

DEPT. OF AGRICULTURAL ENGINEERING
V. P. I., BLACKSBURG, VIRGINIA

1931

1931

ANNUAL REPORT

PROJECT NO. 10

AGRICULTURAL ENGINEERING DEPARTMENT

EXTENSION DIVISION

VIRGINIA POLYTECHNIC INSTITUTE

December 1, 1930 to November 30, 1931

Blacksburg, Virginia,
December 31, 1931.

Director John B. Hutcheson,
Extension Division,
Virginia Polytechnic Institute,
Blacksburg, Virginia.

My Dear Director Hutcheson:

I have the honor to submit herewith annual report of extension work in agricultural engineering in accordance with Project No. 10, Cooperative Extension Work in Agriculture and Home Economics, Virginia Polytechnic Institute, for the period beginning December 1, 1930 and ending November 30, 1931.

GENERAL DISCUSSION

Agricultural engineering extension work necessarily differs from most other agricultural extension projects. In the agricultural engineering projects a careful survey and study of conditions, plans and recommendations are necessary on practically every problem encountered. This necessarily takes time and much office work.

The increasing demands from county agents and farmers for engineering aid cannot be ignored, consequently considerable time is spent in answering these individual requests. These requests demand considerable individual attention that often means personal service to the farmer. However, a certain amount of this is not only necessary but advisable. Every effort is being made to place as much of our work as possible on a basis that will instruct more groups and cut down individual personal service to a minimum.

In spite of the poor economic condition of the farmer, the requests for engineering service has grown. In fact, many of the requests received for engineering service were prompted by necessity for help in emergencies and it is gratifying that we were able to be of help in such emergencies resulting from drouth, etc.

Through irrigation we have helped farmers solve the drouth problem. Through our water supply project we have assisted in securing new sources of water for livestock and domestic service where old sources failed. The low price of building materials has resulted in a greater demand than ever for the services of our farm building specialist. Farmers are taking advantage of low prices and doing a lot of building. It is estimated that the building done from our plans alone is over \$1,000,000

General Discussion (Con'd.)

in value during the year. Farmers are doing more terracing than ever, probably because money is scarce and this is an improvement that they can make without cash outlay. Farmers are securing electric service and installing labor saving equipment that is enabling them to cut costs and increase incomes. We feel that the agricultural engineering projects stressed during the year have been of great service to the farmer.

ORGANIZATION

There has been no change during the year in the organization of the extension personnel. Chas. E. Seitz, extension agricultural engineer has continued as head of the agricultural engineering department, directing all three phases of department activities, namely; resident instruction, research, and extension. He has handled the drainage, irrigation, and rural electrification extension projects during the year. A considerable part of his time has necessarily been given to department administrative duties. Offsetting this, however, the various members of the resident instruction and research staffs have devoted some time to extension work as explained later.

Prof. Jas. A. Waller, Jr., assistant agricultural engineer has devoted his full time to extension work during the year. He has been responsible for the extension projects in terracing, farm water supply and farm water power.

Prof. H. E. Gordon, assistant agricultural engineer, has devoted his entire time to extension work. Mr. Gordon has been responsible for the extension project in rural architecture.

The above named three agricultural engineering specialists carried on projects in the eighty-three (83) separate counties shown on the accompanying map.

SUMMARY OF SPECIALISTS' TIME

Name	Days In Field	Days In Office	Agents Visited	Visits To Counties	Counties Visited	Letters Written	Farmers Contacted
Seitz	96	175	21	61	23	1870	316
Waller	160	123	35	108	47	1117	785
Gordon	159	119	44	148	48	856	475
Totals	315	417	100	317	118	3843	1576

EXTENSION WORK BY OTHER MEMBERS OF DEPARTMENT

Mr. S. H. Byrne, while employed by the resident instruction division has devoted at least one-third of his time to the extension

Extension Work by Other Members of Dept. (Con'd.)

project in rural architecture, assisting Mr. Gordon in drawing plans, preparing blue prints, answering letters, etc. Mr. Byrne gave a radio talk the past year on "Planning the Farm Home".

Professor V. R. Hillman, who is on the resident instruction staff of the department, assisted with the rural electrification project, making several field trips and radio talks. He was co-author with Mr. Seitz of the Extension Bulletin on rural electrification. Prof. Hillman also assisted with the Boys Short Course at V. P. I., and in arrangements for the McCormick Celebration. The radio talks Prof. Hillman gave during the past year are as follows:

Electric Power for Feed Grinding
Electricity from the Farm Stream
Using Electricity on the Poultry Farm
What A 1000 kwhrs. Will Do on the Farm
Electricity in Dairying
Electricity on the Poultry Farm
Household Lighting

Professor P. B. Potter, who is employed for resident instruction and research, has helped with the extension project in farm home equipment, having given a number of radio talks and a series of lectures at the Adult Camp at Jamestown. He also assisted with the Boys Short Course and the McCormick Celebration. Prof. Potter gave the following radio talks:

The Home and Heat
Household Engineering Research
A Budget for Home Conveniences
Farm Home Sanitation
Care of the Sewing Machine
Sewing Machine Adjustments
The Home Laundry
Home Heating (1)
Home Heating (2)

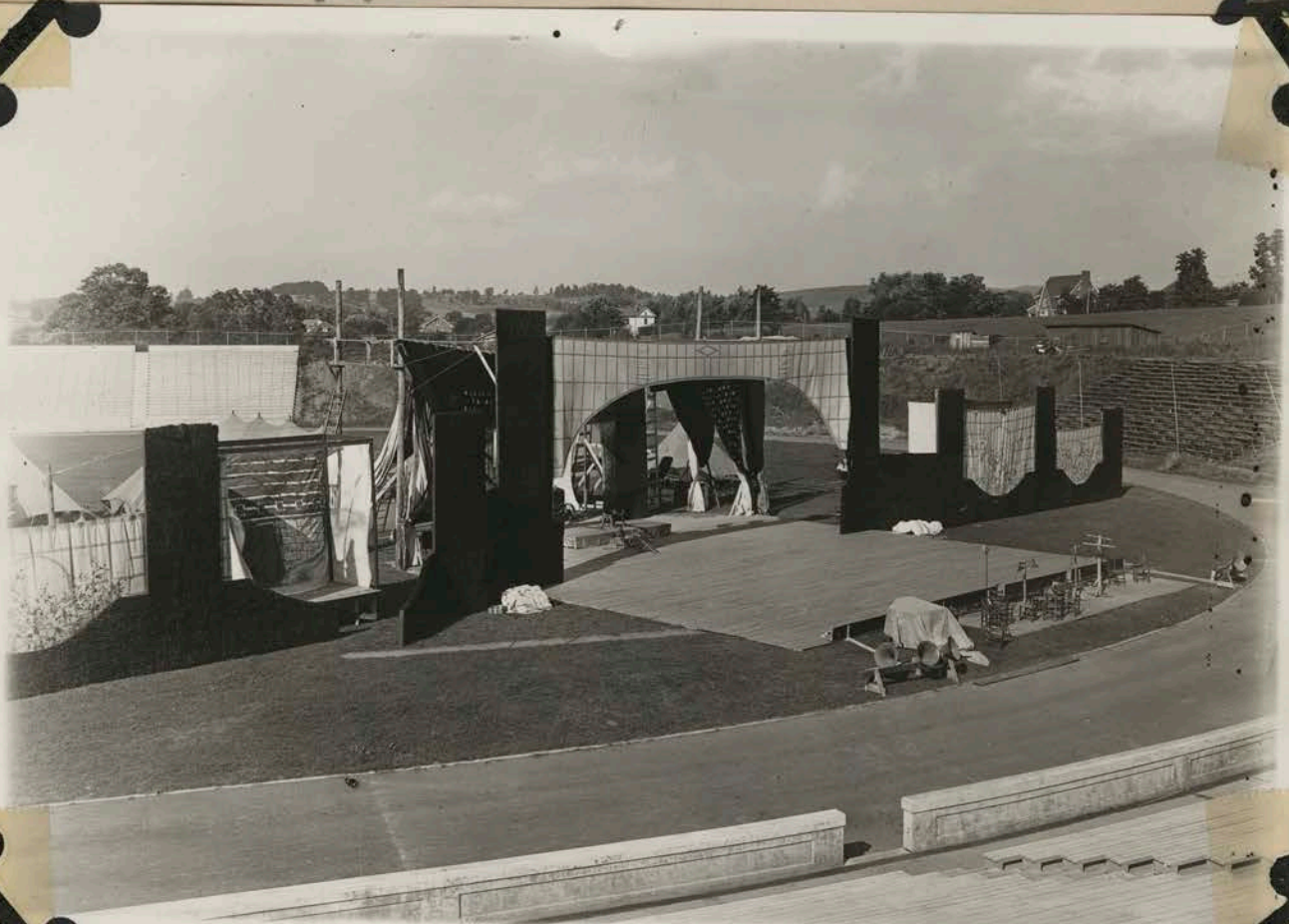
Professor J. W. Sjogren, who is employed for resident instruction and research, did some extension work. He handled a demonstration of harvesting and threshing lespedeza seed in cooperation with the Agronomy Department, answered letters, assisted with the Boys Short Course, and gave the following radio talks:

The Farm Shop
The Centennial of the Reaper
The General Purpose Tractor
Simple Mower Adjustments
Care and Repair of Agricultural Machinery

Extension Work by Other Members of Dept. (Con'd)

COOPERATIVE AGENCIES

In conducting the extension work in agricultural engineering, the engineers have cooperated with the Agronomy, Horticultural, Vegetable Gardening, Dairying, Agricultural Economics, Poultry, and Home Economics Departments and Specialists of V. P. I. Cooperative projects were also handled with such organizations as the Maryland & Virginia Milk Producers' Association, Valley of Virginia Milk Producers' Association, Richmond Cooperative Milk Producers' Association, Norfolk Milk Producers' Association, Dairy & Food Division, District of Columbia Board of Health, the Virginia Electric & Power Company, and the Appalachian Electric Power Company, as well as numerous farm equipment companies. These various cooperative relations and the results are explained under the discussion of the sub-projects.



Stage in V. P. I. Stadium
Where McCormick Day Pageant Was Held

PLAN OF WORK - LONG TIME PROGRAM

The long time program of work in agricultural engineering contemplates work in all the various sub-projects which for convenience in reporting, etc., are classified as follows:

Sub-Project 10-A, Land Reclamation

- 10-A-1, Land Drainage
- 10-A-2, Terracing
- 10-A-3, Land Clearing
- 10-A-4, Irrigation

Sub-Project 10-B, Farm Home Conveniences

- 10-B-1, Farm Water Supply
- 10-B-2, Farm Sanitation
- 10-B-3, Farm Home Equipment

Sub-Project 10-C, Rural Architecture

- 10-C-1, Farm Structures
- 10-C-2, Farmstead Planning
- 10-C-3, Rural Community Plans

Sub-Project 10-D, Farm Operating Equipment

- 10-D-1, Gas Engines and Tractors
- 10-D-2, Farm Implements

Sub-Project 10-E, Rural Electrification

- 10-E-1, Rural Line Extensions
- 10-E-2, Farm Water Power
- 10-E-3, Individual Light Plants

PLAN OF WORK FOR 1931

In the plan of work for 1931 major emphasis was placed on the following sub-projects:

1. Terracing
2. Farm Structures
3. Farm Water Supply
4. Rural Electrification

These projects are fully discussed later in this report, together with the work that was done on other sub-projects that were not given major emphasis.

WORK ACCOMPLISHED NOT IN PLAN

McCormick Celebration

At least two months of Professor Seitz's time was taken up with the voluminous details, etc. in arranging for the Cyrus H. McCormick Celebration. This program was prepared as the main feature of the Institute of Rural Affairs and was in celebration of the centennial of the invention of the first practical reaper by Cyrus H. McCormick on his Virginia farm.

Professors Potter, Hillman, and Sjogren of the instructional staff of the department also put in considerable time in preparing for this event. The program, (a copy of which is enclosed in the exhibit section of this report) consisted of a special luncheon for 500 invited guests, a band concert, motion picture of the "Romance of the Reaper", exhibit of working models of McCormick Harvesting Machines, barbeque, public program of addresses, and an elaborate pageant portraying the evolution of grain harvesting methods from the earliest historical period to the present time. The entire program was a splendid success. It is estimated that at least 10,000 people witnessed the pageant.

Farm Land Development Project

This project has been undertaken at the suggestion of the Bureau of Agricultural Engineering of the U. S. Department of Agriculture. The purpose, cooperative agencies and duties are set forth in the memorandum of agreement, copy of which appears in appendix. Professors Gordon and Seitz spent considerable time in selecting seventeen farms for this project. These farms are located as follows:

- 3 - Princess Anne
- 2 - Warwick
- 1 - Goochland
- 3 - Botetourt
- 1 - Roanoke
- 5 - Albemarle
- 2 - Rockingham

Surveys have been made and maps prepared of these farms. Soil surveys are now being made by Prof. Patterson of the Agronomy Department. Farm records are being made by the Agricultural Economics Department, and recommendations for improvement and development of these farms will be outlined after conferences with all interested parties this winter. The project will run over a period of years with complete records being kept to show results, etc.

Survey for Town Water Supply

Prof. Waller completed a survey for a water system for the town of Bland Court House. The county owns an excellent spring only two blocks from the court house and electric service is available. An automatic electric system with a concrete reservoir on a hill back of the court house was recommended. This system will supply the entire town and give considerable fire protection. Considerable assistance was also given the town of Blacksburg with their proposed water system.

Water Supply for Turkey Knob Orchard

Former Gov. H. F. Byrd was assisted in planning an adequate water system to handle spraying requirements in the Turkey Knob Orchard at Mt. Jackson, Virginia. This orchard which consists of 600 acres is

Work Accomplished Not in Plan. (Con'd.)

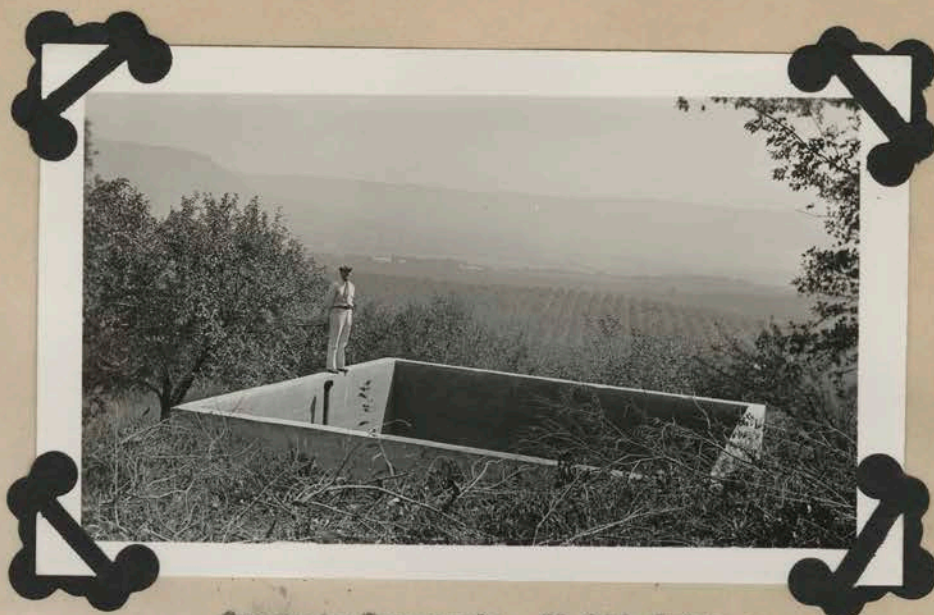
hilly and far from a water supply. Water was being hauled by tractor a distance of 3 miles and an elevation of 300 feet. At the urgent request of the owners the water supply specialist made a complete survey of the entire orchard, drew profile maps of the main pipe lines and all branches. A map was prepared and complete instructions furnished. A 30 g. p. m. pump with 10 horse power electric motor was installed. The system was used this season and according to letters received from Mr. Byrd and the manager, was entirely satisfactory.



