problem can only be handled by growing the crop in cages.

**Fertilizing alfalfa.** Both phosphoric acid and potash seem to be essential for success. These studies have now been under way for many years and even where chemical determination shows considerable phosphoric acid, further additions are beneficial. The effect of potash is particularly noticeable on new seedings in that it improves the stand.

### Pasture Improvement.

A. *The effects of fertilizer treatments on the soil, the flora, and the production as measured by grazing:*

1929 was the first year of the second five-year period on this project under fertilization. In March and April, after a lapse of five years since the initial fertilization of the experimental pastures, the limestone, superphosphate and potash treatments were, with few exceptions, repeated. As usual, nitrogenous fertilizers were applied in April, with the exception that one plot received one-half (28 pounds per acre) of its nitrogen in July.

Where a ton of limestone per acre was applied in both 1924 and 1929, the average pH reading for six plots in April, 1930, was 0.4 higher in the surface 2 inches of soil than in the 2-4 inch, and 0.6 higher than the 4-6 inch horizons. There were practically no differences in pH acidity in the corresponding horizons from five *unlimed* plots. The results indicate that the topdressed limestone is now affecting the reaction of the 2-4 inch, but not the 4-6 inch horizon.

Determinations of available phosphorus on samples of soils from eight plots that have received 1000 pounds of 16% superphosphate, show there is two and one-half times as much of this important element available in the 0-2 inch as in the 2-4 inch horizon, and nearly four

times as much as in the 4-6 inch level. Evidently a little of the top-dressed superphosphate has penetrated below the upper 2 inches of soil.

Although the 1929 season, being one of the driest in forty years, was very unfavorable to the growth of pasture vegetation, several of the plots actually produced more feed than in the preceding wet years of 1927 and 1928. This result was chiefly due to the second 500 pound application of superphosphate in April, 1929. Omitting the second ton of limestone did not reduce the 1929 production, while omitting the second 500 pounds of superphosphate resulted in a 28 percent reduction in that season. However, the plot that received limestone and superphosphate in 1924 and no phosphorous since, afforded better pasturage in 1929 than the plot that was treated with superphosphate *only* in both 1924 and 1929. This suggests that lime is very important in any long time pasture improvement project on our acid soils.



FIGURE 2. The effect of date of cutting gray birches. From left to right: (1) April; (2) May; (3) June; (4) July; (5) August; (6) September.

Applying one-half of the nitrogen (total 56 pounds per acre) in July rather than all in April, resulted in less total pasturage for the season without affecting the distribution of the grazing appreciably. The four nitrogen plots averaged to produce 82 percent of the total feed for the season before July 1, while the corresponding figure for the four limestone-superphosphate plots was 62. The respective percentages for July were 8 and 27.

The relative productions of pasturage for 1929 are given below:

No treatment .....	100
Superphosphate .....	228
Superphosphate and limestone .....	315
Superphosphate, limestone and potash.....	325
Superphosphate, limestone, potash and nitrogen...	342
Superphosphate, potash and nitrogen .....	298
Limestone and potash .....	138

#### B. Effect of time of cutting on bushes and weeds:

After mowing the ungrazed, unfertilized brush land in different months for four years, marked differences in the number and size of bushes were evident in 1929. July and August were the months in which cutting was the most effective in subduing such species as gray birch, alder, blueberry, and soft maple as well as weeds like golden rod, ferns and asters. Cutting during the dormant season was particularly ineffective. See Figure 2.

#### C. Response of pasture species to plant nutrients:

By growing white clover, Kentucky Blue grass and redtop in jars of variously fertilized pasture soil, it was found that the clover and blue grass responded most to applications of lime and phosphorus. The growth of redtop was practically the same regardless of treatment and this fact suggests why its close relative, Rhode Island Bent, is so abundant in the run-down permanent pastures of northeastern United States.

**Biennial sweet clover for pastures.** Recent work indicates that it will be good management to use sweet clover as supplemental feed where ample permanent pasture is available for the first half of the season. Seeded in April on well limed, fertile soil, an acre of this crop may be expected to furnish approximately 120 "cow days" of grazing between July 15 and the end of the growing season. Thus, 10 acres of spring seeded sweet clover should provide grazing for a 20 cow herd for two months during the period when pasturage is usually insufficient.

Where little or no permanent pasture is available, both *first* and *second* year sweet clover should provide good grazing throughout the season. An acre of second year sweet clover which has not been grazed too closely the previous fall, will usually produce 360 "cow days" of pasturage.

**Rate and method of applying fertilizers to corn.** Larger yields of more mature corn (Pride of the North) were obtained from 125



pounds per acre of a 4-10-6 fertilizer applied in an area 3 x 10 inches around the seed than from 500 pounds broadcasted. 250 pounds of 4-10-12 retarded germination, early growth and reduced yields in 3 x 10 inch, but not in 6 x 10 inch hills. July side dressings with nitrate of soda were ineffective in 1929, possibly because of the extremely dry weather during most of that season.

#### Fertilizing potatoes.

A. On the farm of F. V. Williams of Buckland, using triplicated five row plots, no increases in yields of marketable potatoes were obtained from applying above 750 pounds of 10-16-14 fertilizer per acre. Broadcasting one-half of the fertilizer when the rate was 1500 pounds or over did not influence the yields appreciably. There was a distinct correlation between the number of missing hills and the rate of fertilization. These results are very similar to those obtained in 1928.

B. On pasture land which had received no fertilizer for many years, save one ton of limestone and 500 pounds of 16% superphosphate per acre, nitrogen, phosphoric acid and potash were each broadcasted in commercial fertilizers at four different rates, varying only one nutrient at a time. Plots were replicated three times. Omitting potash reduced the yields appreciably more than omitting either nitrogen or phosphorus. The first 60 pounds of potash increased the yield 50 bushels per acre; the second, 37; and the third only 11 (not significant). These data support previous work at this Station (reported in Bulletin 106), namely, that approximately 80 pounds of potash (160 pounds of the muriate) was sufficient for the potato crop on the Charlton series of soils on the College farm.

The omission of either nitrogen or phosphoric acid was less important than the omission of potash. No increases in yields were obtained from more than 100 and 160 pounds per acre of these nutrients respectively.

#### Agricultural Economics

The department has continued the general project dealing with farm organization and land utilization in the Eastern Highland and in the Connecticut Valley. Various subprojects falling under these main projects have been initiated, completed, or are in the process of development. Three main lines of attack have been developed in each: (1) studies relating to the economic significance of soil type; (2) studies relating to farm organization and management; and (3) in the case of the Connecticut Valley, a project involving a study of the prices of tobacco.

A special short time study of taxation was conducted during the past summer and brought to completion.