Pump House at Creek, Turkey Knob Orchard Water Supply



One of the Many Water
Stations for Filling Spray Tanks.
Turkey Knob Orchard Water Supply

Work Accomplished Not in Plan. (Con'd.)

Concrete Reservoir, 30,000 Gallons
Turkey Knob Orchard Water Supply

Industrial Survey Report

Considerable time was spent by Prof. Seitz in preparing a report on "Power" for a bulletin on the "Industrial Development of Virginia". The Industrial Survey report is to be published in book form by the State Chamber of Commerce. The report on Power deals mainly with the electrical power situation in the state. Public Service companies, municipal, and private plants, steam and hydro-electric development and rural electrification are covered.

Stationary Spray Plants

Preliminary surveys and recommendations were made for the installation of seven (7) stationary spray plants in orchards, where such equipment will save labor and other costs and enable a much better spraying job to be accomplished.

Visits to Colleges

While on annual leave Prof. Seitz visited 19 different state colleges and universities. At some of these institutions methods of handling extension work in agricultural engineering were studied.

Advisory Committee, College Division, A. S. A. E.

A meeting of this committee of which Prof. Seitz is a member was attended at Washington, D. C. Recommendations dealing with resident instruction, research and extension were made by this committee. Prof. Seitz was appointed by the President of A. S. A. E. to be chairman of the College Division, A. S. A. E. for the year 1931-32.

National Research Council Meetings

Meetings of the National Council of Research in Farm Structures and the National Council of Research in Farm Operating Equipment were attended by Prof. Seitz who is a member of these councils.

Fish Ponds

Every year several requests are received for advice on building fish ponds. Several letters were written and bulletins mailed on this subject and three surveys made.



A Fish Pond on Farm in Bedford County

Work Accomplished Not in Plan. (Con'd.)

Apple Washing Equipment

Help was given the Horticultural Department in the design and construction of a home made apple grader.



Home-made Apple Washer in Orchard
in Clark County.
Constructed From Plans Furnished by V.P.I.



FIELD PROJECTS AND DEMONSTRATIONS

SUB-PROJECT 10-A. LAND RECLAMATION

10-A-1 - Land Drainage

Due to economic conditions this project has not been stressed for several years. Only urgent requests are taken care of and only in unusual cases is a farmer advised to tile drain. In most cases systems of surface drainage are advised. However, some tile drainage work has been done this year.

Results

Thirteen drainage surveys were made and recommendations proposed for draining about 730 acres. One of these projects was for the tile drainage of 100 acres on the municipal air port at Manassas, Virginia.

Plans were prepared for the tile drainage of a 30 acre field on the H. E. Yoder farm in Warwick County. This will be the third field Mr. Yoder has tile drained in the last three years. He has a power ditching machine and does his own work. He has secured splendid results from his drainage and expects to eventually have his whole farm tiled. Complete cost records and results are being kept of this project.

A number of letters from farmers were answered on drainage questions and bulletins on this subject mailed out. Two radio talks on the subject were given and one article written. The following bulletins were sent on request:

50 Tile Trenching Machinery
200 Farm Drainage
50 Drain the Wet Land

Outlook

As the proper tile drainage of farm land entails a considerable outlay of cash and since the farmer's financial situation is extremely poor, work of this nature will only be recommended under exceptional conditions. More stress will be placed on surface drainage to temporarily drain the land until such time that the farmer will be justified in making a cash outlay for tile drainage. The drainage project will not be stressed this coming year. Only urgent requests for assistance will be handled.

10-A-2 - Terracing

Soil erosion resulting from water run-off is a serious menace to profitable farming in at least 25% of the state. It occurs in every county but in some it is especially severe. Surveys conducted in typical counties of the state indicate that a large proportion of the land is eroding

Field Projects and Demonstrations, (Con'd.)

10-A-2 - Terracing

rapidly. Considerable farm land has been abandoned as a result of excessive erosion. The U. S. Bureau of Soils report that soil erosion carries away 20 times as much plant food material every year as is permanently removed by crops. Experiment station work and extension demonstrations have proven that by a proper system of terraces much of this soil and plant food loss can be prevented.

The terracing specialist was impressed this year with the greater interest in erosion control shown by the farmers in attendance at the meetings, etc. Farmers generally are becoming more concerned about soil erosion and more appreciative of efforts to help them control erosion. Terracing is an improvement that can be made without money outlay. It is therefore one of the projects that was stressed this year.

The work this year was conducted by means of adult demonstrations and boys terracing clubs.

Adult Terracing Demonstrations

An average of two adult terracing demonstrations were given in each of (16) sixteen counties. At these demonstrations two night meetings and one full day field meeting were held. At the night meetings illustrated lectures were given covering such subjects as the erosion menace, losses resulting from erosion, methods of control, use of instruments and machinery, etc. At the day meeting terraces were actually laid out and constructed on the farm and the farmers present were given actual practice in laying out the terraces and constructing them so that they could do this work themselves on their own farms.



A Terracing Demonstration for Colored Farmers in Brunswick County

Field Projects and Demonstrations, (Con'd.)10-A-2 - TerracingResults

Thirty-two (32) terracing demonstrations were held in the sixteen (16) counties shown on the accompanying map. At these demonstrations 63,725 feet of terraces were laid out and 7,225 feet of terraces constructed. The night meetings were attended by 207 farmers and the field demonstrations by 185 farmers. Four (4) radio talks on terracing were given and a number of bulletins mailed out on request.

The following bulletins on terracing were mailed from this office:

52 Gullies, How to Control and Reclaim Them
654 Terracing Farm Lands



Constructing Terrace at Demonstration on Farm
in Botetourt County

Outlook

Considerable more interest among farmers is now being evidenced in soil erosion due no doubt to extension work in terracing, establishment of National soil erosion stations by the government, and the great amount of National publicity on the subject. More time will be given to this project during the coming year. Terracing demonstrations will be given in at least twenty (20) counties.

Boys Club Terracing Project

Club work in this project was organized for the first time this year. While the project is new the results secured show that it is a worth while project and a good means of advancing terracing practice in the counties. Boys are naturally interested in learning to handle

Field Projects and Demonstrations, (Con'd.)10-A-2 - Terracing

surveying instruments. By training boys in each community there will be leaders to handle this work for farmers. The county agents, agricultural teachers and school principals are very much interested in this club project and have cooperated very effectively.



Terracing Club Class Receiving Instruction on Use
of Level for Laying Out Terraces.
Mecklenburg County

Terracing clubs were organized in five counties as follows: Campbell, Halifax, Mecklenburg, Pittsylvania, and Franklin. The county agent is the local leader of the project in each case but the agricultural high school teacher and principals cooperated in the work. One week was spent by the specialist in visiting the five counties for purposes of organization.

A total of five trips were made to each county club. The first three visits were for the purpose of giving instruction to the club members on such topics as control methods, plowing, planting, and cultivating terraced land, etc. The fourth visit was for the purpose of giving instruction on the use of the surveyor's level, while the fifth trip was given over to field instruction in laying out and constructing the terraces.

Results

One hundred and twenty-five (125) boys were enrolled in terracing clubs in the following counties:

Campbell County Club	-	20	boys	instructed
Halifax " "	-	30	" "	" "
Mecklenburg " "	-	35	" "	" "
Pittsylvania " "	-	14	" "	" "
Franklin " "	-	<u>26</u>	" "	" "
Total		125		

Field Projects and Demonstrations. (Con'd.)10-A-2 - Terracing

Several boys in each of these counties are now qualified to lay out and construct terraces in their counties.

Boys Club Class.
Instruction on
the Construction
of the Terrace.
Pittsylvania Co.

Outlook

This is a very promising project. It is hoped that the club project can be developed further this year. The work will be handled in about the same way during the coming year. Not less than one week in each of the three months, January, February, and March will be devoted to indoor instruction in at least five counties. It is possible that two weeks in each month might be used to advantage. The outdoor work or field demonstrations will be handled in September and November.

10-A-3 - Land Clearing

No work of any importance was accomplished on this project. Only letters of inquiry were answered and the following bulletins mailed out:

340 The Use of Explosives on the Farm

10-A-4 - Irrigation

The drouth of 1930 impressed many farmers with the necessity of supplementary irrigation. Many farms have available sources of water supply such as streams, ponds, wells or springs which can be utilized for irrigation purposes in dry years. Numerous requests for information on irrigation have been received. The several irrigation demonstration projects that have been in operation for the last few years are showing the possibilities and advantages of irrigation to supplement the rainfall. In dry years losses resulting from short crops are often sufficient to more than pay for the installation of an irrigation system. Thirty year records for Virginia show that an average of one year out of every three is too dry for good crop production and that nearly every season there is a dry period in which irrigation can be used to advantage.

Field Projects and Demonstrations. (Con'd.)10-A-4 - IrrigationOrchard IrrigationStrathmore Orchard Project

This was the third year of irrigation in this orchard. Mr. Wissler, the manager, states that he used practically as much irrigation water this year as last and that his results were splendid. He is more enthusiastic than ever in regard to orchard irrigation. He extended his system to 125 acres of apples which were irrigated this year. He expects to enlarge his pumping plant to double capacity for next year.

Luray Orchards

This was the second year of irrigation in this orchard. Mr. M. E. Roudabush, the owner, stated that he only made one irrigation this year but found out that this was not sufficient. He wishes now that he had made more irrigations. He is watering 200 acres of apples and has made several improvements to his system this year. This particular system was put in as an emergency irrigation project during the drouth of 1930.



Simple Irrigation
Outlet Used on Luray
Orchard Irrigation
Project. Page Co.

J. G. Hopkins Orchard

This project covers 75 acres of apple orchard and was installed during the drouth of 1930. It was only operated once this year but the owner now feels that he should have made several irrigations.

New Projects

Irrigation surveys have been made on 6 orchards totalling 486 acres of apples.

A 50 acre apple orchard spray irrigation project was started on the Tavenner & Zes Orchard in Woodstock. About ten acres of this orchard

10-A-4 - Irrigation

were equipped with orchard sprinklers for irrigation and were tested out for the first time this summer. The project was started late so complete results were not secured. The owners however were well pleased with the results so far. It is hoped that a full season of operation this coming year will demonstrate the advantages of this system of orchard irrigation.

Hale Orchard

A survey of a 20 acre orchard was made for irrigation in this orchard in Giles County. It has not as yet been installed.

Turkey Knob Orchard

A survey of about 150 acres was made and an irrigation system designed for this orchard. It has not as yet been installed.

Preliminary irrigation surveys were made on three additional orchards comprising about 260 acres.

Field Crops

Eight (8) surveys were made on as many farms for the surface irrigation of field crops. The acreage to be irrigated in these projects is approximately 350. All but two of these projects have nearby streams from which to pump the water for irrigation. On the other two farms the water will be pumped from wells.

Truck Crops

Six (6) surveys were made on as many farms for the irrigation of truck crops. These surveys covered approximately 96 acres of which at least three projects totalling 22½ acres of overhead sprinkler systems have already been installed.

Sanderson Irrigation Project

This project is typical of the way such work is handled so it will be explained in some detail.

Mr. J. W. Sanderson operates a 50 acre truck farm near Hollins, Virginia. The extension agricultural engineer asked him to give in his own words a brief description of this project which he has done as follows:

"At some time during each year of the fifteen years I have been farming this land, I have experienced the need for additional water for proper plant growth. Since my farm is located on rolling land about 130 feet above and over a half mile from an available source of water supply, I had no idea it would be practical to irrigate my farm. For years I have tried to purchase some land adjoining the stream so that I could irrigate it.

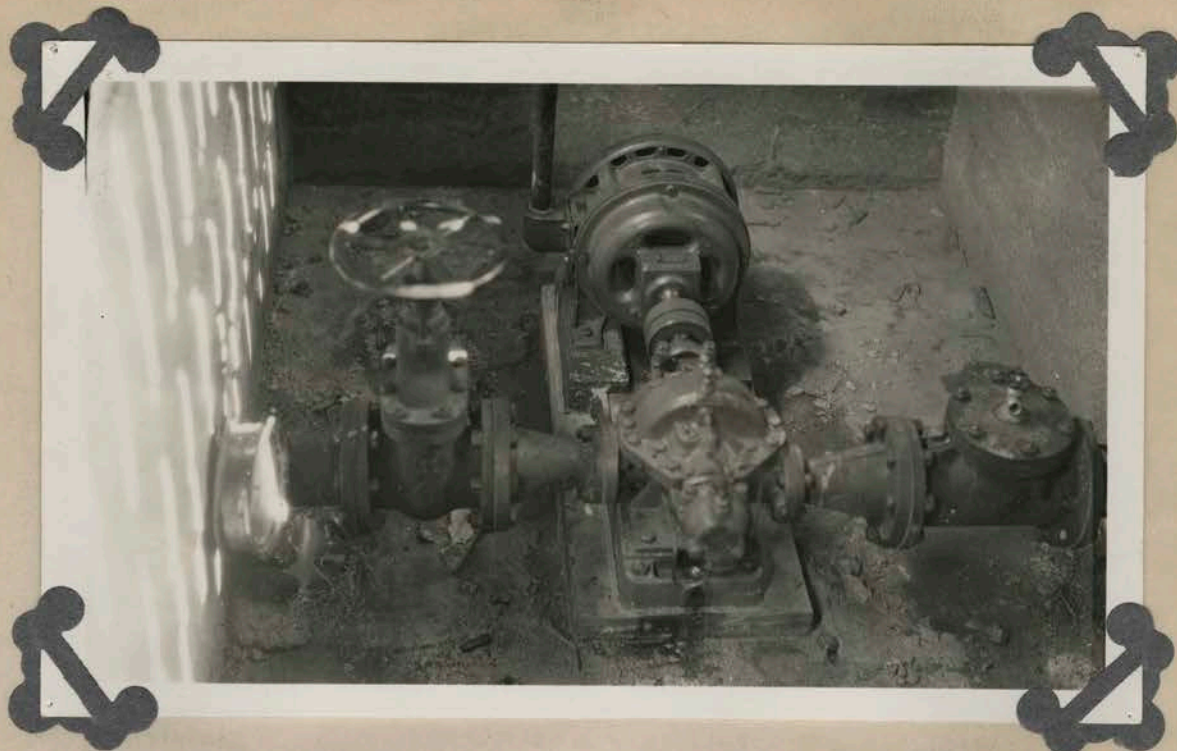
10-A-4 - Irrigation



1. Rear View of pump House Showing Intake Pipe From Stream to Pump House

"Last season (1930) I did not make expenses as all my crops were practically ruined from the drouth. An irrigation system would easily have paid for itself last season. I came to the conclusion that I must have water if I were to continue to raise truck, so I called on the agricultural engineer of the State Extension Division late in the summer of 1930. He told me of the irrigation pumping plant that he had helped Mr. Garland Hopkins install in his orchard in the adjoining county. After visiting this orchard and seeing the pumping plant in operation, I was convinced I could irrigate my farm. With the aid of the extension agricultural engineer and the agricultural engineer of the local power company I planned my overhead sprinkler irrigation system.