**Eastern Connecticut Highland.** In the Eastern Highland the five-year study begun in the summer of 1927 is entering upon its fourth year. It is being conducted in cooperation with 160 farmers whose farms were mapped in detail and subjected to soil survey and classification. The labor and other costs of production and the yields expressed in physical, as well as economic terms are measured or estimated each year with respect to measured areas of land on each farm. Part of the farmers keep complete farm records and from all farms complete financial estimates are secured as a basis for studying the organization of the farm business. An attempt is being made to account for the basic relationships between cost, as measured in both the physical and

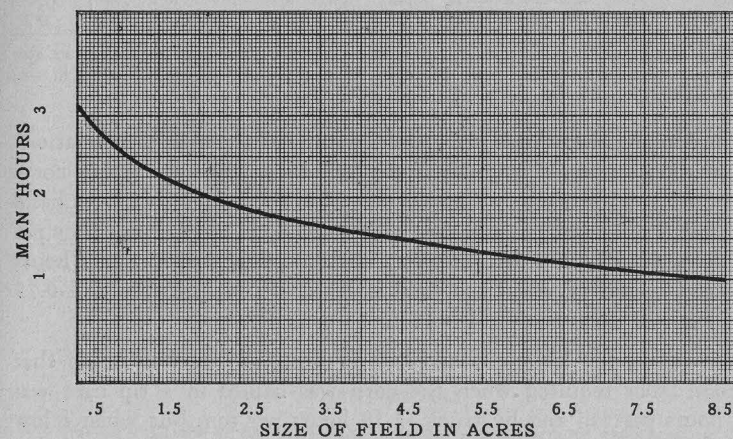


FIGURE 3. Relation between size of field and number of man hours used in cultivating corn.

economic terms, and output in the hope that eventually these figures may be used in discovering the most profitable system of farm organization for given sets of prices and given natural conditions. Data have been analyzed along two lines during the past year.

#### (a) Labor costs of producing hay and silage.

The purpose of the first of these subprojects was to determine the extent of differences in the labor cost of producing hay and silage and to attempt to account for the causes of these differences. The results were embodied in an extensive report which is being revised for publication. It was found, among other things, that the size of fields

has an important relationship to labor costs. The following table shows the rate at which man labor cost per acre drops as the size of field increases.

*Decrease in the Number of Man Hours Per Acre in Plowing, Cultivating, Mowing, and Raking as the Size of the Fields Increases*

	SIZE OF FIELD IN ACRES										Total Decrease
	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 4.5	4.5 to 5.5	5.5 to 6.5	6.5 to 7.5	7.5 to 8.5	8.5 to 9.5	9.5 to 10.5	
	DECREASE IN MAN HOURS										
Plowing	1.92	.88	.56	.44	.35	.29	.28		.40*		5.12
Cultivating	.81	.37	.23	.18	.15	.12	.12	.08			2.06
Mowing	.50	.23	.14	.12	.09	.08	.07	.05	.04		1.37
Raking	.26	.12	.08	.06	.05	.04	.04	.02	.03	.02	.72

\*This represents the decrease in time between fields averaging 8.5 acres in size and those averaging 6.5 acres, since the only fields between 7.0 and 8.0 acres in size were plowed with a tractor and were therefore not included.

In producing silage corn the yield per acre has an important relationship to the number of man hours per ton necessary for cutting corn. Where the yield is from 4 to 7 tons per acre the average cost with hand cutting is 1.45 hours per ton, but where the yield is 10 to 13 tons per acre the average cost is .84 per ton. With machine cutting, 0.33 hours per ton is necessary when the yield is 7 to 10 tons per acre and 0.23 hours per ton when the yield is 10 to 13 tons per acre.

In studying the labor expenditures in filling silos it was found that the man labor required when the corn was hauled in a tip cart was 2.53 hours per ton and by truck, 2.39 hours per ton, but when a low wagon rack was used the man labor required was reduced to 1.9 hours per ton. Since silo filling is one of the farm operations which makes a very heavy demand on the labor supply of the farm, a careful study was made of the labor costs of silo filling. It was found that 31 man hours per acre, or 3.28 man hours per ton were required to fill silos; that silo filling in competing dairy regions was carried on at considerably lower labor costs; and that there was a wide range of difference in the labor costs on different farms in Connecticut. In order to ascertain the possibility of reducing labor costs in silo filling, three farmers cooperated in putting into practice the best known methods of organized silo filling. This involved the use of no new machinery except the making of a low wagon rack—a job which can be done very quickly and at practically no extra expense to the farmer. On these test farms the labor was reduced from the average of the region, 31 hours per

acre, to 10.18 hours per acre, practically one-third. The labor cost per ton was reduced from 3.28 hours, the average for the region, to 1.22 hours per ton—a saving of approximately 63%. These savings were effected by improved organization of the silo filling crew. The number of men per crew is cut approximately in half without any substantial addition to the amount of work per man.

(b) *Net productivity of different soils in producing hay.*

Another unit of this study was completed with the development of a statistical approach to certain agronomic questions basic to land utilization research. The purpose was to determine the degree to which

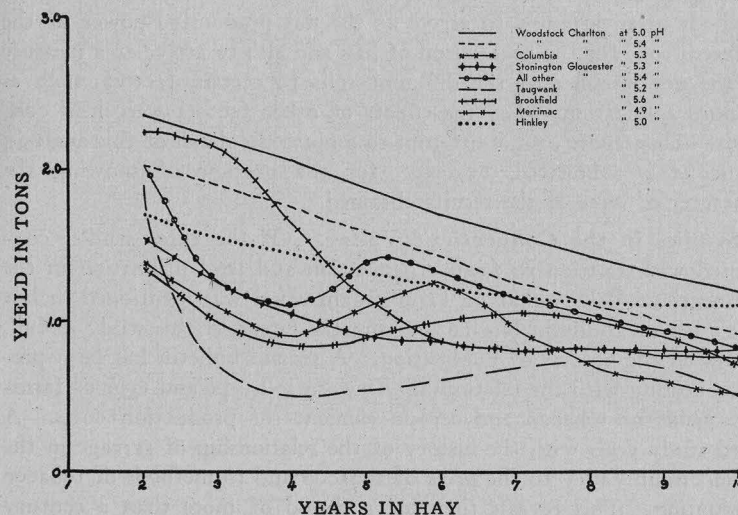


FIGURE 4. Yield of hay on several soils; no manure applied after seeding.

soil type, soil series, amount of manure and fertilizer, soil acidity, and the number of years since the field had been seeded, were responsible for hay yields in Eastern Connecticut. The following table shows the extent of the relationship found to exist between soil type and yield.

*Relation of Soil Type to Hay Yield in Eastern Connecticut on 190 Dairy Farms*

Soil Groups	1928			1929		
	No. Farms	Av. Crop Index	St. Dev. of Av.	No. Farms	Av. Crop Index	St. Dev.
I	33	109.1	39.2	29	114.1	41.1
II	37	102.9	33.5	30	104.5	33.9
III	13	94.4	31.8	12	101.0	39.1



Although these averages may be indicative of superior productivity of farms having over 75% of their improved area on soils of Group I, they do not explain why there is such a wide scatter around these averages. The standard deviations are large in every case, about one-third the size of the average, which indicates that there are wide variations in the crop indices of these farms which cannot be explained on the basis of the above soil grouping. The problem of the study was to measure by methods of multiple and partial correlation (Beane's method) the effects of the various factors responsible for the wide dispersion about the average crop index. The effects of these factors were successively eliminated through various statistical and logical methods in an attempt to arrive at the net productive power of the different soils for the production of hay and also to arrive at a measure of the net response of the different soils to certain factors, such as manure application, when the effects of other factors were held constant. This report cannot attempt to go into the detail of this analysis. Figure 4 is submitted, however, for the purpose of showing the character of some of the results obtained.

**Studies in the Connecticut Valley.** Of the three studies conducted with relation to farm organization and land utilization in the Connecticut Valley, that on farm organization was mentioned in last year's report. Bulletin No. 165, giving the report of this study in full, is now in the process of publication. A second bulletin has been prepared dealing with the relationship between soil type and type of farming, yields of tobacco and certain elements of production costs. A third study deals with the history of the relationship of acreage in the Connecticut Valley to the price of tobacco and to methods of tobacco production. This reveals that for a period of more than a century there has occurred an ebb and flow of tobacco production in the various sections of the Connecticut Valley. The areas have expanded when prices and costs of production have been favorable to the farmer and have contracted when they have become unfavorable. In general, there is a section which may be called "the heart of the Valley" including a few towns on either side of the Connecticut River and adjacent to it, in which tobacco production remains fairly constant irrespective of economic conditions. About this there is a zone in which the volume of production tends to advance and recede as conditions become more or less favorable. The three studies noted above have all been completed and will be published during the coming year.