"I had tentatively decided on a site for the pumping plant on the stream on the adjoining farm," continued Mr. Sanderson. "This location would have necessitated the building of an electric line across private property that would cost \$500. The agricultural engineer suggested another site on this stream which was within 50 feet of an 11,000 volt, three-phase electric line along the highway. I was able to secure the right-of-way for the 5" main pipe line across my neighbor's farm and under the railroad track. I then secured the pump house site on the banks of the stream which is about 2500 feet from my property line.



2. Direct Connected Motor Driven Centrifugal Pump Supplies
 115 g. p. m. water under pressure

"I had planned to purchase 3000 feet of 6" galvanized iron pipe for the main line from the pump to the farm. This would have cost me 50¢ per foot for pipe alone or \$1500. The cost of laying would have been considerable. After a careful investigation the agricultural engineer advised getting second-hand 5" boiler tubing from the local railroad shops. I bought 5000 feet of this pipe for about \$200.00 or a saving of \$1300 over the galvanized pipe.

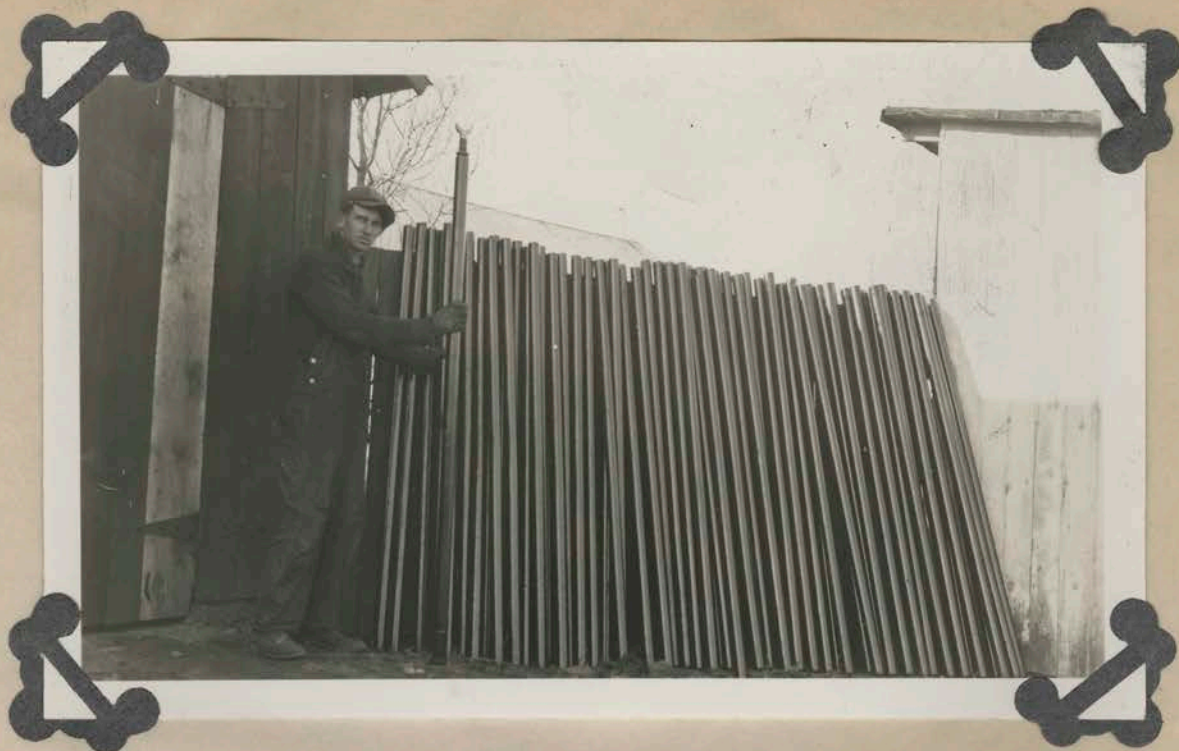
"We secured recommendations for the installation of standard automatic overhead irrigation equipment and lines from a representative of an irrigation company. To equip six acres with factory built-up automatic irrigation lines required an investment of about \$1800, however, as the capacity of the pump we had figured on would not operate this much equipment at one time with a high efficiency, we decided to use several of the sectional portable automatic lines which resulted in a saving of about 10 automatic oscillators which cost about \$30.00 each and a number of nozzles and overhead pipe lines. The overhead pipe line, globe valves and flush valves were purchased from a local dealer while the automatic oscillators, quick-acting couplings, roller bearing hangers, and nozzles were purchased from the irrigation company.

"By purchasing the valves and pipe for overhead lines locally and drilling the holes for the nozzles on the farm, I saved in the neighborhood of \$500.00 over purchasing this equipment direct from the irrigation company. The advice of the power company's agricultural engineer enabled me to save at least \$2500 on the installation of my irrigation system. This service which the power company is rendering is certainly of great value to us farmers."

Field Projects and Demonstrations. (Con'd.)10-A-4 - Irrigation

3.- 5" Second-Hand Boiler Tubing Was
Used on All Mains Which Resulted
In Considerable Saving

The complete cost of Mr. Sanderson's irrigation installation on 9 $\frac{1}{2}$ acres amounted to approximately \$3300. This amount also covers the cost of equipment on hand sufficient to install on two additional acres, (not including oscillators) and main pipe lines sufficient for about 20 acres which Mr. Sanderson hopes to get under irrigation in another season or so. The pumping plant consists of a 15 h. p., 3-phase, G. E. motor direct connected to a Worthington double suction centrifugal pump. This outfit delivers 115 gallons per minute against an actual head of 130 feet and handles about 2 acres at one time. At 2 cents per k.w.h. it costs Mr. Sanderson about 4 cents per thousand gallons to pump water for irrigation. Mr. Sanderson figures roughly that the irrigation he has done this summer has cost him about 25 cents per hour for power. In other words for about one dollar's worth of electricity he can put on one acre inch of water.

Field Projects and Demonstrations. (Con'd.)10-A-4 - Irrigation

4.-- 2" Second-Hand Boiler Tubing Used for All Over-Head Pipe
Line Supports. Cut, Fitted and Installed By
Own Labor.

Mr. Sanderson specializes in spinach, mustard, kale, and turnip salad, peppers, tomatoes, beets, carrots, strawberries, cabbage and egg plant. He raised the finest egg plant under irrigation this year that he has ever raised. It is easily the best in this section. His irrigation also enabled him to save his pepper and egg plant crops from the first killing frost.

On October 18 when the temperature dropped to 32° at 5 a. m. the pump was started and water sprayed on his peppers and egg plants until 7:30 a. m. On the 19th the temperature dropped to 28° at 2 a. m. so these crops were sprinkled from 2 till 7:00 a. m. On the 20th the temperature again dropped to 32° at 4 a. m. and the crops were again sprinkled from 4 to 7 a. m. This sprinkling prevented any frost injury whatever to the pepper plants and only slight injury to the egg plants while on other farms in the community similar crops were killed outright. It cost about \$2.50 for power to irrigate these three mornings for frost protection. Mr. Sanderson sold about \$200 worth of peppers and egg plants since the frost. In other words, by being able to prevent the loss of these crops from the first severe frost he was enabled to lengthen his season and sell his produce at a higher price. For an expenditure of about \$2.50 for power he secured a return of over \$200.00. Naturally he is well pleased with his first season's experience with irrigation.

Field Projects and Demonstrations. (Con'd.)

10-A-4 - Irrigation



5. Automatic Oscillators Turn Sprinkler Pipes From Side to Side so that Water is Evenly Distributed on Both Sides of Line



6. One of the Many Overhead Sprinkler Lines in Operation

Field Projects and Demonstrations. (Con'd.)10-A-4 - Irrigation

7. A General View of Part of the Sanderson Overhead
Irrigation Project

Outlook

Results of irrigation demonstrations indicate that by irrigation many farmers favorably situated as to water supply, topography of land, etc., can insure crops in dry years by means of irrigation and thus increase their income. There will no doubt be a steady increasing interest in this subject. While this project will not be stressed all requests for assistance will be taken care of as far as possible during the coming year. Records will be kept on the several installations made.

SUB-PROJECT 10-B - FARM HOME CONVENIENCES10-B-1 - Farm Water Supply

The 1930 Census of Agriculture lists 15,291 farms reporting water piped into the dwelling house with 10,032 reporting water piped into the bathroom. This means that less than 9 per cent have water piped to the dwelling and less than 6 per cent have water piped into the bathroom.

Running water in the home is essential to the housewife and the rest of the farm family and should be the first convenience installed. Running water in the farm home saves the mother foot steps and the drudgery of carrying water. It means better health and happiness for the whole family.

Field Projects and Demonstrations. (Con'd.)10-B-1 - Farm Water Supply

Since a higher standard of living on the farm is the ultimate goal of all extension work and running water is essential, this project cannot be stressed too strongly. It continues to be one of the major projects in agricultural engineering.

The real value of the water supply project has been very apparent the past two years. In dry years when springs and wells go dry this project becomes increasingly important as a relief project. Many of the calls received this year for assistance on this project were from stock farmers, orchardists, and other types of farmers who were in urgent and immediate need for water for livestock, for spraying orchards and even for domestic use. While the number of surveys is not as large as in recent years the requests were much more urgent.

Results

Farm water supply campaigns were conducted in nine (9) counties as follows: Accomac, Campbell, Floyd, Franklin, Montgomery, Patrick, Princess Anne, Pulaski and Rockbridge. In thirty-three (33) counties, 127 surveys were made. Each farm was visited and after a careful investigation and survey of conditions, suggestions and recommendations were made that contained a complete itemized list of equipment, costs, etc. necessary for the most economical and efficient installation for the particular job.

The different kinds of water supply surveys were as follows:

11	Gasoline Engine Systems	
23	Electric	"
5	Windmill	"
1	Water Wheel	"
16	Gravity	"
4	Rural Town	"
50	Single Acting Ram	"
12	Double	" " "
3	Hand Power	"
2	General Information	

129 - Total

In addition to the above a number of letters have been answered. The following listed bulletins were mailed out:

52	Construction & Use of Farm Wiers
100	Farm Reservoirs
300	Water Systems for Farm Homes
100	Farm Plumbing
300	Farmstead Water Supply
50	Simple Plumbing Repairs for the Farm

Field Projects and Demonstrations. (Con'd.)10-B-1 - Farm Water Supply

A large percentage of the surveys made will result in installations sooner than usual as most of them were for urgent needs.

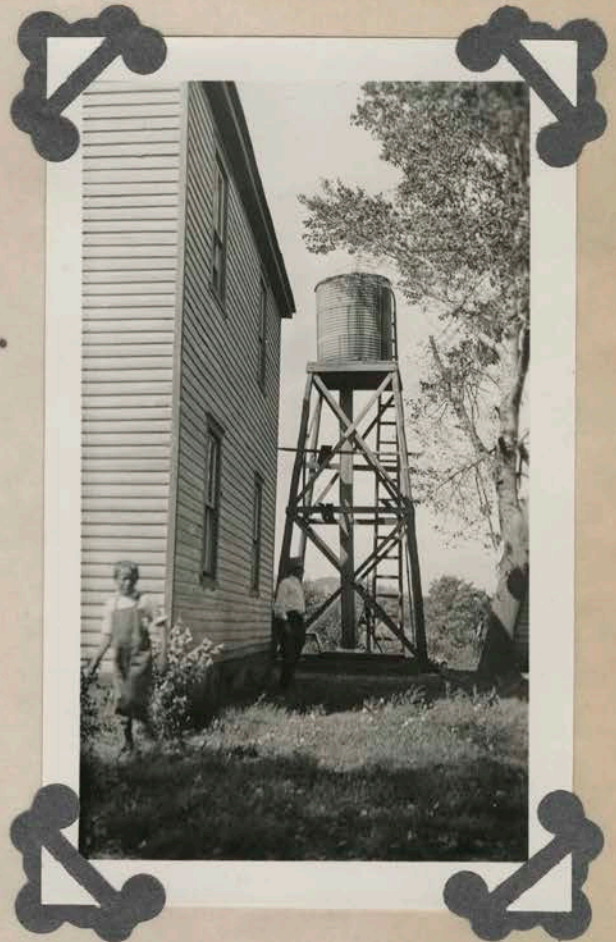
The following radio talks were given on this subject:

The Hydraulic Ram on the Farm
 Selecting the Farm Water System
 Sources of Farm Water Supply

Outlook

Many springs and wells have gone dry and others are still going dry. Sources of supply which have been in use for years have become inadequate. This condition will no doubt result in a considerable number of requests for help on this project during the coming year. Our plans therefore call for answering as many individual requests as possible but the main work will be devoted to water supply campaigns in at least ten (10) counties during 1932.

Storage Tank for Farm Water Supply.
 Farm in Bedford County.

10-B-2 - Farm Sanitation

As the State Health Department maintains sanitary officers in a number of the counties most work on this project is turned over to them. We only handle correspondence and field projects when on some other job.

Results

Six (6) surveys were made for sewerage disposal systems in Accomac, Albemarle, Botetourt, Dinwiddie and Pulaski Counties. Most of these surveys were for septic tanks. Numerous letters were written and the following bulletins were mailed:

120 Sewage and Sewerage for Farm Homes
50 Septic Tank System for Suburban and
Country Homes

Outlook

As the State Health Department is taking care of this work, we will not devote any time to this project. Only information will be mailed out on request and when in a county on some other project help will be given if needed.

10-B-3 - Farm Home Equipment

The only work done on this project was a series of lectures on household equipment given by Prof. Potter at the four day adult Jamestown camp. Although a number of letters were answered on the subject and bulletins sent out. Considerable electrical equipment has been installed in farm homes as a result of the work of the rural service engineers of the power companies who are cooperating with us on the rural electrification project. Seven radio talks were given on this project.

The following bulletins on this project were sent out:

50 The Well Planned Kitchen
50 The Farm Kitchen as A Workshop
400 Farm Home Conveniences
100 One Register Furnaces
50 Operating a Home Heating Plant
100 Methods and Equipment for Home Laundering

Outlook

This is an important project but lack of personnel prevents any stress being given to it. We will continue, however, to send out information on this subject and report the results of investigations conducted by Prof. Potter.

SUB-PROJECT - 10-C. RURAL ARCHITECTURE

10-C-1. Farm Structures

The Agricultural Census of 1930 does not list the value of buildings separately. In the 1925 Census, however, the value of farm buildings in Virginia is given as amounting to over \$286,000,000 or approximately 38% of the value of all land, machinery and livestock. The percentage

Field Projects and Demonstrations, (Con'd.)10-C-1 - Farm Structures

is probably larger this year. Farm buildings, therefore, represent a large part of the farm investment. The proper planning, construction and up-keep of these buildings is extremely important in the economy of the farm program. This project deserves to be stressed and is one of our most important projects. Probably more actual definite results are secured from this project than from any project of extension work.