**Factors affecting the price of tobacco.** A fourth study relating to the agriculture of the Connecticut Valley is at present being carried on in cooperation with the United States Bureau of Agricultural Eco-

nomics. This project is entitled "The Determination of the Factors Affecting the Prices of the Various Types and Classes of Cigar-leaf Tobacco." Its purpose is to determine the relationships which have prevailed between cigar-leaf tobacco prices and such factors as the supply of tobacco, its quality, numbers of cigars produced, and the general price level, and to deduce from these past relationships probable future trends in tobacco prices.

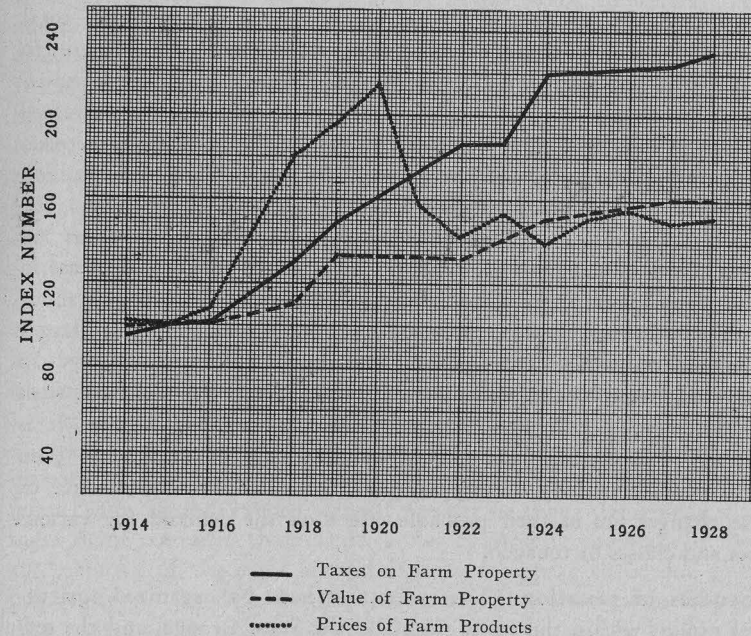


FIGURE 5. The trends of prices of farm products, value of farm property and taxes on farm property.

Since 1922, the annual average prices of the various types and classes of cigar-leaf tobacco have fluctuated widely. The ranges in cents per pounds have been: Connecticut Valley Broadleaf 18.9 to 30.0; Connecticut Valley Havana Seed 16.1 to 31.5; N. Y. and Pa. Havana Seed 15.3 to 37.0; Wisconsin types 9.0 to 16.0; Miami Valley types 8.5 to 17.5; Pennsylvania types 10.4 to 18.1. Preliminary analyses have indicated the necessity of a separate determination of the price factors for each type and class of cigar-leaf tobacco and the inadequacy for that purpose of the data now available. Prior to 1922, crop estimates of cigar-leaf tobacco were made only as state totals. Since that year each type

has been estimated separately. Complete separation by types of the stocks of tobacco held by dealers and manufacturers was begun in 1929. Longer series of comparable data are necessary for detailed price analysis.

Tobacco dealers and farmers in Connecticut have cooperated in furnishing information as to the quality and price of their tobacco of each crop and each type. It is planned to obtain similar information from others of these two groups. These sources should yield fairly reliable measures of the price and quality of Broadleaf and Havana Seed during the past 15 or 20 years. Within that period the total acreage of those two types of tobacco has varied from 19,300 acres to 35,134 acres and many significant changes have occurred in the industry. The number of cigar factories in the United States has decreased from 20,555 in 1912 to 7,502 in 1929. The number of large factories has increased; factories producing annually more than forty million cigars each increased in number from 11 in 1921 to 28 in 1928. The total cigar production of the United States has decreased from 7.6 billion cigars in 1913 to 6.4 billion in 1928 with a further decrease in 1929. The use of cigar manufacturing machinery has brought about the concentration of cigar production in fewer factories. A larger proportion of low-priced cigars is now produced than formerly. In 1921, 26 percent of the cigars were intended to retail at not more than five cents each; in 1928, 52 percent were in this price class. It is generally agreed that the quality of this class of cigars has been improved substantially during the past 10 years. The significance of these changes lies in their probable effect on the demand for various types and classes of tobacco.

**Studies of taxation.** The interest evinced by organized agricultural groups within the state, especially the State Grange, and the setting up of a permanent Taxation Committee by the Connecticut Agricultural Policy Conference, resulted in the undertaking of a special project entitled "A Survey of Taxation in Connecticut with Emphasis upon its Relation to Agriculture." For the prosecution of this study the services of Dr. M. Slade Kendrick of Cornell University, a specialist in public finance, were secured. This study consisted of two parts: first, a study of the taxation loads borne by Connecticut farmers, and second, a survey of public receipts and expenditures, both state and local, and of public debts and their trends, for the purpose of arriving at some conclusions with relation to the interests of the property owner, especially the farmer, in the taxation problem. A full report is in process of publication.

## Animal Diseases

### Studies on infectious abortion in cattle.

(a) *Establishment and maintenance of abortion-free herds.* At the present time there are 80 herds, representing a total of about 2300 head, under observation. Of this number, five were free from positive reactors to the agglutination test for infection with *Br. abortus* on the initial test. In 35 herds Bang's disease has been completely eradicated through systematic blood testing and nearly so in 16 others. Nine additional herds which discontinued testing after eradicating the disease make a total of 49 clean herds with a total of over 1400 head. During the past year 29 new herds have been placed under test. Four of these were free from infection on the initial test and seven others, from which the reactors have been removed, were free on the last test made this year. The total number of blood samples tested during the year was 7523, of which 2779 were sent to the laboratory. (Project No. 1a. In cooperation with Dairy Husbandry.)

(b) *Types of Br. abortus recovered from 129 cases of undulant fever.* A comparison of Huddleson's dye plate method and the glucose utilization method of McAlpine and Slanetz has shown that the results obtained by these two methods are in close agreement. Both procedures were employed in a study of 129 strains of *Br. abortus* of human origin. Of 111 strains isolated from cases of undulant fever in the United States, 45 were found to be of the bovine type and 66 of the porcine type by both methods of differentiation. Eighteen additional strains obtained from Denmark and Sweden were of the bovine type. In regions where more swine are raised than cattle, as for example in the State of Iowa, the majority of the cases of undulant fever appear to be due to the porcine type. On the other hand, in areas where more cattle are raised than swine, as for example in the State of Michigan, the bovine type appears to be the principal causative agent. The ratio of bovine to porcine types, based on the total number of strains studied (129) is 63 to 66, whereas the ratio of the total number of cattle to swine in the states and countries from which these strains were obtained is about 12 to 17.

(c) *Studies on microbial dissociation in the abortus-melitensis group.* Further studies on the "mucoïd" form of *Br. abortus* have shown that antisera prepared by the injection of ordinary *Br. abortus* cells will agglutinate ordinary cells but will not agglutinate mucoïd cells, whereas antisera prepared by injecting mucoïd cells will agglutinate both mucoïd and ordinary cells of *Br. abortus*. This condition suggests that the mucoïd forms of *Br. abortus* and possibly *Br. melitensis* possess a double



antigen complex as compared with only one complex in the normal type. In common with other capsulated bacteria, the mucoid cells have poor agglutinogenic properties, and rabbits which have received injections show the presence of agglutinins only after repeated large doses. Further studies are in progress to show the serological relation of the mucoid forms of the bovine and porcine types of *Br. abortus* to *Br. melitensis*.

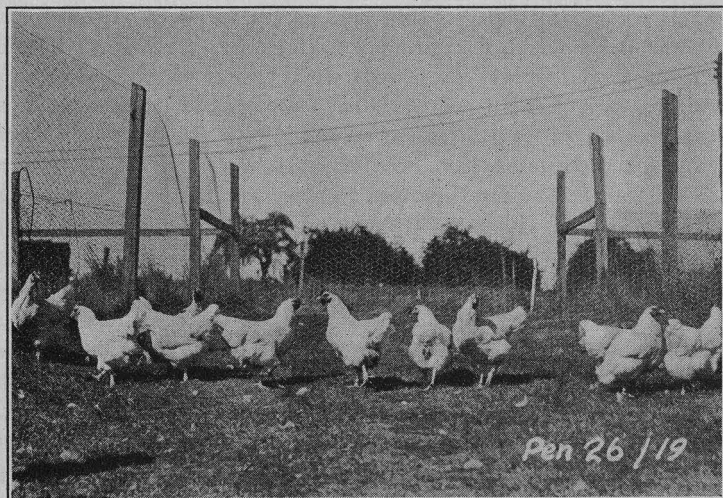


FIGURE 6. White Plymouth Rocks, Egg Laying Contest of 1930. First Prize for all round excellence. Owned by E. H. Rucker, Ottumwa, Iowa.

(d) *The occurrence of Br. abortus infection in man.* Increased interest during the past year in the occurrence of undulant fever in Connecticut has been reflected in the number of human blood samples submitted for diagnosis. This year, 325 samples were received as compared with 174 during the previous year. Fifty-one of these agglutinated *Br. abortus* antigen in dilutions of 1:100 or higher; 64 in dilutions of 1:50; and 74 in dilutions of 1:25. Clinical histories obtained in 15 cases were characteristic for undulant fever. Seven of ten cases recognized during the last four months of the year occurred in rural and three in urban districts. A greater incidence of infection has been observed in males than females. In 20 of 26 cases on which clinical data are available the agglutinin titer of the patient's serum has been greater than 1:1000, and in only two cases less than 1:100.

**Blackhead of turkeys.** The work of 1929 was a continuation of the experiments of preceding years which were reported in Station Bulle-

tin No. 156 (April, 1929). The main purpose of the investigation is twofold; namely, to determine further the influence of frequent ground rotation on blackhead mortality, and to obtain additional information regarding the role that the ordinary barnyard fowl plays in the transmission of the infection, the chickens acting more or less as passive carriers.

The experiment of 1929 supported the earlier conclusions that weekly rotation is an important means of reducing blackhead mortality to a low and insignificant rate, as the following table shows.

TURKEY LOTS	ORIGINAL NUMBER IN LOT	DEATHS FROM BLACKHEAD	PERCENT. DEATHS FROM BLACKHEAD
(1) Winter Control	51	12	24
(2) Summer Control	51	9	18
(3) Rotation	50	4	8

The experiment also emphasized the importance of allowing the ground to rest during the winter and spring months (Lot 2 as compared with Lot 1). Added evidence has been obtained to incriminate chickens as gross carriers of blackhead. In order to extend this phase of the general investigation two new yards (100 by 100 feet) have been added to the previous plant. These are filling an important need in the 1930 program.

**Infectious Mastitis.** The prophylactic use of autogenous herd bacterins as a means of preventing the spread of bovine infectious mastitis has been tried on three commercial dairy herds within the state for the past two years. No severe cases of mastitis have occurred in two of the herds during the past 18 months. An occasional case of mastitis has occurred in the third herd. For the most part these have apparently been caused by staphylococci as indicated by bacteriological examinations of the udder secretion from the affected animals. Several animals in the same herd have continued to give "thick milk" at irregular intervals. Failure to detect an appreciable number of bacteria of any kind, either by direct microscopic examination or by cultural examination of the udder secretion of these animals suggests some other cause than bacterial infection as the responsible agent for the "thick milk."

The predominant kinds of bacteria recovered from 102 milk samples from active cases of mastitis received during the past two years are as follows: Beta streptococci 57, alpha streptococci 31, gamma streptococci 6, staphylococci 11, diplococci 4, negative 3. It has been observed that one or several of these organisms may be the cause of udder inflammation in a given herd.

**Studies on a pullorum-like disease in domestic fowl.** A study of a disease outbreak affecting adult barnyard fowl and young chicks,

and apparently caused by an organism which is not identical with any that have hitherto been described was begun in January of this year. The mortality observed in young chicks has varied from five to seventy percent and in adult stock from five to twenty-five percent.

The causative organism was isolated on liver infusion agar and was found to be non-motile and non-sporulating and to stain readily with ordinary dyes. Primary cultures failed to grow on standard nutrient agar and the same agar plus 1 percent glycerol. The isolations from chicks and adult birds all showed marked pleomorphism. Many of the cells were elliptical, averaging  $2\mu \times 2.5\mu$  in size and occurred singly or in pairs while others were quite large rods or short filaments, assuming giant forms at times and appearing swollen or club-shaped. The diameter of these forms often attained  $3-4\mu$  and the length from 5 to  $20\mu$ . Other cells were decidedly smaller and occasionally resembled *S. pullorum*.

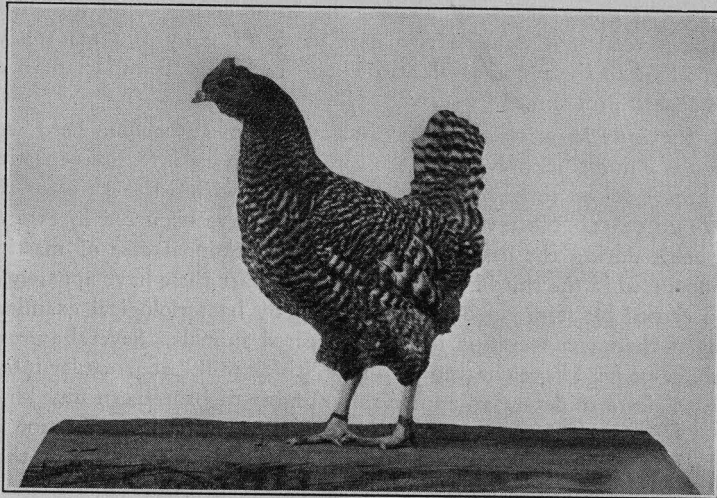


FIGURE 7. Barred Plymouth Rock No. 24, Egg Laying Contest of 1930. 334 eggs in 365 days. Owned by James Dryden, Modesto, Calif.

The organism in question has been found to resemble *S. pullorum* serologically and also in ability to ferment differential sugars in broths prepared from sugar-free meat infusion. On the other hand, it differs materially from the well known *pullorum* disease organism in morphology, cultural requirements and virulence for adult birds.