In spite of the severe business depression and lack of money on farms, there was a greater demand on the farm structures specialist's time than in any previous year. And it is probable that more actual farm construction was done than in any previous year. This is largely accounted for by the fact that materials and labor were cheaper by at least 33-1/3 per cent than in previous years, and in the dairy field by increasingly strict regulations, necessitating immediate construction or remodeling. While this construction was very surprising after the severe drouth last year and existing business conditions, the greatly lowered costs made it desirable and economical, where finances could be arranged.

In handling this project the specialist not only prepared complete plans, blue prints, specifications and bills of materials but did field work which consisted of visits to the farms for a survey of the conditions and advice. The specialist cooperates closely with the various subject matter specialists involved such as the Horticulturist, Dairy Husbandman, Poultry Specialist, etc. He also cooperates closely with the various organizations such as Maryland Virginia Milk Producers' Association, etc.

Results

During the year the farm structures specialist made 148 visits to 48 counties, working with 42 county agents and visiting farmers on 385 projects. He worked also with 35 dairy inspectors and contacted 55 other individuals on various projects. 756 letters were written, 1784 bulletins mailed out and 159 days spent in field work. In addition to farm structures this specialist handled 5 drainage, 5 terracing, 5 rural electrification and 3 stationary spray jobs for other specialists.

Twenty-two hundred and sixty-two (2262) plans for farm structures were sent to farmers on request. This number, while only 90% of the number furnished last year, represents a larger percentage of actual building. It is conservatively estimated that the building done during the year from plans furnished represented considerably over \$1,000,000 in value.

Plans Sent Farmers by Request

Poultry	735
Dairy	1056
Gen. Purpose	44
House Plans	31
Hog House & Equip.	98
Storage Houses	85
Tobacco Barns	39
Miscellaneous	174

Field Projects and Demonstrations, (Con'd.)10-C-1 - Farm StructuresNew Plans Prepared

Twenty-eight (28) stock plans and 26 special plans were prepared, requiring 66 tracings in addition to the drawing. Of this number 8 were furnished the State Dairy & Food Division. These plans were as follows:

Stock Plans

A-8, 6-room bungalow - 2 sheets
 A-21, 6-room farm house, brick - 3 sheets
 B-1-a, Framing and ventilation details for Richmond Market
 B-8, Framing details for 1-story dairy barn, redrawn - 2 tracings
 B-10, 30-cow, 1-story dairy barn, redrawn - 2 tracings
 B-18, 10' x 20' dairy house plan, redrawn - 4 tracings
 B-22, 12' x 28' " " " " - 1 tracing
 B-24, 12' x 28' dairy house plan, redrawn - 2 tracings
 B-25-a, 22' x 28' " " "
 B-25-b, 22' x 28' " " "
 B-33, Bull pen
 B-36, Steam sterilizer for small dairies - 2 tracings
 B-37, Cold storage room for dairy
 B-38, 10-cow gambrel roof barn - 2 tracings
 B-39, Framing details for small dairy barns - 2 tracings
 B-40, 30' x 32' dairy house plan
 C-12-a, Feed rack for cattle
 C-16, Beef cattle barn
 F-11, Retraced
 F-11, F-12, Redrawn and combined on 1 tracing (outdoor roosting shed and wash hopper)
 H-20, 34' x 34' gambrel roof general purpose barn
 H-21, General purpose barn
 I-10, Gambrel roof 2-story implement shed
 J-12, Cinder block apple and vegetable storage
 J-13, Apple storage plan revised
 J-14, Apple storage plan revised
 L-4, Barley tobacco barn
 N-29, Outdoor toilet for Washington Milk Shippers

Special Plans

Dairy barn remodeling plan for Mrs. R. W. Cranford, Inlet, Virginia
 Refrigerator type door for apple storage, Dr. S. S. Guerrant, Callaway, Va.
 Cold storage room illustration for bulletin
 Insulated storage tank, illustration for bulletin
 Horse barn, 16' x 50'
 Floor plan for dairy plant, Mr. C. C. Satterfield, Richmond, Va.
 Floor plan for surplus milk plant, Norfolk Milk Producers' Assn.
 Cold storage plant for meat, B. L. Angle, Rocky Mt., Va.
 Horse barn, 26' x 32', J. H. Smith, Emporia, Va.
 Cross section for 12 cow, 1½ story barn
 Horse section and elevation for 10 cow 1½ story barn
 Tracing for old church cemetery, Charlotte County

Field Projects and Demonstrations, (Con'd.)10-C-1 - Farm Structures

Remodeling plan for 4 room house
 Poultry house plan 20' x 70' for Experiment Station
 Map of Holland Experiment Station
 Special dairy barn floor plan
 Plan for remodelling barn for apple storage, D. D. Cole, Calhowie, Va.
 Tracing of map for cold storage plant, Crozet, Va.
 Remodeling plan, sweet potato storage, South Hill, Va. - 2 sheets
 Special general purpose barn plan
 Combination service stall for bull pen, Dr. Hebane, Dublin, Va.
 Gymnasium for Chester High School
 Remodeling plan for Woodberry Forest School dairy barn
 Dairy house floor plans, Max Fleischer, Gordonsville, Va.
 Remodeling plan for Reserve Hill Farm, Clarendon, Va. - 2 sheets
 Posters for Home Economics Department
 Charts for poultry bulletin

Of this number 19 plans and 22 tracings in addition to some posters and charts were prepared by Mr. Byrne, while 54 plans and 42 tracings were prepared by Mr. Gordon.

Dairy PlansDairy & Food Division

Relations with the State Dairy & Food Division continue to be most friendly and our cooperative arrangement appears to be working perfectly. As their regulatory work increases, more and more of the educational work and planning is referred to the Extension Service. This is shown not only by the fact that we furnished 936 dairy plans this year as against their 118 but also by their personal requests on frequent occasions that we help them by calling on the dairymen personally.

Maryland Extension Service

As stated in last year's report, the Maryland Extension Service requested that they be allowed to duplicate our dairy plans prepared for the Washington Market, for use by Maryland shippers to both the Washington and Baltimore markets. In February they made the statement that whereas heretofore they had been weakest in their building plan service, it had now become their strongest project and already over 400 plans had been furnished for the two markets. Such an exchange of plans is much to be desired.

Dairy House,
 Loudoun County.
 This is typical
 of many new dairy
 houses built from
 our plans. This
 plan of 3 rooms is
 equipped with steam
 boiler, steriliza-
 tion cabinet and
 electrical refrigera-
 tion.

Field Projects and Demonstrations. (Con'd.)10-0-1 - Farm StructuresMaryland-Virginia Milk Producers' Assn.

Close cooperation with the Maryland-Virginia Milk Producers' Association and the District of Columbia Board of Health has continued. A number of the regular monthly meetings of the dairy inspectors were attended and considerable field work done with the Association fieldman. This was particularly true in the case of the very large amount of remodeling required of Loudoun County dairymen this year. The Secretary of the Association in referring to our plan service made the following statement in his 1931 Annual Report:

"The Producers have recognized this assistance not only because it gives the best and most modern plans upon which to build, but if these standard plans are followed the producer will not later have to remodel his building in any particular which he has often been required to do in the past, because even his new buildings were not always properly constructed. This has given the member more confidence in the Health Department since he feels he is making permanent improvements which will not have to be changed, and is, of course, therefore more willing to go to the expense of meeting the Health Department requirements in this respect."

Valley of Virginia Milk Producers' Assn.

Considerable work was done with the Valley of Virginia Milk Producers' Association in helping them improve conditions on the farms of their retail producers. It was hoped that these men could be prepared for the Washington market, thus increasing their income, and relieving the Valley Association of a surplus of fluid milk. However, this hope has failed to materialize so far.



Frame dairy barn for 40 cows. Built from our plans. Prince William Co. Typical of frame barns being built. Dairy house in foreground.

Norfolk Health Department

Close contact has been kept with the Norfolk Health Department who are cooperating in a study of dairy refrigeration and its effect on bacteria counts. Help has been given the Norfolk Milk Producers' Association in the preparation of plans for a surplus milk plant. This work being done in cooperation with the Dairy Department.

Richmond Cooperative Milk Producers' Assn.

Considerable help has been given the Richmond Cooperative Milk Producers' Association. The first work being on codification of the Health Department requirements so the dairymen might better know what was required of him, and relieve him of the whims of individual inspectors and arbitrary rulings having no effect on clean milk production. A special effort has been made to bring these requirements more in line with other similar markets and some progress is being made. Some very objectionable arbitrary rulings have been rescinded as a result of our efforts and we hope as time goes on to improve conditions and secure a revision and codification of the regulations. Help was also given in selection of equipment to be purchased for members at a considerable discount and in planning a surplus milk plant. As the Association gains in strength relations similar to those with the Maryland-Virginia Association may be expected.



Old barn in Orange County remodeled according to plans furnished by specialist at saving of \$3,000 over cost of new barn.

Considerable attention is being given also to help in remodeling. On two jobs alone the saving amounted to \$5,500 making it an important part of the work.

The dairy refrigeration study is being continued, with the Appalachian Power Company, Roanoke, Virginia, and the V. E. P. Company of Norfolk, Virginia, keeping accurate cost records for the different types of refrigeration on a number of dairy farms. These records will furnish us with much valuable and accurate information on this important subject.

The demand for definite information on dairy refrigeration by both Health Departments and individuals became so great that a Circular E-295, "Mechanical Refrigeration for Dairies" was prepared in cooperation with the Dairy Department. Copies of this circular were mailed at the request of the various health departments and on request from individuals. A total of 1500 were mailed during the year. Many complimentary letters on this circular were received from health departments and manufacturers of refrigeration equipment, and apparently it fulfilled a much felt need.

10-C-1, Farm Structures

The dairy plan service now appears to be quite complete and satisfactory. The designs have been carefully worked out not only with reference to market requirements and convenience, but economy in construction, and costs now are very satisfactory including costs of masonry and permanent type construction.

Modern 40 cow masonry barn built from our plans. Henrico County. This type proving very popular in the state. Concrete stave silo in foreground. Many such are being erected.



Horticulture Plans

Fruit Storage and Packing Houses

On account of the unusually large apple crop and low prices interest in common storage has increased greatly. Three (3) common storages were built in Smyth County alone. One 11,000 bushel storage was constructed in Franklin County following the plans developed especially for this state. The owner, Dr. S. S. Gaerrant, Callaway, Virginia, expresses himself as highly pleased with it, and feels it is a very profitable investment.

The study of common storages and operation was continued again during the storage season of 1930-31 on three houses. Careful instructions were given for operation, and in one case additional ventilation provided. Records secured were exceptionally good, showing particular improvement in operation, and demonstrating the fact that careful operation is one of the most important factors in common storage success. It now appears certain that our common storage design is sound and satisfactory as well as economical and a steady growth of interest is expected.

A number of new packing houses were constructed this year from our plans, and special attention given to proper lighting, a very important factor in successful design of apple packing houses.

Field Projects and Demonstrations, (Con'd.)10-C-1 - Farm Structures

Apple Common Storage House, (11,000 bushels) - Franklin County.
 Built from our plans. The design of this house is based on three
 years study of apple storage requirements.

Potato Storage - Individual Storage Houses

Work with sweet potato storage is being done in cooperation with the sweet potato specialist of the Vegetable Gardening Department, and a careful study was made of all houses during the curing process, checking on operation, design, time of curing, distribution of heat and other important factors, with detailed and specific instructions given the operators.

The past season has seen greater interest in sweet potato storage than any other one project. While sweet potatoes marketed in the fall were very low in price, the prospects for cured and stored sweet potatoes marketed in the spring, are brighter than for any other truck crop. Houses were built in Lunenburg, Mecklenburg, Southampton, Isle of Wight, Nansemond, Warwick, and Lancaster Counties, in addition to a number of new ones in Princess Anne, where 43 individual sweet potato storage houses are now in operation.

Field Projects and Demonstrations, (Con'd.)10-C-1, Farm Structures

Cinder Block Sweet Potato Storage House in Princess Anne County (2,000 bushels) built from our plans which is proving satisfactory. There are now 43 individual houses in this county.

Existing houses and methods of operation are being carefully studied in order to check present designs particularly with reference to ventilation and heating methods.

In this connection two electrically heated houses, one in Lancaster and one at Suffolk, show much promise, both as to results secured and economy of operation. This will be discussed in greater detail under rural electrification.

Poultry

With the standardization of poultry plans no great amount of work has been necessary on poultry plans. Plans were prepared and supervision given on a 20' x 70' laying house for the Experiment Station at the college plant. Seven hundred and thirty-five (735) plans for poultry houses were sent out on request.

Cold Storage of Meat

Help was given in two instances on cold storage plants for meat. Plans were prepared for Mr. B. L. Angle, Rocky Mount, Virginia, for a plant with the capacity of 15 beeves. The building and insulation was designed, refrigeration checked, and bids secured on insulation and equipment. This plan is to be used this year by the State Farm for holding hogs and beef for that institution.

Field Projects and Demonstrations. (Con'd.)
10-C-1, Farm Structures

The following radio talks and lectures have been given on this project:

Radio Talks

Labor Saving Equipment on the Dairy Farm
 Dairy Houses and Equipment
 What Kind of Silo Shall I Build
 Milk Cooling Equipment for Small Dairies
 Buildings for the Dairy Farm
 Building Materials for the Farm

Lectures

Dairy Short Course Students, Dairy Buildings and Equipment
 Freshman Class, Extension Work in Farm Buildings
 4-H Club Boys, Farm Building Plan Service

The following bulletins were sent out in connection with this project:

50 Hog Houses
 50 Poultry House Construction
 100 Equipment for Farm Sheep Raising
 100 Pit Silos
 100 potato Storage and Storage Houses
 50 Home-made Silos
 50 Self Feeder for Hogs
 50 A Simple Hog Breeding Crate
 300 Poultry Houses
 100 Farm Dairy Houses
 50 Beef Cattle Barns
 50 Principles of Dairy Barn Ventilation
 100 Practical Hog Houses

Outlook

The greatly lowered cost of building will no doubt result in considerable construction work on the farms of the state during the coming year.

Interest in this project is becoming more evident each year. It is work of great value that is recognized by the farmer, probably more so than any other of the department's projects. Work will be continued along the same lines as in the past. However an attempt will be made this year to contact all building and supply dealers, lumber manufacturers, etc., with the object of thoroughly acquainting them with the services rendered on this project and secure better cooperation and use by such agencies of plans furnished by this department.