## Dairy Husbandry

**Infectious abortion in cattle—methods of control and eradication.** So far as the college dairy herd is concerned the principal object at present is to determine the practicability of maintaining a herd free from *Brucella abortus* infection. The herd has been free from abortion since June, 1925. No particular precautions have been taken other than with reference to the introduction of animals. The barns are open to visitors at any and all times and there are animals in the community that are known to be infected. Notwithstanding these conditions the herd has continued to give every evidence that it is entirely free of infection with *Brucella abortus*. The agglutination reactions of all animals over six months of age in the herd during the past four and one-half years have been studied. 178 females were involved. 1798 individual tests have been made on animals which varied all the way from a few on young heifers to over thirty on cows that had been continuously in the herd during this time. In making the agglutination tests the Animal Diseases Laboratory has continued to use dilutions of 1-25, 1-50, 1-75, 1-100, 1-150 and 1-300. In all of these tests not a single positive reaction has occurred.

1599 of the individual tests have been entirely clear in each tube  
(0 0 0 0 0)

140 tests gave a slight agglutination in the first tube (? 0 0 0 0)

9 tests gave a 2 + reaction in the first tube (2 + 0 0 0 0)

2 tests gave a 3 + reaction in the first tube (3 + 0 0 0 0)

37 tests gave some reaction in the first tube and ? in the second

1 test reacted in the first tube and gave a 2 + in the second

7 tests gave some reaction in the first two tubes and a ? in the third

3 tests on two different animals gave a 2 + ? ? ? 0 0 reading.

Among all of these tests only the latter three would have been looked upon with a degree of suspicion in an infected herd. Those tests reacting slightly in the third tube (1-75) would have been marked doubtful in the summary but would not be looked upon with any great suspicion. It should also be noted that none of the tubes gave a reading of 4 + in either the first or second dilutions.

These results show clearly that full positive reactions do not occur in a clean herd. Also they demonstrate what had been our previous observation, that some non-specific reactions, usually slight, may occur in the lower dilutions, particularly the 1-25 and 1-50.

**Corn silage feeding investigations.** During the past two winters three trials were conducted to determine the optimum amount of silage for the ration of dairy cows. The combined results of these



three trials, all of which were in agreement, may be briefly summarized as follows:

	HEAVY SILAGE	LIGHT SILAGE
Silage consumed	36,578	18,319
Hay consumed	10,579	14,834
Grain consumed	9,471	9,416
Dry matter consumed	27,677	27,053
4% milk	25,616	25,763
Weight change	-72	-120
Feed cost* 100 lbs. milk	\$1.93	\$1.73

\*Grain valued at \$52, hay \$16, and silage \$9.

In each trial one group of animals was fed about the standard amount, slightly over three pounds of silage per hundred pounds of live weight, while the other group was fed exactly one-half as much. In other respects the conditions were the same for both groups, except that the animals were allowed to eat all of the hay they would clean up in two feedings per day.

The trials demonstrated that the animals on half the usual amount of silage were able to maintain their milk yield and their weight as successfully as the other group. No more grain was required, but naturally the group on limited silage consumed more hay than the other group. When calculated on the basis of cost of feed, with grain at \$52.00 per ton, hay at \$16.00 per ton, and silage at \$9.00 per ton, the group receiving heavy silage produced milk at a cost of \$1.93 per hundred as compared to \$1.73 per hundred for the light silage fed group. In case the prices of roughage were varied to suit other conditions it may be stated that with silage at \$5.00 per ton, hay could be valued at \$23.00 per ton before the feed cost of milk production became equal for the two groups.

**Effects of freezing on milk.** In continuing the project on frozen milk a series of experiments was conducted to ascertain the effect of homogenization on the stability of casein when milk was held in a frozen state. The frozen milk was held at  $+10^{\circ}\text{F}$ . and  $-14^{\circ}\text{F}$ . for four months. Milk was homogenized at 2000 and 4000 pounds pressure. The results obtained with the control milks both at  $+10^{\circ}\text{F}$ . and  $-14^{\circ}\text{F}$ . are in perfect agreement with the results of previously reported experiments. That is, there was only a slight precipitation of casein when milk was held at  $-14^{\circ}\text{F}$ . but at  $+10^{\circ}\text{F}$ . a heavy precipitation of casein occurred.

Homogenization of milk at 2000 pounds per square inch caused a slightly greater increase in precipitation of casein as compared with the control lots when the milk was held at  $+10^{\circ}\text{F}$ . When milk was homogenized at a pressure of 4000 pounds per square inch and held at  $+10^{\circ}\text{F}$ . the precipitation of casein occurred approximately twice as rapidly as that homogenized at 2000 pounds.

At the holding temperature of  $-14^{\circ}\text{F}$ . the precipitation of casein was not influenced by homogenization pressures.

**Chemical investigation of gargety milk.** A chemical analysis of gargety milk was begun during the past year in an effort to determine some of the chemical characteristics of gargety milk as compared to normal cow's milk.

The total nitrogen content of 56 samples of gargety milk averaged 643.75 milligrams per 100 cc. of milk, varying from 332.30 to 1150.10 milligrams per 100 cc.

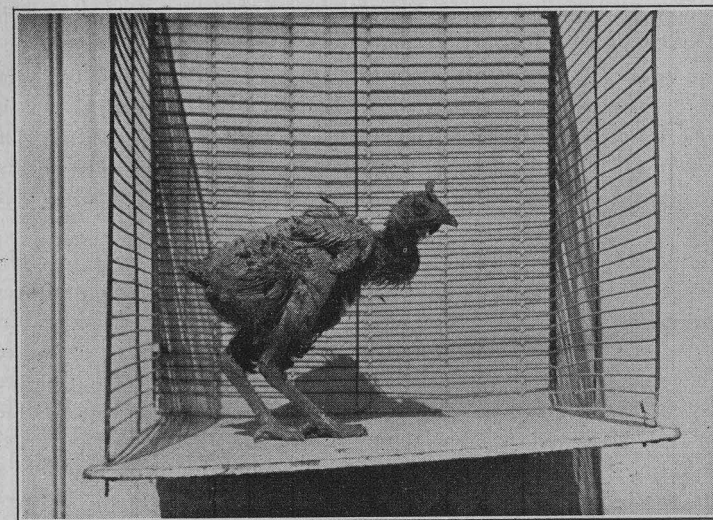


FIGURE 8. Genetically pure (homozygous) Frizzles are frequently almost bare of feathers. In this condition they are not good breeders.

The total nitrogen content of normal milk was found to be 485.56 milligrams per 100 cc. Thirty-three samples of gargety milk contained more and nineteen samples contained less total nitrogen than the average of the normal milk.

Likewise the amino nitrogen content of gargety milk was higher than that of normal milk. Normal milk was found to contain 12.36 milligrams of amino nitrogen whereas gargety milk contained 36.55 milligrams per 100 cc. of milk. The amino nitrogen content of gargety milk varied from 16.8 to 112.0 milligrams per 100 cc. of milk. In no case was the amino nitrogen content of gargety milk lower than the average of normal milk.

**A study of the cost of cooling milk by electrical refrigeration on farms.** Data on the cost of cooling milk with electricity have been collected for a period of one year. Cooling tanks of the wet storage type were studied on seven farms in North Coventry, Connecticut. A summary of the year's study shows that:

1. The average cost of cooling 100 pounds of milk with electricity for the wet storage type of cooling tanks on seven farms was 15.07 cents.
2. The average investment in the cooling unit (compressor) and wet tank was \$343.57 and \$125.41 respectively.
3. The average number of kilowatt hours of power needed to cool 100 pounds of milk was 1.103.

**The effect of homogenizing pressure on the body and texture of ice cream.** Many ice cream manufacturers have wondered if it is possible to use a higher homogenizing pressure as a substitute for gelatin. In other words, can a suitable body in ice cream be obtained by increasing the homogenizing pressure and reducing the percentage of gelatin?