Field Projects and Demonstrations, (Con'd.)10-C-2 - Farmstead Planning

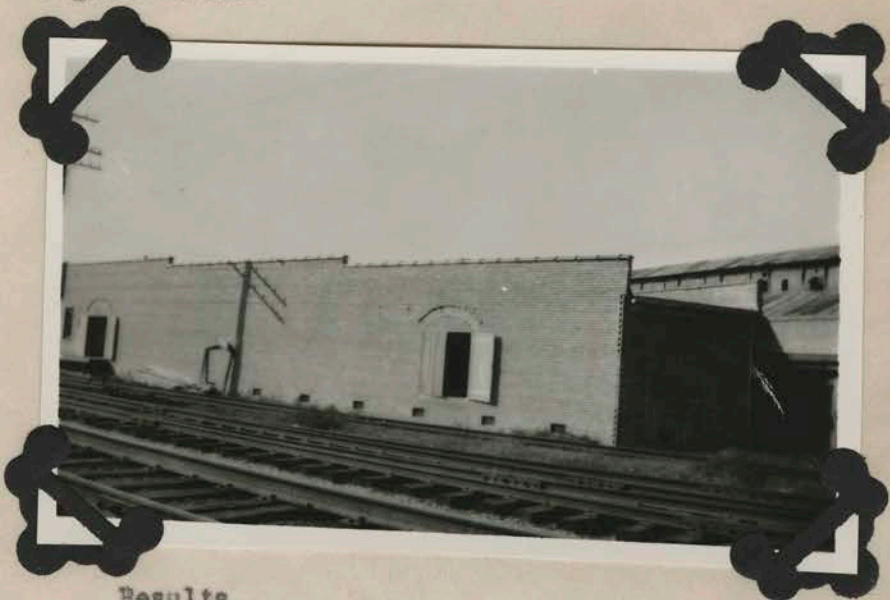
Work on this project as last year was confined to selection of sites for dairy buildings, this being an important part of the dairy building work. On all field visits in regard to dairy barns the proper location of the dairy barn is selected by the specialist.

The following bulletins on farmstead planning were mailed from this office:

400 Beautifying the Farmstead
50 Planning the Farmstead

10-C-3 - Community Buildings

There is an increasing demand from communities or cooperatives for help in the design of new storage houses or remodeling of old buildings for storage. Many requests are also received from towns, state institutions, etc., for assistance on various kinds of building work. An effort is made to answer all such requests from rural communities or organizations.



Old warehouse in Suffolk. Remodeled into satisfactory cooperative sweet potato curing and storage house at cost of \$650.00.

Results

In Mecklenburg and Hansemond Counties cooperative associations were formed and the storage houses rented. The members paying so much for curing and storage for the season. The charge varied from 15 to 25 cents per bushel. The storage houses were old warehouses remodeled under the direction of the farm structures specialist and varying in size from 4500 to 11,000 bushels. Potatoes in these houses cured out beautifully and the houses give every promise of being a complete success, in spite of the fact they were built for another purpose and utmost economy had to be used in remodeling. In the other counties houses were built by individuals with space rented to neighbors.

10-C-3 - Community Buildings

Community Storage Houses

In Caroline County great interest is being shown in community sweet potato storage houses, starting with one of 4,000 bushels capacity. Formation of an association and building of a new house from our plans appears certain at this time.

This crop in connection with proper curing and storage promises much for the tobacco, cotton and peanut farmers who must turn to other crops.

Rural Community Plans

The following is some of the most important work done on this project:

4500 bushel community sweet potato storage house, South Hill, Va.
11,000 bushel community sweet potato storage house, Suffolk, Va.
Horticultural Buildings, Hampton Institute, costing \$15,000.00
25,000 bushel community apple packing house, Crozet, Va.
Fruit and vegetable storage house for the District Almshouse,
Waynesboro, Va.
4000 bushel community sweet potato storage house, Sparta, Va.
Cold storage plant, sweet potato storage, Irish potato storage
houses for the State Farm and Sattoir and smokehouse for
100 hogs
Preparation of plans for a District 4-H Club Camp at Chester, Va.
Gymnasium for Chester High School
Completion of \$15,000.00 office building for county officers of
Chesterfield County

The following bulletins were sent out under this project:

100 Plans of Rural Community Buildings
50 Organization of Rural Community Buildings

Outlook

There is a continued and growing interest in community or cooperative storage and packing houses. The department has been called upon to design a 25,000 barrel apple packing house for the coming season. The specialist will cooperate with the Horticultural Department on this project. Other cooperative projects are contemplated that will require considerable of the specialist's time.

SUB-PROJECT - 10-D. FARM OPERATING EQUIPMENT

10-D-1. Gas Engines and Tractors

Lack of personnel prevented any work being done on this project with the exception of the instruction given about 100 club boys at the State Short Course last summer.

No work will be attempted this coming year on this project other than the instruction given to the boys at the State Club Short Course.

The following bulletins under this project were mailed from this office:

- 50 The Gas Tractor in Eastern Farming
- 50 Practical Hints on Running A Gas Engine
- 50 Laying Out Fields for Tractor Plowing
- 50 Choosing A Tractor
- 50 Motor Trucks on Corn Belt Farms

10-D-2, Farm Implements

Now as never before it is necessary that the farmer reduce the cost of production and use labor more efficiently. This can partly be accomplished by farming a large enough acreage to permit the best use of labor and machinery. Improved farm machinery is available that will enable the farmer to reduce his costs but to do this the right machine used in the right way is of great importance.

The farmers of Virginia need instruction in farm machinery selection, operation and care. Limited personnel, however, prevents very much being accomplished on this project.

Results

The principal work done on this project was the instruction given the boys at the State Club Short Course, several radio talks, letters, bulletins, and a field demonstration in harvesting and threshing lespedeza seed. An account of this demonstration is contained in the following report by Prof. Sjogren, who handled the demonstration for the department.

The following bulletins were sent out on this project:

- 50 Minor Articles of Farm Equipment
- 50 Harvesting Hay with Sweep Rake
- 50 Haymaking
- 100 Care and Repair of Farm Implements (Plows and Harrows)
- 100 Care and Repair of Farm Implements (Mowers, Reapers, Binders)
- 100 Labor Saving Practices in Haymaking
- 100 The Efficient Operation of Threshing Machines
- 100 The Use of Machinery in Cutting Corn
- 50 Effective Haying Equipment and Practices

10-D-2 - Farm ImplementsHarvesting and Threshing Lespedeza Seed

On September 30, 1931 assistance was given county agent Williams in conducting a lespedeza harvesting and threshing demonstration. The demonstration was held on the farm of Mr. Butterworth near South Hill, Mecklenburg County, who is a successful dairy farmer in the South Hill community. He had four acres of lespedeza which he wished to save for seed. The purpose of the demonstration was to show the adjustments and the changes that were necessary in order to thresh lespedeza successfully with the ordinary grain separator.



A Group of Farmers and Sons at Lespedeza Threshing Demonstration
In Mecklenburg County

Mr. Butterworth cut his lespedeza crop with a mower equipped with a lespedeza seed pan attached under the cutter bar and extending to the rear of the bar. Two men were employed to rake the lespedeza across the pan as it was cut. The raking caused some of the seed to shatter and to fall through the perforated top into the seed pan. Only a small amount of seed--about 25 per cent--is saved in this operation. The seed must be recleaned as it contains many impurities.

After the hay was cut it was raked into windrows, allowed to dry and then threshed with the ordinary grain separator. An old Geiser, No. 3 thresher had been secured for this demonstration. It had neither self-feeder nor stacker. The machine, after several adjustments, threshed and cleaned the lespedeza satisfactorily.

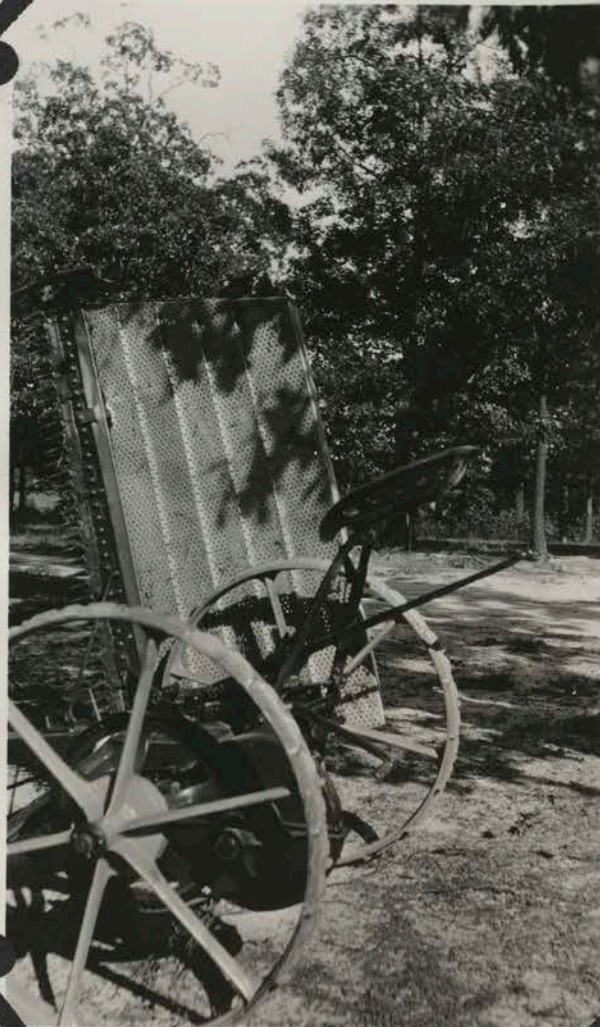
The normal speed of the cylinder was 1320 r. p. m. and after several trials it was found to do its best work at about 1200 r. p. m.

Field Projects and Demonstrations. (Con'd.)
10-B-2. Farm Implements

The lespedeza was rather tough and somewhat green so that it was not necessary to materially reduce the cylinder speed. A high cylinder speed has a tendency to grind the hay into too fine particles and thus cause overloading of the sieves. High speed will also separate the lespedeza seed from its outer hull, which is objectionable. The results of high speed mentioned above are noticeable if the hay is very dry.

The other rotating and reciprocating parts of the thresher should operate at normal speed, regardless of the speed of the cylinder. If the speed of the cleaning mechanism is reduced the efficiency of the mechanism is also reduced.

A lespedeza seed pan attached to the cutter bar of a mower. The lespedeza is raked across the top of the pan as it is cut. The seeds that shatter will fall through the perforated top into the pan.



Some difficulty was experienced in cleaning the seed until the proper fan adjustments were obtained. The ordinary wheat sieve was used since no other was available. The sieve must be kept free of chaff and straw by adjusting the fan blinds until the proper amount of wind is secured. The fan blind adjustment can be determined only by watching the

10-D-2 - Farm Implements

machine in operation and regulated to give the required amount of blast. After the proper adjustment was obtained an excellent job of cleaning was secured.

If a large amount of lespedeza seed is to be threshed it would be advisable to obtain special corrugated teeth for the concaves and a set of sieves for cleaning the seed. A recleaner which can be attached to the side of a grain separator is now manufactured by one of the threshing machine companies. This recleaner does an excellent job of recleaning lespedeza as well as other small seeds.

It was estimated that about 75 farmers witnessed the operation of the grain separator, threshing lespedeza seed on Mr. Butterworth's farm. As a result of the demonstration five or six farmers signified their intentions of using grain threshers in threshing their lespedeza seed. The yield of Mr. Butterworth's lespedeza was 2160 pounds from four acres, which he considered a very good yield.

The following suggestions may be helpful in threshing lespedeza:

1. The seed pan attached to the ordinary mower will save about 25 per cent of the lespedeza seed if fully ripe.
2. The ordinary grain separator will thresh lespedeza seed without special equipment.
3. The concaves are set as for threshing wheat. Minor changes can then be made as needed.
4. The speed of the cylinder may have to be reduced if the lespedeza is very dry.
5. The speed of the other rotating and reciprocating members of the separator should be operated at normal speed regardless of the speed of the cylinder.
6. The amount of wind produced by the fan must be carefully adjusted. Enough wind must be provided to keep the sieves free from dry chaff. too much wind will carry the light lespedeza seed into the straw.

10-D-2 - Farm Implements



A Grain Thresher Being Used for Threshing the Lespedeza Crop

Outlook

There is urgent need for a specialist in farm machinery who could instruct the farmers of the state in the judicious selection, operation and care of farm machinery. The farm machinery project should be one of the important extension projects. However, until a properly trained man is employed for this project it will not be possible to stress this work. The work will be limited to the answering of inquiries and one or two demonstrations as specially requested.

SUB-PROJECT - 10-E - RURAL ELECTRIFICATION

10-E-1. Rural Line Extensions

Research studies conducted by the agricultural engineers of agricultural experiment stations in over twenty states in cooperation with farmers and the rural service engineers of power companies, have developed many profitable uses of electric power on the farm. Over two hundred different farm tasks are being performed to advantage by electric power and new uses are being developed.

Research studies have demonstrated that by the intelligent and liberal use of electricity on the farm, time and human labor can be saved, productive work can be accomplished more efficiently, and production costs can often be materially reduced. Evidence of the biological possibilities of electricity in agriculture and the probability that electricity will some day be profitably applied to field power operations, which constitute about 70 per cent of the farm power requirements, point to a constantly expanding use of electricity in agriculture.

10-E-1. Rural Line Extensions

Electric power is comparatively cheap and the farm man or woman who is doing work that the electric motor will do is working for less than 3 cents an hour. Definite cash values can be placed on the farm operations that can be performed by electric power and the savings effected can often be made to pay for the services in the home on which it is difficult to place a cash value. However, we know that anything that will lighten the burden of the housewife and preserve her health and strength, as well as improve the standards of living of the whole family has a real value.

It is of the greatest importance that the results of the research studies in rural electrification be presented to the farmer in a way that he can make the most use of them. The farmer and other groups concerned must be guided, by means of extension education, while rural electrification is still in the pioneer or development stage.

As the electrical power companies, in the last analysis, are the agencies that must serve the farmer, they have a definite obligation to educate him in the proper uses of electricity so that he may derive the greatest benefit. The main effort on this project is therefore placed on educating the power company officials to a proper appreciation of the importance of educational work with the farmer. Our main activities for the year have therefore been cooperative activities with the rural service departments of the power companies.

Results

Twenty-four (24) trips were made to 12 different counties and some 150 farmers were contacted by the specialist on this project. About 25 conferences were held with power company representatives and project demonstrations were established on some 20 farms for special studies of equipment. On these farms costs and other records will be made over a period of years. Several articles on rural electrification were written, some 10,000 of our "Rural Electrification in Virginia" bulletins mailed out and the following radio talks were given on this project:

Electricity From the Farm Stream
Using Electricity on the Poultry Farm
The Use of Power in Agriculture
What A 1000 Kwhrs. Will do on the Farm
Electricity in Dairying
Rural Electrification in Virginia
Electricity on the Poultry Farm

The four following districts of power companies have established rural service departments as recommended by us with agricultural engineers in charge and are cooperating with this department very effectively:

Norfolk Division of Virginia Electric & Power Co.
Lynchburg District of A. E. P. Co.
Roanoke District of A. E. P. Co.
Bluefield District of A. E. P. Co.

Field Projects and Demonstrations. (Con'd.)10-E-1. Rural Line Extensions

During the year in these four districts these companies extended electric service to 1421 rural customers of which 535 were farmers. They built 129.48 miles of rural lines. This brings the total miles of rural lines to 1016.48 in these four districts with 13,841 rural customers of which number 2581 are actual farmers.