Preliminary results indicate that it is possible to secure a smooth, velvety body in ice cream by increasing the homogenizing pressures and reducing the gelatin. The additional cost of current used when homogenizing at 3000 pounds rather than at 2500 pounds per square inch is very slight. It was found that 1.5 kilowatts of electricity were needed to homogenize a 50 gallon mix at 2500 pounds pressure while 2 kilowatts were needed when homogenizing at 3000 pounds pressure. The additional power per 50 gallons of mix would cost 1.5 cents at a 3 cent power rate. If the gelatin were reduced from 0.4 to 0.1 percent a saving of 1.425 pounds of gelatin per each 50 gallon batch would be effected. With gelatin at 40 cents a pound the net saving for each 50 gallon mix would be 55.5 cents.

### Animal Breeding

**Inbreeding experiments with white leghorns.** The actual breeding work has been discontinued. A large amount of observations, collected in these experiments, remains to be analyzed. One inbred line, showing a strikingly high embryo mortality early in incubation has been purchased by the Bureau of Animal Industry for a study of the factors involved in this mortality. Another line is being used in inbreeding work at Mount Hope Farm, Williamstown, Massachusetts.

**Rumplessness.** An attempt is being made to select for a high grade of intermediate rumplessness in order to secure material for a genetic

study of the intermediate condition. It also was decided to search for linkage between rumplessness and any other easily classifiable morphological character. A linkage, if found, would be helpful in differentiating the mode of inheritance of rumplessness and intermediate rumplessness. The first character to be tested for linkage with rumplessness is crest.

**The creeper fowl.** A series of further matings has added considerable evidence concerning the lethal nature of the Creeper gene in homozygous condition. It was found that not only do the homozygous

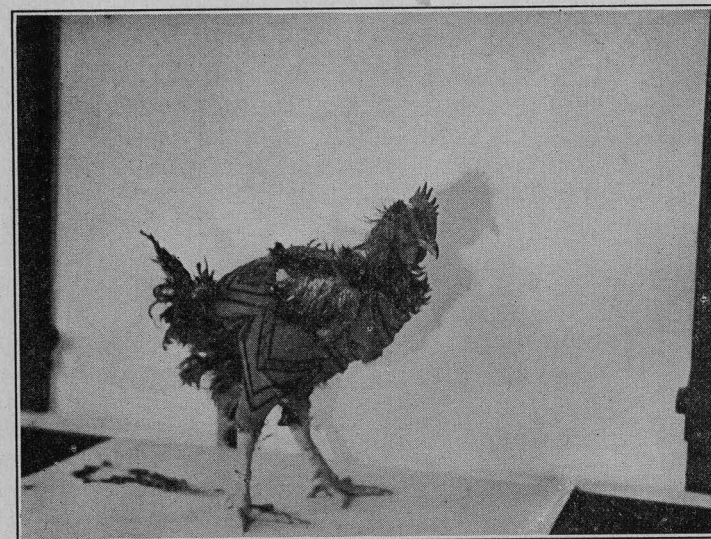


FIGURE 9. If Frizzle fowls are kept in a heated room or provided with a covering as shown above, they will develop good plumage. (See Figure 10.)

embryos not survive but even in heterozygous condition the Creeper gene has a slight lethal effect. This is demonstrated by the fact that in inter-se matings of Creepers as well as in crosses between Creepers and normal fowl there is an excess of Creepers among the chicks which failed to hatch and a deficiency of Creepers among the hatched chicks. These deviations from the expectation are significant and demonstrate the pathological nature of the Creeper condition. A histological comparison of Creeper and normal bones has demonstrated a close relationship of the Creeper condition to chondrodystrophy. The endochondral ossification of the long bones is strikingly deficient.



**The frizzle fowl.** An analysis of the experiments with Frizzle fowl demonstrates that there are at least three distinct types of frizzling: homozygous Frizzles which are almost bare and if feathered have an extremely curly plumage; exhibition-type Frizzles with a complete body covering consisting of feathers with a rather high grade of frizzling; and  $F_1$ -Frizzles from out-crosses to normal fowls, showing only a low expression of the Frizzle character.

Crosses of normal females to a male of any of the three different Frizzle types gives a normal hatchability. In crosses of exhibition-type Frizzles inter-se and of homozygous females to normal males, however,

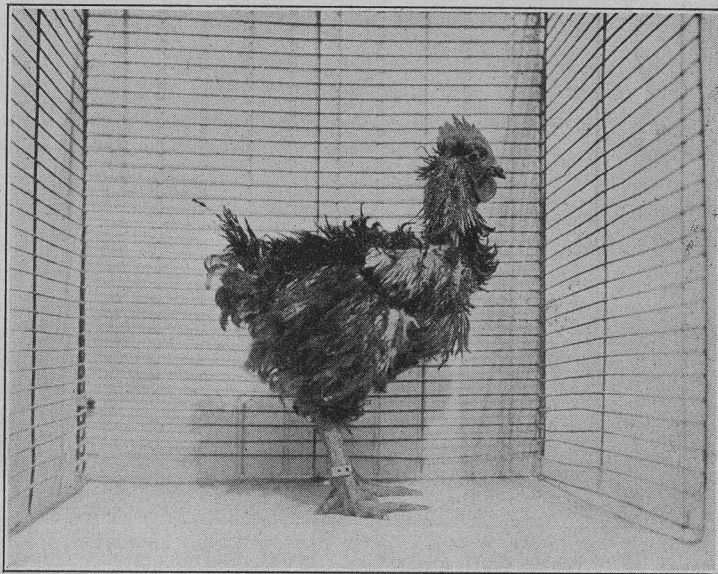


FIGURE 10. A Frizzle with good plumage as a result of wearing the "overcoat" shown in Figure 9.

the hatchability is very low, while it is normal if  $F_1$ -Frizzle females are used.

Among the homozygous Frizzles a high percentage of both males and females remains immature. Males of this type show degenerative changes in the tests.

Exhibition-type and homozygous Frizzles show a higher food consumption than do normal chickens. It is assumed as a working hypothesis that the basal metabolism of Frizzles is increased in proportion to the deficiency of the plumage. This will be tested experimentally.

The feathers of  $F_1$ -Frizzles, exhibition-type Frizzles, and homozygous Frizzles show increasing structural deficiencies.

**Cross-beak.** A mating between two pullets and a cockerel all showing a marked bending of the upper beak gave a considerable progeny consisting exclusively of normal chicks. This indicates that the cross-beak condition is not inherited.

### Home Economics

**Factors that determine standards of living in farm homes.** This is the general title of a series of studies started in 1928 in 160 farm homes in eastern Connecticut. The first phase to be attacked was a sub-project entitled "Factors and Conditions Affecting the Amount and Use of Family Income in the Eastern Highland." The majority of these families have kept monthly accounts of all family expenditures for varying lengths of time.

In a preliminary analysis a random selection of ten account families was taken from the total, in an attempt to discover the trend of expenditures between native and foreign born families. The percentage distribution shows several interesting facts. The amount spent for food among the foreign born families was 4% higher than the amount spent by the native families. On the whole the foreign born expenditures appear higher than those of native born families for food, housing, clothing, and personal items. There is nothing conclusive regarding these percentages, as the sample is too small, but it may show the way the trend lies in this section of the state. It is comparatively simple to get accurate figures for the various items of family expenditures, whereas any workable estimate of the cash income available for farm family living expenses is difficult to obtain. It was finally decided that the cash income, which is the difference between the cash receipts and the cash expenditures gave the best figure for their income. To this was added any outside income they might receive, the farm produce used calculated on a retail basis, wood and ice supplied by the farm, and 10% of the house valuation as rent, in order to make an amount which might be considered a family income figure. During this period, the average income computed in this way for the whole group was \$1885.67, of which \$1951.34 represented the average income for the native born and \$1819.60 for the foreign born families.