New Customers and Rural Lines Built, 1931(Cooperating Demonstrator Companies)

Cooperators	Miles Rural Lines Built 1931	Total Miles Rural Lines	No. Rural Customers Added 1931	Total Rural Customers	No. Farm Customers Added 1931	Total Farm Customers
Va. Elect. Power Company	34	371	160	4000	218	946
Norfolk Dist. App. Elect. Power Company	20.28	100.28	200	1200	34	200
Lynchburg Dist. App. Elect. Power Company	12.2	222.2	300	3472	53	430
Roanoke Dist. App. Elect. Power Company	63	323	761	5169	230	1005
Bluefield Dis.						
TOTALS	129.48	1016.48	1421	13,841	535	2581

In the state as a whole there is in the neighborhood of 4300 miles of rural lines, some 35,000 rural customers and 9500 actual farm customers. When this project was started in 1924 there were only about 500 farmers receiving electricity from power companies.

Following our recommendations the Lynchburg District of the A. E. P. Company established a rural service department with an agricultural engineer in charge as did the Bluefield Division of the same company.

These rural service men do no selling whatever. Their duties are confined to educational endeavors, such as; advising with the farmer on the use of equipment that will aid him in reducing costs, staging demonstrations, etc., cooperating with all educational agencies and in general doing everything that will promote good will and a more intelligent use of electricity on the farm. These men make weekly reports to this office. The following being a sample copy which is typical of such reports.

Field Projects and Demonstrations, (Con'd.)
10-E-1, Rural Line Extensions

Appalachian Electric Power Co.
 Roanoke, Virginia

November 20, 1931

REPORT WEEK ENDING NOV. 18, 1931

Mr. W. I. Whitefield,
 Appalachian Electric Power Co.,
 Roanoke, Virginia.

Dear Sir:

The following calls have been made this week:

Prospective rural customers;	
Along existing lines	6
Off existing lines	3
Existing rural customers	12
Dealers or manufacturers merchan-	
dising electrical equipment	6
Total	<u>27</u>

M. C. Garst, Roanoke, Virginia, purchased an automatic electric water heater for his residence. Mr. Garst was given assistance in the selection and installation of this heater. He expects to install a 1500-watt electric battery brooder this fall. The connected load for this farm at present is 9.5 kilowatts with a monthly consumption of approximately 500 kilowatt hours.

W. M. Cook, Bonsack, Virginia, was given information about the installation of an electric pump which he installed at his residence this week.

R. E. Puckett, Roanoke, Virginia, called for assistance on the installation of an automatic deep-well water pump, an electric range and a refrigerator. Mr. Puckett recently purchased a truck farm on our lines and he greatly appreciated our assistance on the installation of his equipment and solving his electrical problems.

N. R. Honk, Salem, Virginia, was given assistance in planning the wiring for a new poultry house and the use of a portable 5 H. P. electric motor.

A. P. Greenwood, S. H. Hubbard, and H. S. Turner, near Cave Spring, Virginia, applied for electric service and were furnished estimates on line extensions, information about equipment and rates. These three farmers use individual electric plants at the present time. Mr. Turner has spent an average of \$150.00 per year for 15 years for electric service from his plant.

I have noted an increase in the installation of electrical equipment during the past three weeks by farm and rural customers. At this season of the year, after the summer crops have been gathered, the rural customer has more time to devote to the installation and planning of his electrical additions.

Yours very truly,

(Signed) R. R. Choate
Rural Service Engineer

RRC:RL



Rural Electrification Class from V.P.I. Visiting
One of Electric Demonstration Farms on Rural
Electrification Tour

On this project the extension agricultural engineer has cooperated with the rural service engineer of the several power companies in putting on demonstrations, holding meetings, and general advice on best ways of assisting the farmer with his power problems. While we cooperate with all the companies in the state to a certain extent it is only with the above named four that we have worked with this year.

The following brief year's report of the rural service engineer of one company gives some idea of the character of work of these men.

Field Projects and Demonstrations. (Con'd.)
10-E-1. Rural Line Extensions

APPALACHIAN ELECTRIC POWER COMPANY

Bluefield, W. Va.
 December 12, 1931

Mr. Chas. E. Seitz, Head
 Agr'l. Engineering Dept., V.P.I.,
 Blacksburg, Virginia

Dear Mr. Seitz:

In reply to your letter of November 17 requesting a brief report on my work for 1931, I am attaching hereto a data sheet which is self explanatory.

In addition to the above, I might mention a few things which we believe will be of interest to you.

1. A farm customer card index record file has been set up for The Pulaski District. The survey has been completed for Christiansburg and Pulaski offices.
2. Cooperated very closely with Agricultural County Agents, Home Demonstration agents, Agricultural High School teachers and the Agricultural Engineering Dept. of V.P.I. In furthering Rural Electrification work in the territory served by the Bluefield Division of the Appalachian Electric Power Company.
3. Cooperated with the various manufacturers of electrically operated farm equipment in getting them to establish distributors, and dealers in our territory, especially, the Pulaski District.
4. Cooperated with the various Fair Associations, manufacturers, distributors, and local dealers in taking the Rural Electrification Exhibit to four County Fairs. The theme story of the entire exhibit was "What 10¢ Worth of Electricity will do in your Home and on your Farm," such as "milk 20 cows for 3 days", "Cook 2 meals for family of 5", "Cut 3 tons of Ensilage", "Pump 1200 gallons of water", etc. Such equipment as electric refrigerators, both household and dairy types; electric automatic water systems, both deep and shallow well types; electric water heaters, both household and dairy type; electric dairy sterilizers; electric milking machines; electric churns; separators; etc; electric clipping and grooming machines; electric washing and ironing machines; electric incubators and brooders; electric poultry lamps; electric general purpose 5 H. P. portable farm motors to be used with such equipment as insilage cutters, feed mills, both Hammer and Burr types, wood-saws, etc; electric utility motor 1/4 H.P. to be used with such equipment as churns, separators, grinding wheels, small saws, drills, etc., was displayed and demonstrated to over 100,000 people at the four fairs. It is quite interesting to note that the cost averaged \$0.0028 per person or much less than postage required to have mailed a single piece of literature.

Field Projects and Demonstrations. (Con'd.)
10-E-1. Rural Line Extensions

5. Put on a water system campaign in the Pulaski District with the result of 35 water systems being installed totaling 22,675 watts connected load. It is very interesting to note that the 1 H. P. water system installed on the Chrisman Dairy Farm, Christiansburg, Virginia, is saving Mr. Chrisman approximately \$7.00 per month over his previous cost for water. He was using 1000 gallons a day from the town system.
6. Have installed a number of farm motors for silo filling, wood-sawing, feed grinding, etc. Perhaps the most outstanding case is that of Mr. W. B. Wyatts farm, Pulaski, Virginia. Mr. Wyatt saved \$65.00 on silo filling cost over previous years when he used tractor power. He is using the same motor to operate small Prater Hammer mill, cost of feed grinding ranged less than 1/2¢ per bushel. The cost of cutting ensilage was approximately 3¢ per ton.
7. Have made surveys and estimates on several proposed irrigation projects. The owners of the orchards are very much interested in installing a combined system of irrigation and stationary spray plant.
8. The increase farm load of 71.8 Kw or 95.6 H. P. does not really cover the total increase load since I have no record of ranges, refrigerators, etc. Perhaps there has been some water systems, etc. added with which I did not work, however, I judged from letter you wanted a report on the work which I was personally in contact.
9. Electrical uses on some of our farms:
 - (a) C. C. Allison Dairy Farm, Pulaski, Virginia, 1 H.P. milking machine, 1 H.P. pasteurizer, 1 H. P. deep well pump, 1/4 H. P. milk pump, 1/2 H. P. brine pump, 1/2 H. P. bottle washer and sterilizer pump, 1/2 H.P. dairy refrigerator, 1/4 H. P. separator, 1/2 H. P. deep well pump, 1/4 H. P. shallow well pump, 1/4 H. P. household refrigerator, electric range, electric radio, electric percolator, electric cleaner, electric ironer.
 - (b) W. B. Wyatt, Pulaski, Virginia, general farm - electric range, electric cleaner, electric percolator, electric toaster, electric waffle iron, electric radio, electric portable farm motor, electric separator, electric water system.

Yours very truly,

(Signed) L. L. Koontz

LLK:EA

Field Projects and Demonstrations. (Con'd.)
10-E-1. Rural Line Extensions

BLUEFIELD DIVISION-A.E.P.Co. Agric. Eng. Report. Dec. 1930 to Dec. 1931

Table No. 1	: Clinch ;		
	: Valley &		
	Pulaski	Bluefield	Bluefield
	District	District	Division
Total miles of rural lines 1930	137	123	260
" " " " " 1931	179	144	323
No. miles of rural extensions made in 1931	42	21	63
Total rural customers 1930	2243	2166	4408
" " " " 1931	2621	2473	5094
No. of rural customers added in 1931	378	308	686
Total Farm Customers 1930	426	350	776
" " " " 1931	555	425	980
No. of farm customers added in 1931	130	75	205
Est. average Kwhr. Consumption of farm cus. 1930	600	600	600
Est. average Kwhr. Con. of farm cus. 1931	720	720	720
Est. avg. increase Kwhr. consumption of farm cus. 1931	120	120	120
No. watts added in farm water systems 1931	22,575	1,867	24,442
No. watts added in farm motor equipment 1931	24,248	23,126	47,374
Total No. watts added in farm water systems and farm motor equipment 1931	46,823	24,993	71,816

Numerous rural electrification meetings were held during the year. The most important were a meeting at Lynchburg and one at Richmond with representatives of all electric and telephone companies. At these meetings the State Landscape Engineer explained what he was doing to beautify the highways and plans were worked out for cooperation between all interested agencies in tree trimming.

Talks on rural electrification were given at the Southeastern Division of the N. E. L. A., the North Atlantic Section of A. S. A. E., and several state utility meetings. The following farm meetings were held by the rural service engineer of the Roanoke Division of the Appalachian Electric Power Company.

Pincastle	-	59	farmers	attendance
Louderdale	-	60	"	"
Daleville	-	79	"	"
Troutville	-	90	"	"
Salem	-	49	"	"
Shawsville	-	96	"	"

Cutting Ensilage with
Electric Motor on Farm
In Pulaski County



Report on Rural Electrification

The Roanoke Division of the Appalachian Electric Power Company was selected by the National Electric Light Association as one of nine companies in the entire United States doing outstanding work in rural electrification. This company is following our recommendations in handling rural electrification. The following is a report of this company contained in a recent bulletin of the N. E. L. A.

Southeastern Division—Appalachian Electric Power Company

Foreword

The Virginia Committee on the Relation of Electricity to Agriculture was formed in 1924, at which time electricity was available only in the cities and larger towns with few exceptions. This committee consisted of representatives of the farm organizations, the State Agricultural College, Department of Agriculture and the leading power companies. It fostered and supervised a 2-yr program of research in rural electrification, which laid the ground work for the progress since made in the state.

The work of the Virginia Committee created some interest on the part of the power companies, but there was no uniform practice for the building of rural extensions.

In 1928 the Governor appointed a special joint committee on rural electrification to work out a uniform plan for making rural extensions. This plan has been generally adopted by the power companies throughout the state.

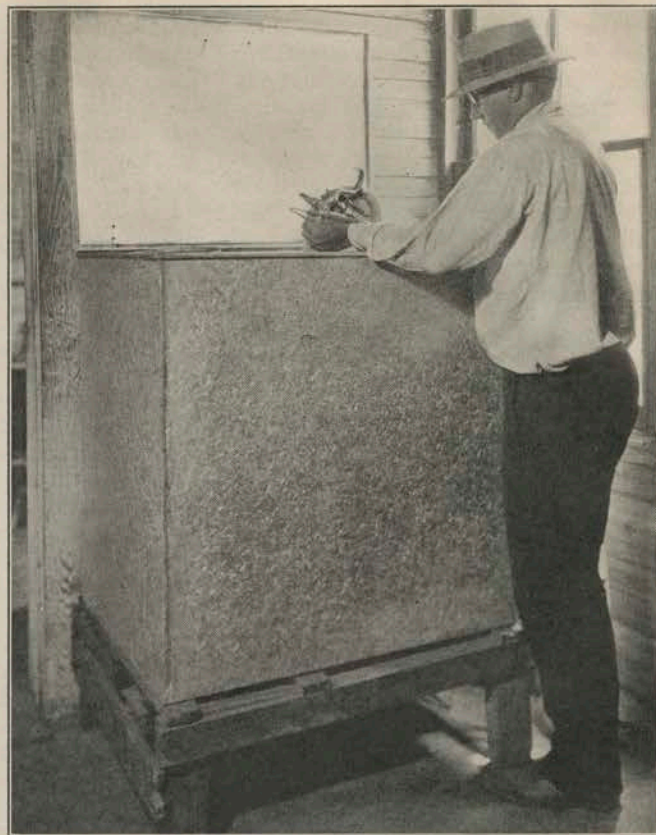
Prof. Charles E. Seitz, Head of Agricultural Engineering Department of the Virginia Polytechnic Institute, the State Agricultural Engineering College, who instituted the rural electrification program in Virginia, and was chairman of the Virginia Committee on the Relation of Electricity to Agriculture, has sponsored educational programs, including several experimental rural lines, assisted power companies in establishing rural service departments and has directed studies of the application of electricity to farming operations.

The Appalachian Electric Power Company, a subsidiary of the American Gas & Electric Company, supplies power service in a large part of the western half of Virginia and in southern West Virginia. This analysis will be confined to the Roanoke-Lynchburg Division, where particular attention has been paid to rural development during the last 5 yr and more intensively during the last 3 yr.

In the Roanoke-Lynchburg Division of the Appalachian Electric Power Company there are 2 district offices, one located in Roanoke, with a population of 70,000, and the other in Lynchburg, with a population of 40,000.

The territory served by this division covers 1,040 sq miles with a population of approximately 175,000. Included in the territory are the cities of Roanoke and Lynchburg and 46 towns and

Fig. 2—Dairy Equipment Sterilizer Which Has a 2 Kw Heating Element



rural communities varying in population from 50 to 3,500 each, in the counties of Albermarle, Amherst, Bedford, Botetourt, Campbell, Craig, Fluvanna, Franklin, Montgomery, Nelson and Roanoke. There are 33,126 customers in the division of which 4,172 are farm and rural customers outside of the cities and of towns with a population of 1,000.

Agricultural Characteristics of the Territory

In the Roanoke-Lynchburg Division is much fertile agricultural land in the valleys between the Blue Ridge and Alleghany Mountains and the foothills east of the Blue Ridge. Much of it is mountainous and unsuited for agricultural purposes. The territory is traversed by the James and Roanoke Rivers and many smaller feeder streams. It has much scenery of unsurpassed beauty, and a desirable all-year climate.

No section of Virginia offers more diversified agriculture. There are hundreds of square miles of orchards and in the western end of the territory is a celebrated blue grass grazing re-

gion. Many farms throughout the territory specialize in dairying, fruit growing, trucking, tobacco raising, poultry, stock and game.

Modern, well-kept farm buildings are the rule. Roads are good and automobiles in general use, including many trucks and tractors. There is an average of 3 customers per mile of rural line.

The average farm has about 100 acres. Dairying, fruit growing and trucking are the most important types of farming. Poultry raising and egg production are important side lines on nearly every farm. There are many small canneries for tomatoes, peas and other garden crops scattered throughout the communities. Most of the grain and hay is fed on the farms. With the exception of fruits and canned goods, most of the farm products are sold at nearby local markets.

In order to gain some knowledge of the agricultural territory according to the U. S. Department of Commerce, Bureau of the Census, there is a total of 23,345 farms with a total acreage of 2,453,205 and valued at \$121,818,735 which includes farm building. Ap-

proximately 74.5 per cent of these farms are owned by the farmers who operate them.

How the Company Meets the Farm Customers' Needs

The farm development work is assigned to rural service departments, one located in the Roanoke district and one in the Lynchburg district. The agricultural engineers in charge of the departments report direct to the district managers. While these departments sell no merchandise or farm equipment, they do actively foster load building in various ways described herein. They offer to the farmer free advice and consultation on electric service and equipment—sell him the electric idea and do the promotion work. The Appalachian Electric Power Company's merchandising departments, local dealers, manufacturers and mail-order houses sell him electrical equipment. The rural service departments prepare all estimates of the cost of rural line extensions, working in close cooperation with the distribution departments.

Rural Extensions

In the development of rural electrification, 3 factors are recognized as of primary importance: (1) A plan under which lines can be financed and built on an equitable basis fair to both the consumer and the company; (2) the proper design and construction of

rural lines to provide adequate, dependable and economical service; (3) the building up of loads on rural lines, in order to place the business on a profitable basis.

In 1928 the company put into effect a rural extension tariff in accordance with the state-wide rural electrification plan, offering farm and other rural customers electric service upon liberal terms and on a definite basis. This plan has met with favorable reception on the part of rural customers.

Briefly, under this plan the company constructs, owns and maintains at its own expense rural electric line extensions, including transformers, along public highways provided the customer or customers will guarantee to pay monthly 2 per cent of the construction cost for a term of 4 yr. Individual lines on private property are constructed, owned and maintained by the customer. Monthly guarantees are reapportioned at the beginning of each calendar year on those lines where additional customers have been added during the year.

An extensive study was made covering a period of several years of the design and construction of rural lines to provide adequate, dependable and economical service. Economical construction may lower the guarantee of the consumer, but if that alone is considered and the lines are not properly designed for the rural load as it develops, the customers' service will not be satisfactory. Aluminum core, steel

reinforced wire, with long-span construction, is now being used and has been found to best meet the requirements for this class of lines.

Rural Rates

Under the uniform state-wide rural extension plan effected in 1928:

1. The company finances the line on a monthly guarantee basis.

2. The monthly guarantee is equal to 2 per cent of the construction cost of the line, including transformers, required to serve one or more customers on a particular extension, for a period of four years. The minimum monthly guarantee includes the consumption of energy under the scheduled rate.

3. The energy rates are as follows:

For Lighting Only:

For the first 100 kwhr	8¢ per kwhr
For the next 500 kwhr	5¢ per kwhr
For the next 500 kwhr	4¢ per kwhr
For all over 1,100 kwhr	3¢ per kwhr

Minimum monthly charge—One Dollar.

For full domestic electric service (including lighting—one meter) to rural customers engaged principally in agricultural pursuits, having connected and in regular use any or all of the following equipment:

An electric range or other cooking equipment of not less than 1,500 w connected capacity;
A standard motor driven outfit for household refrigeration;

A standard waterheater permanently installed and connected of not less than 1,000 w connected capacity;

A space heater permanently installed and connected of not less than 1,000 w connected capacity;

A motor driven blower used as an auxiliary to domestic heating furnaces;

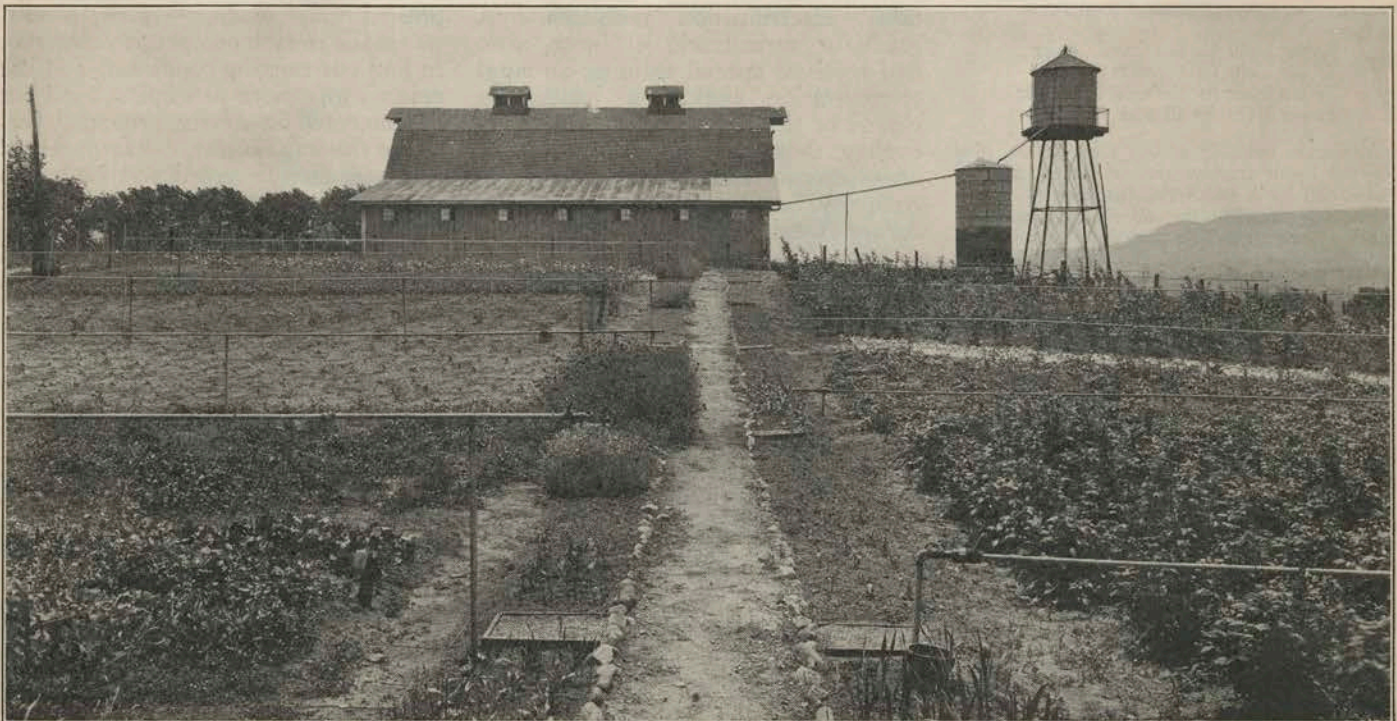


Fig. 3—Overhead Irrigation System—a 7½ Hp Motor Operates the Pump

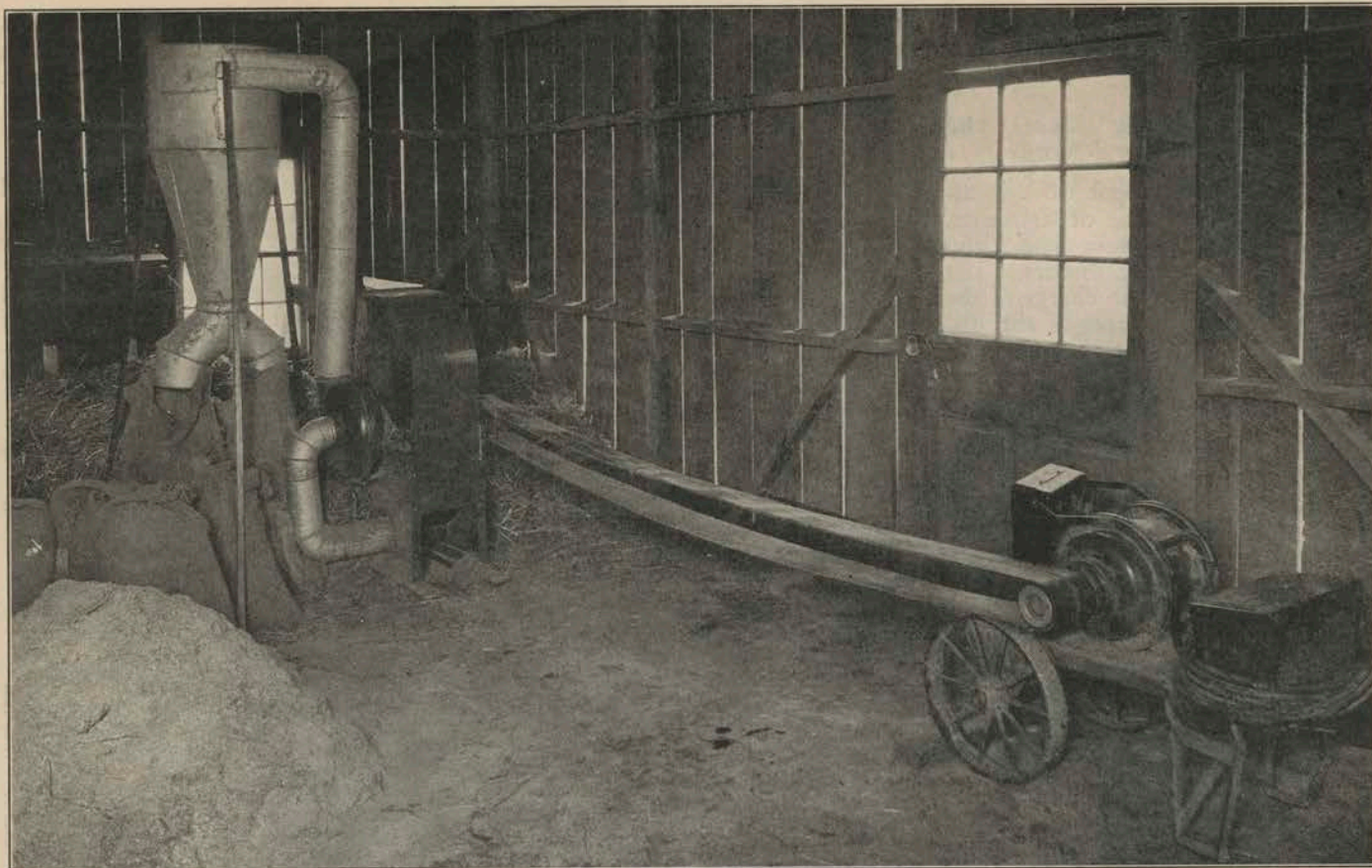


Fig. 4—Portable Electric Motor and Feed Grinding Mill

A motor driven pump used for household water service;

Heating apparatus and motors driving equipment for the exclusive use of the customer in connection with his farming activities;

A monthly customer charge of 50¢ plus an energy charge of

6¢ per kwhr for the first 25 kwhr
4¢ per kwhr for the next 50 kwhr
3¢ per kwhr for the next 225 kwhr
2¢ per kwhr for all over 300 kwhr

Minimum monthly charge One Dollar, plus 50¢ per hp or fraction thereof for capacity in excess of 1 hp in each individual motor.

For full domestic electric service (including lighting—one meter) to customers having connected and in regular use *both an electric range* of not less than 1,500 w connected capacity and an *electric water heater* of not less than 1,000 w nor more than 3,000 w connected capacity.

A monthly customer charge of 50¢ plus an energy charge of

6¢ per kwhr for the first 25 kwhr
4¢ per kwhr for the next 50 kwhr
3¢ per kwhr for the next 125 kwhr
1½¢ per kwhr for all over 200 kwhr

Minimum monthly charge—One Dollar.

The officials of the company consider these low rates, which have proven very satisfactory to the customer, the most important single factor in rural load building. Once a customer is connected, it is relatively easy to get him to build up his load to the point where his consumption equals or exceeds the guarantee.

Realizing the importance of building up loads on existing lines, the Roanoke district in November, 1928, established its first rural service department to aid and assist rural customers in their farm electrification problems. A graduate agricultural engineer, who had received special training on rural electrification work, was placed in charge of this department. After becoming thoroughly familiar with the organization, rates and policies of the company, his first work was to make a survey of existing farms.

A farm record card was used for each farm customer, showing existing applications of electricity and the possible further applications that might profitably be made. Other information listed on this card gave the size of farm, type of farm business, condition of buildings, water system in use, gasoline engine and tractor applications, number of livestock, number of poultry and other data necessary for a correct analysis of the farmers' needs for a fuller use of electrical labor-saving devices in their farming operations. This contact with the customer afforded the rural service engineer opportunity to become personally acquainted and also to explain the company's desire to aid and assist its rural customers.

In visiting the farm customers in 1928 it was found there were a number of farm homes along existing lines not connected for electric service. In order to acquaint these people with our present rural extension plan, a visit was made to each prospective customer to find out existing conditions and the reasons why more customers could not be connected for service, principally between the small towns. A farm record card was used to record pertinent data obtained on these prospective rural customers.

To picture the importance of rural line development, the following illustrative example is used:

Immediately north of the city of Roanoke, in the counties of Roanoke and Botetourt, is an excellent farming section. The land is unusually productive and profitable, its principal products being fruit, stock raising, dairying, trucking, poultry, hay, wheat and corn. A line was built from a point beyond the northern suburbs of the city through this section to the town of Fincastle, a distance of 18 miles. Fincastle has a population (1930 census) of 517. It was incorporated as a town some years before the Revolutionary War. The line passes through the small rural communities of Hollins, Cloverdale, Daleville, Trinity and Am-

sterdam. There had been no electric service in Fincastle or the other communities.

This extension was completed and placed in service about April 1, 1926, with a total of 123 customers, of which 111 were small residence and commercial customers residing in Fincastle and the other small communities. The other 12 were farms. After almost 5 yr of continued intensive effort in building up the load of existing customers and securing new ones, there are now 349 customers, with a total of 90 farm customers. Farms are classified by the United States Census Bureau's definition of a farm as any tract of 3 or more acres for agricultural purposes. There has been practically no change in the population of the territory traversed by this rural line since it was constructed in 1926.

The accompanying data table shows the increase from year to year in the number of customers and annual revenue:

Date	Farm Customers			Other Rural Customers			Total		
	Number Added During Year	Number at End of Year	Annual Revenue	Number Added During Year	Number at End of Year	Annual Revenue	Number Added During Year	Number at End of Year	Annual Revenue
4/1/26	*12			*111			*123		
12/31/26	12	24	**\$ 360	39	150	**\$1,780	51	174	**\$ 2,140
12/31/27	16	40	1,024	28	178	4,264	44	218	5,288
12/31/28	10	50	1,485	22	200	5,292	32	250	6,777
12/31/29	18	68	2,326	7	207	6,120	25	275	8,446
Dec., 1930	22	90	3,982	52	259	8,034	74	349	12,016

* Number connected on completion of the line.

** Nine months—April 1 to December 31.

Wiring

Practically all farms now connected have installed at least a 60 amp entrance switch and 3 wire service. The power company does not take contracts for the wiring of these farms. However, through the rural service department free advice is offered on planning an adequate wiring job for the farmstead. All farm wiring is contracted for by local electrical dealers and licensed wiring contractors. The wiring for each service, both farm and urban, must pass the National Board of Fire Underwriters' regulations. As the wiring system is the foundation on which electric service rests and determines the uses to which electricity can be put, as well as its convenience of application, the company assumes the responsibility of promoting better wiring for its farm customers.