### Poultry Husbandry

**The Storrs laying contest.** More 300-egg hens than in all the previous years put together constitute one outstanding feature of the test that ended October 23, 1929. These twenty hens include Barred

Rocks, White Leghorns, Rhode Island Reds, and Australorps, sent from Connecticut, Oregon, New York state, Missouri, Massachusetts, and Vermont. The most significant record, though perhaps not the most sensational, is the flock average of 205 as compared with the best previous record of 188 eggs per bird. This average is based on the 1000 pullets that were entered, irrespective of whether there was a full complement at the finish.

Up to 1923 any pen of ten hens that could lay from 2000 to 2200 eggs was an almost certain winner, whereas in 1928 and 1929 the two leading pens each laid over 2900 in 51 weeks and one of them made the total of 3014 eggs in one year. Obviously, poultrymen are doing better breeding and better grooming, and it is hoped that the station has made some small contribution by way of better feeding and better management.

An examination of the records of all the Rhode Island Reds that have participated in this project during the last 18 years shows that increased production in this breed amounts to almost exactly two eggs per hen per year. Thus the average annual yield for Reds has increased from about 140 eggs in 1911 to nearly 180 eggs per bird.

Analyses are being made of the records of other breeds, including Rocks, Wyandottes, and White Leghorns. These breeds like the Reds, all show a distinct trend upward in the matter of egg production.

### Rural Sociology

**The character of the rural population.** During the past year, investigators again went into the towns of Killingworth, Goshen, Cheshire, Ellington, East Windsor, and Orange, and gathered further material regarding the families in these towns. Previous investigation furnished the basis for the bulletin, "The Genesis to Farming Occupations in Connecticut," published in October, 1929, as Bulletin 161. The new data are now being analyzed with a view toward presenting additional information regarding the characteristics of rural Connecticut population.

As yet, only one very definite result has been reached. It is quite evident that there is no principle or solution which can be applied generally to the social problems of the farmer in this state. The investigations in several towns show quite clearly that there is an individualistic character to each town which differentiates it from any of the others. Because of these marked differences, the problems facing each group and, in fact, those facing single individuals within the separate groups, depend in great measure on the immediate environ-

ment and are not applicable to the state at large. For example, it has already been ascertained that income and rate of mobility have a rather low negative relationship in all towns completed, with the exception of Killingworth where there is a comparatively high relationship between these two factors. The latter, no doubt, indicates the rather large group of people who have spent mobile lives and have come into the towns seeking a place to retire. This group, in contrast to the group that has always lived in towns and whose income has depended largely on what they have made from the farm, has an ample sum in investments, and this supplements, to a large degree, the remuneration from farm operation.



FIGURE 11. A row of Italian dwellings in Cheshire, with tidy yards and grape arbors.

Income and home equipment score show the consistently high positive relationship which might be expected. This seems to carry out the adequacy of the method, since it is evident that those families with the largest income will have the better homes regardless of the availability of such community conveniences as electricity and water power.

When the rate of mobility of the head of the family and the organizational membership of the family as a whole were compared, there was a relationship which was slightly negative, except in the case of Orange which showed a fairly high negative relationship. This seems to indicate that the more mobile people do not participate in local activities to the same extent as do the people who have lived in the town most of their lives.



In correlating home equipment scores with years of schooling, and with the number of newspapers and magazines read by the family, it was found that in both cases there were indicative positive relationships. These findings bore out the expectation that the better educated and more widely read people would tend to have more home conveniences.

Comparisons between home rank score and organizational membership have not been completed for all of the towns, but from the results at hand, there is a marked relationship between the higher home rank score and organizational memberships.



FIGURE 12. A prosperous dairy farm in Cheshire, owned by a family of native stock.

In examining the average rate of mobility it was found that the foreign-born cooperators had an average mobility rate only slightly higher than the native-born. This slight difference can no doubt be accounted for by the one extra move necessarily made by the foreign-born people in coming to this country. There is also a brief period of unrest in the lives of these immigrants while they are becoming adjusted to their new status of life. Discounting the brief period of rapid moves, the data would seem to indicate that the foreign-born farm people are more stable than are the native-born.

When the data have been completely analyzed and correlated, it will be possible to present fully the sociological "picture" of each of these towns. The present study aims to discern the problems which are before the residents of these six towns, and to give in that way a suggestion as to the social problems of the rural resident in Connecticut.

## PROJECTS ACTIVE—1930-1931

### Agronomy

7. Factors that may influence the vigor of seed potatoes.
  - a. When free of the virus diseases.
    1. Maturity when dug.
    2. Plant nutrients available for "seed" crop.
  - b. Rapidity of spread of the virus diseases in various sections of Connecticut.
12. Alfalfa experiments.
  - a. Fertilization.
  - b. Nurse crops.
  - c. Dates of seeding.
14. The maintenance and improvement of pastures.
  - a. The effects of fertilizer treatments on the soil, the flora, and the production as measured by grazing.
  - b. Effect of time of cutting on bushes and weeds.
  - c. Response of pasture species to plant nutrients.
  - d. A study of the adaptability of varieties and species of grasses and clovers for pastures.
  - e. Relation between chemical reactions of the soil and the response of vegetation on permanent pastures.
16. Fertilizing the dairy farm rotation to determine:
  - a. If manure should be applied to corn or hay.
  - b. If manure should be reinforced with superphosphate.
  - c. If fertilizer should be used as a "starter" for the corn crop, when manure is applied at 12 tons per acre.
19. Hubam for hay and nurse crop.
20. Test of legumes to seed in small grains.
21. Biennial sweet clover for Connecticut pastures.
25. Rate and method of applying fertilizers for corn.
26. Rate and method of applying fertilizers for potatoes.
27. Response of various crops to different levels of fertility.

### Agricultural Economics

2. The economic significance of soil type.
  - a. Studies in the Eastern Highland.
  - b. Studies in the Connecticut Valley.
  - c. Types of farming.
3. The economic conditions affecting agriculture in the Connecticut Valley.
  - a. An economic study of the tobacco industry.
  - b. A study of tobacco farm organization in selected areas.
  - c. The determination of the factors affecting the prices of various types and classes of cigar leaf tobacco. (In cooperation with the U. S. D. A.)
4. Farm taxation studies.

### Animal Diseases

1. Studies on infectious abortion in cattle.
  - a. Establishment and maintenance of abortion-free herds by periodic blood testing and complete segregation of non-reacting animals and disposal of reactors. (With Dairy Husbandry.)
  - b. Studies on the metabolism of the abortus-melitensis group.
  - c. Studies on microbic dissociation in the abortus-melitensis group.
  - d. The occurrence of bact. abortus infection in man. (With State Department of Health.)
  - e. Types of Br. abortus.
  - f. Mode of transmission of Bang's disease.
2. Blackhead in turkeys. (With Poultry Husbandry.)

3. Studies on infectious mastitis.
  - a. Efficacy of autogenous herd bacterins in the control of bovine mastitis. (With Dairy Husbandry.)
  - b. Differential studies on streptococci of bovine origin.
4. Further studies on a pullorum-like disease affecting young and adult domestic fowl.
5. Studies in infectious tracheitis. (With Poultry Husbandry.)

#### Dairy Husbandry

1. Infectious abortion in cattle—methods of control and eradication. (With Animal Diseases.)
2. Studies on corn silage for dairy cattle.
  - a. Influence of the quantity of silage in the ration on the cost of production.
  - b. The succulent value of silage.
3. Inheritance of fat percentage in the milk of dairy cows.
7. A study of herd records of four dairy breeds.
13. A study of the effects of freezing and storing in a frozen state upon the physical-chemical properties of milk and milk products.
14. Infectious mastitis.
  - a. Efficacy of autogenous herd bacterins in the control of bovine mastitis. (With Animal Diseases.)
15. A study of the cost of cooling milk by electrical refrigeration on farms.
16. The effect of homogenizing pressure on the body and texture of ice cream.

#### Genetics (Animal Breeding)

2. A study of the factors involved in the hatching of eggs.
  - a. Genetic (lethal) factors as a direct cause of low hatchability and a study of the embryonic expression of such factors. (Creeper fowl.)
  - b. Genetic factors as an indirect cause of low hatchability. The possible bearing of genetic characteristics upon the metabolism of the chicken and, thereby, upon the hatchability of the egg. (Frizzle fowl.)
  - c. External factors acting upon the chicken or directly upon the egg in their relation to hatchability and embryonic mortality.
  - d. The influence of external agents upon physical characteristics of the constituents of the egg during incubation as compared with normal conditions, with special reference to viscosity.
4. Studies on the inheritance and linkage relations of morphological characters in poultry. (Frizzle, Creeper, Rumpless, Cross-beak, etc.)
5. Experiments concerning the physiology of moulting and of pigmentation.
6. Experiments concerning the influence of heavy metal treatment of males upon the mortality of their progeny by untreated females.

#### Home Economics

1. Factors that determine standards of living in farm homes.
  - a. Factors and conditions affecting the amount and use of family income in the Eastern Highland.
  - b. An economic analysis of the food consumed by a selected group of families in the Eastern Highland.

#### Poultry Husbandry

6. Storrs International Egg Laying Contest.
8. Blackhead in turkeys. (With Animal Diseases.)
9. Studies on infectious tracheitis. (With Animal Diseases.)

#### Rural Sociology

1. The origin and character of the rural population.
  - a. The vocational genesis of Connecticut farmers.
  - b. The mobility of the rural population in Connecticut.
  - c. Recreational facilities and their use by the rural population.

## PUBLICATIONS

### Bulletins

- No. 157. THE SHEEP STOMACH WORM.
- No. 158. STUDIES ON INFECTIOUS MASTITIS WITH SPECIAL REFERENCE TO STREPTOCOCCI—FIRST REPORT.
- No. 159. CORN SILAGE FEEDING INVESTIGATIONS—RELATIVE FEEDING VALUES OF THE DRY MATTER OF DIFFERENT TYPES OF SILAGE CORN ENSEILED AT DIFFERENT STAGES OF MATURITY.
- No. 160. THE CAUSES OF DEGENERATION OF IRISH POTATOES IN CONNECTICUT.
- No. 161. THE GENESIS TO FARMING OCCUPATIONS IN CONNECTICUT.
- No. 162. REPORT OF THE DIRECTOR, 1929.
- No. 163. STUDIES ON THE PLUMAGE OF THE SILVER SPANGLES FOWL.

### Journal Papers

- ANDERSON, E. O. and PIERCE, R. L. Some Chemical Changes in Frozen Milk Occurring in Storage. *The Milk Dealer*, Vol. 18, No. 12, pp. 60-63. September, 1929.
- BROWN, B. A. Reseeding Pastures. *Rural New Yorker*, pp. 670-671. May 17, 1930.
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- \_\_\_\_\_. Pasture Fertilization. *Rural New Yorker*, pp. 320-321. March 1, 1930.
- \_\_\_\_\_. Controlling Weeds and Bushes in Pastures. *Rural New Yorker*, p. 87. January 18, 1930.
- \_\_\_\_\_. Fertilized Pastures in Dry Weather. *Rural New Yorker*, p. 1484. December 14, 1929. (Also in *Eastern States Cooperator*.)
- \_\_\_\_\_. Effect of Time of Cutting on the Elimination of Bushes in Pastures. *Jour. Amer. Soc. Agron.*, Vol. 22, No. 7, pp. 603-605. July, 1930.
- ✓ DAVIS, I. G. Significance of Soil Type in Farm Economy. *Amer. Farm Econ. Review*. July, 1929.
- ✓ DUNN, L. C. and LANDAUER, WALTER. Further data on a case of autosomal linkage in the fowl. *Jour. of Genetics*, Vol. 22. 1930.
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- \_\_\_\_\_. and MCALPINE, J. G. Types of Br. abortus Recovered from 129 Cases of Undulant Fever. Accepted for publication by the *Jour. Inf. Dis.*
- \_\_\_\_\_. Microbic Dissociation in the Abortus-Melitensis Group. Observations on the Mucoid Form. *Jour. Inf. Dis.*, Vol. 46, No. 4, pp. 315-323. April, 1930.



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RETTGER, L. F. and PLASTRIDGE, W. N. Eradicating Infectious Abortion. New England Homestead. November, 1929.

✓ MCALEPINE, J. G. and WARNER, D. E. A Comparative Study of the Intradermal Pullorin Test and the Routine Agglutination Test. Jour. Amer. Vet. Med. Assoc., Vol. 77. July, 1930.

### CHANGES IN STAFF

#### Appointments:

J. S. Owens, M.S., *Assistant Agronomist.*

H. B. Boyd, B.S.A., *Assistant Economist.*

E. H. Spaulding, B.S., *Research Assistant (Animal Diseases).*

D. G. Steele, Ph.D., *Assistant Geneticist.*

Carroll D. Clark, M.A., *Associate Sociologist.*

Eileen Kennedy, B.S., *Research Assistant (Rural Sociology).*

#### Resignations:

J. G. McAlpine, Ph.D., *Bacteriologist.*

J. F. Markey, Ph.D., *Associate Sociologist.*

All of which is respectfully submitted.

WILLIAM L. SLATE,

*Director.*

### REPORT OF THE TREASURER

FOR THE YEAR ENDING JUNE 30, 1930

#### Receipts

State Appropriations:		
Current Expenses .....	\$40,000.00	
Sheep Fund .....	2,000.00	
Federal Appropriations:		
Adams Fund .....	7,500.00	
Hatch Fund .....	7,500.00	
Purnell Fund .....	30,000.00	
Miscellaneous Receipts:		
Sales of Produce, etc. ....	5,004.61	
Fees—Infectious Abortion ..	5,433.98	
Fees—Advanced Registry ..	5,763.44	
Interest .....	350.00	\$103,552.03
Balance July 1, 1929 .....		1,874.86
		<u>\$105,426.89</u>

#### Expenditures

Salaries .....	\$57,711.76	
Labor .....	15,699.72	
Stationery and Office Supplies ..	1,479.48	
Scientific Supplies Consumable ..	2,441.27	
Feeding Stuffs .....	3,958.12	
Sundry Supplies .....	1,339.38	
Fertilizers .....	670.80	
Communication Service .....	622.99	
Traveling Expense .....	7,015.89	
Transportation of Things .....	360.48	
Furniture, Furnishings and Fixtures ..	2,478.11	
Library .....	820.76	
Scientific Equipment .....	2,525.59	
Livestock .....	260.00	
Tools, Machinery and Appliances ..	94.23	
Buildings and Land .....	531.50	
Contingent Expenses .....	993.33	\$99,003.41
Unexpended Balance .....		6,423.48
		<u>\$105,426.89</u>