The new business departments of the company contract for the wiring of ranges, refrigerators and water heaters sold by this department.

Merchandising

The company does not merchandise farm electrical equipment, as this would undoubtedly require a larger investment in stock and handling than the demand would justify from the company's standpoint. Farm customers may obtain such equipment from local dealers, factory sales representatives, mail-order houses or manufacturers. The rural service departments assist the customer in the selection and installation of equipment.

The new business departments sell 3 major electrical appliances used in the homes of customers—ranges, refrigerators and water heaters. This equipment is also sold at the same prices and terms by local electrical dealers throughout the territory.

washing machine, milking machine, churn and feed grinding mill, for the purpose of demonstrating to the farmer this equipment in actual operation. A cordial invitation is extended to all farm customers to make use of this practical laboratory in order to receive maximum benefit from their electric service. This enables the farmer to come to us for first-hand information and at the same time the rural service engineer can be of advantage to him by helping select the type of equipment best suited to his individual needs.

Besides demonstrating certain electrical applications in operation, the farmer is given circulars and literature explaining the use of electricity on the farm, is shown pictures of electrical installations used by his neighbors, referred to maps, charts and records showing the types of farms served in the company's territory, and his attention directed to farmers who may be considered as having model electrified farms.

The magazine, "Electricity on the Farm," is sent monthly to every farm customer. In addition to this direct-by-mail publicity, the company does regular advertising in newspapers, telephone directories, farm papers and fair programs. Some billboard advertising is used. All these mediums reach the farmer.

Through the rural service departments the company keeps in close touch with the work carried on by representatives of the State Extension Service, agricultural engineering department of the Virginia Polytechnic Institute, farmers' organizations and country agricultural agents, who are directly interested in rural electrification as an important phase in the development of rural farm communities in the state.

During the months of January and February, 1930, the rural service departments and the agricultural county agents gave free moving pictures at high schools in 9 farm communities. The company used the General Electric Company moving picture—"The Yoke of the Past"—and the county agents gave films made by the United States Department of Agriculture on crops and live stock. Short lectures were given on electric service and equipment for the home and farm. More than 1,000 farm men and women attended these moving picture programs. The pictures were entertaining and instructive for all farm men and women interested in agriculture, and who understand and know the value of electricity on the farm and in the home.

Extension representatives of the

The company employs a home service director in each district, who conducts range and refrigerator demonstrations for the city and farm housewives. In the office buildings of each district the Home Service Director has a model electrified kitchen where the customers may come to group schools conducted to show the proper operation of the range and other electrical appliances used in the home. Demonstrations are frequently held in the smaller rural communities. A greater percentage of farm electric customers use ranges and refrigerators than urban resident customers in the same territory.

A farm demonstration room has been established in the Roanoke office where local dealers and manufacturers are permitted to place electrical appliances, such as portable farm motor, automatic water system, utility motor,

agricultural engineering department of the Virginia Polytechnic Institute have cooperated with the company's rural service department in establishing electrification projects on farms in the territory served. They make available to both the farmer and the power company as rapidly as possible the latest information on the uses of electricity in agriculture. Different types of farms, such as dairy, fruit, truck and poultry, have been selected, and an effort made to get these farmers to use as many practical applications of electricity as possible. The agricultural extension engineer and the rural service engineers assist the farmer in selecting his equipment, and offer

suggestions or advice on wiring, installation and proper operation of such electrical equipment. Meters have been installed to check the practicability of certain electrical applications on farms, such as electric water heaters, sterilizers or milk cooling systems for dairymen, incubators or brooders for poultrymen, and irrigation systems for truck and fruit growers.

No attempt has been made to set up any one farm as a model or example of electricity applied to all the different uses on farms in the territory, but rather to select progressive dairy, truck, poultry or fruit farms as outstanding examples in each district, and to direct the farmer's attention to an

electrified farm in his community similar to the one he operates.

Accomplishments

Largely as a result of the extension program and rural service work in this division for the 2-yr period, 1929-1930, the rural customers were increased from 2,828 to 4,172, or 47 per cent, and the farm customers from 294 to 543, or 80 per cent. The 294 farm customers in 1928 used an average of 1,003 kwhr per customer, while in 1930 the average was 1,207 kwhr for the 543 farm customers, or an increase of 20 per cent. The actual revenue from the farm customers was increased more than 100 per cent during the 2-yr period.

Eastern Division—Central Hudson Gas and Electric Corporation

Agricultural and Territorial Characteristics

The extensiveness of the rural development of Central Hudson Gas & Electric Corporation, as any other utility company, is subject to natural limitations, such as climate, topography and soil conditions, together with the activity of the farming industry and the general welfare of the farming population. An understanding of these conditions within the franchise area assures a clear comprehension of the rural electrical development activities of this company.

The present area served extends along both sides of the Hudson River; on the west for a distance of 70 miles; on the east for 40 miles; and inland from the river in either direction approximately 30 miles. The total area served is 2,570 sq miles, bounded on all sides by mountain ranges cross-sectioned with still other ranges and with sizable streams and rivers. The principal ranges in the territory are the Catskills, Shawangunks, Taconic and Helderbergs, on the southern border the "Highlands," and on the extreme east Connecticut's Berkshires, while the northern and western boundaries are formed by the Catskills and Shawangunks. Although a valley, the entire region is decidedly rolling with sharp outcroppings of shale and sandstone formations, bared or laid down by glacial activity. Further evidence that the area may not be mistaken for an expansive plateau of contiguous farms may be gleaned from the fact that census statistics report only 43 per cent of the land as used for crops and pasture, the remaining 57 per cent being mountains, streams, wooded

areas, waste land and woodland pasture.

That portion of the total area suitable for agricultural purposes may be said to be fertile, well drained and adapted to the production of a variety of crops and livestock products which, when linked with the excellent transportation facilities available and the close proximity to consumers' markets, have combined to place the Central Hudson Valley farmers among the most prosperous in the nation. In this section the problem of the submarginal farmer and farm land is of little importance as nature definitely solved this problem by sharply marking between the land now considered suitable or not suitable for farming. So carefully is it labeled that few save hardy woodsmen plant the rough mountainous areas while even mediocre effort produces a fair living in the areas nature intended to be farmed.

Three agricultural enterprises predominate within the Central Hudson area, dairying, poultry raising and fruit growing. The area comprises about 5 per cent of total area of New York State, and the value of all crops produced compares very favorably with this percentage. One-eighth of all the state's apples, 5 per cent of the dairy products and 7½ per cent of all poultry products are produced. For this area 56 per cent of the farm income is from crops and 44 per cent is from livestock products. Because of the climatic effect of the large body of water, the lands along the river produce fruit crops almost exclusively. Apples, pears, peaches, cherries, grapes, currants and berries are of major importance. Inland, as frosts

and freezes become more of a hazard, fruit growing tapers off into dairying and poultry raising. Much of the rougher lands where field work is difficult are given over to poultry and on the smaller farms in the more thickly settled areas poultry raising predominates.

Adequate and suitable markets so vital to the continued success of any farming community plan an important part in the agricultural success of this territory. Consumer demand for fresh farm products reaches out insistently from the 10,000,000 appetites of New York City's populace to consume more than 60 per cent of all the products produced. With a ready demand from other nearby population centers, another 20 per cent is easily marketed. Demand from local cities and towns removes the probability of any surplus without resorting to processing or shipping in large quantities to foreign markets. Farmers have been greatly aided by the transportation facilities provided by trucking service, river boats and steam railways. From any point in the territory a shipment made one day arrives in the buyer's hands for delivery the next morning.

This stability and success of the agricultural people in the area have caused an ever-increasing demand from them for central station electric service.

The time had presented itself when reliable information on farm equipment and the advantages of using electricity on the farm should be given the farm people and at the same time it was necessary to develop the usage on rural lines in order that the investment could be put upon self-supporting

DEMONSTRATIONS

A few of the more interesting demonstrations of electrical uses on farms being conducted in cooperation with the rural service departments of the power companies are as follows:

Overhead Irrigation

See Sanderson Project explained in detail on pages 17 - 23. Several other overhead irrigation demonstrations are also under way in Eastern Virginia.

Dairy Utensil Sterilizers

An electric sterilizer built in the agricultural engineering department laboratory is being demonstrated on the Bradley farm in Botetourt County. The farmer reports successful operation in sterilizing equipment for a 20 cow dairy. Costs run about \$3.00 per month for current with much saving in labor.

Sweet Potato Curing.

With electric strip heaters about 750 bushels of sweet potatoes were cured in a storage house on farms in Nansemond County. As this is a new development the following report of the results should be of interest.

CURING SWEET POTATOS WITH ELECTRIC HEAT

1. Current turned on Sunday night, October 18. Potatoes put in Monday night, October 19.
2. Temperature maintained, 80 degrees 24 hours a day from October 19 through October 29. Temperature averaged 82 degrees during the last 5 days.
3. Kilowatt hours consumed first 8 days - 878. Kilowatt hours consumed through curing period October 29 - 1212; current was not cut off during the entire time. During last 5 days extra heat was used to bring temperature from 80 degrees to 82 degrees. Current was out off the night of October 29, and temperature reduced to 56 degrees. Current consumed between end of curing period and November 17 - 55 kwh. Total current consumed from start to November 17 - 1267 kwh.

Twelve street car heaters were used to heat the potato house. These heaters are rated at 110 volts but were connected three heaters in series on 220 to give a low wattage low temperature. The total connected load was approximately $4\frac{1}{2}$ kw. The heaters were controlled with two automatic furnace house type controls, one on each side of the house. Each control governed six heaters. Heaters were set on pieces of tin on

10-E-1. Rural Line Extensions

the floor and false flooring for potato boxes built over the top of the heaters. Two extra heaters were connected in during the last five days to get additional heat, these two heaters being connected in series on 220 volts and placed in the aisle between the two potato rows.

Relays were used to cut in the heaters, the relay being operated by the temperature control. This temperature control was set to act within three degrees. The time of curing and since the expiration date was unusually favorable because of warm weather, indications are that slightly more heat will be necessary in cooler weather, but the same results could be obtained at a slightly increased cost.

At this particular location, the current could be figured at $1\frac{1}{2}$ ¢ per K. W. H. However, because of various demand factors and connected load, the current may cost as high as 2¢, which would not be excessive.

The following letter from the farmers concerned expresses their opinion of the demonstration:

Route #5, Suffolk, Va.,
November 21, 1931.

Mr. Chas. E. Seitz,
Blacksburg, Va.

Dear Mr. Seitz:

We received both your letters and would have answered them earlier, but had to wait until we could get some of the data from Mr. Will of the V. E. P. Co. He has been out of the city a great deal lately. We are sending you some information on a separate sheet from him.

We consider this method of heating as near perfect as we could ask for. We have been in many houses in Princess Anne since we cured and realize more than ever the value of this method of heating. We consider it the only house of really cured potatoes we have seen. As you saw they are cured the same from top to bottom and the same on both ends and in the middle. We have not seen another house that the potatoes on the bottom row are cured. We consider that the difference in cost is more than offset by the quality, safety in cool snaps, and the convenience. It is possible to store more potatoes in a house cured with electricity than where a stove is used as no space is lost where the stove sits or the space that is required around the stove. This one advantage will nearly pay for the entire electric bill.

Field Projects and Demonstrations, (Con'd.)
10-E-1 - Rural Line Extensions

If there is any other information that you may desire about this house we will be glad to furnish same. We are expecting to get some more information from your department before another year and we appreciate the interest you all have taken very much.

With kindest personal regards and best wishes, we are

Very truly yours,

(Signed) F. B. Eberwine

W. T. Wright

Electric Brooding

The electric brooding of quail is being demonstrated on the Upland Game Farm near Salem. This is an entirely newly developed method and the results so far look very promising. Some brooding tests are also being made on several poultry farms. Complete results of this project will be reported on next year.

Dairy Refrigeration Demonstrations

On several dairy farms in the Norfolk and Roanoke sections dairy refrigeration tests are being made and complete cost and other records will soon be available on these farms.

A number of demonstration farms are being selected in different sections of the state. On these farms, which represent all types of farming, records are being kept of the electrical consumption, cost, results, etc. on various uses such as:

Dairy Refrigeration	Lights for Egg Production
Electric Milking	Stationary Spray Plants
Dairy Sterilizers	Fruit Grading
Feed Grinding and Mixing	Removing Spray Residue from Fruit
Ensilage Cutting	Evaporation of Fruit
Electric Incubation and Brooding	Cold Storage of Fruit
Water Heating	Electric Hot Beds
Irrigation	Vegetable Grading and Sizing
Hay Hoisting	Trapping Insects

Rural Electrification Bulletin

Bulletin No. 122, entitled "Rural Electrification in Virginia", was published in March. This bulletin of 51 pages contains 58 illustrations. This bulletin explains the state plan for extending electric service to rural sections and describes many uses of electricity on the farm and in the home that are now being performed to advantage on Virginia farms. The full report of the Governor's Joint Committee on Rural Electrification is contained in the appendix of the bulletin. Over 12,000 of these bulletins have been distributed in the state.

10-E-1 - Rural Line Extensions

Outlook

This project will continue to be one of the main lines of work of this department. Power companies are building more rural lines each year and becoming more and more interested in rural electrification. The work for the coming year will be along the same lines as in the past. The main emphasis will be placed on work with power companies looking toward the organization of rural service departments. The goal will be to have a rural service department in each company in the state with a trained agricultural man in charge. When this is accomplished much greater results can be secured. In the meantime consulting and demonstration work will be continued with the local leaders or rural service men with the companies already organized.

10-E-2 - Farm Water Power

There are many farms in the state so situated that there is little possibility of their securing electric service from power companies for many years to come. Some of these farms have water powers that are practical of development for the generation of electricity. Each year requests are received from a few farmers for advice in developing their water power. In some few cases these projects are found practical of development for the generation of electricity for lighting the farmstead and some small power work. When practical such a development enables the farmer to harness a natural resource for his own benefit. Only urgent requests for advice in this project are answered.



Dam, head race and power house. Farm water power project in Floyd Co. that furnishes lights for farm house and buildings.

Results

Twenty (20) farm water power surveys were made in 15 different counties during the year. These surveys were in answer to urgent requests. The development of most of these sites means a considerable investment and consequently it will probably be several years before many of them will be completed.

Field Projects and Demonstrations, (Con'd.)10-E-2 - Farm Water PowerOutlook

This project is not emphasized as it is only in exceptional cases where the development of small water powers are practical. The work for the year on this project will be confined to answering urgent requests for advice and help.

10-E-3 - Individual Light Plants

No work was done on this project during the year. The light plant, however, will continue to be the main source of electric light on thousands of isolated farms for years to come. We, therefore, feel justified in maintaining this project. However, practically all work on it in the future will consist of supplying information by mail in answer to direct inquiries.

SUMMARY

38 Radio Talk

3843	Letters written
1576	Farmers visited
317	Visits to counties
79	Different counties visited
100	Agents visited
315	Days in field
417	Days in office
16,420	Bulletins sent out
2262	Farm building plans sent out
53	New farm building plans drawn
13	Drainage surveys made
730	Acres in drainage surveys
32	Terracing demonstrations
207	Adult farmers instructed in terracing
5	Club terracing schools
125	Boys enrolled in terracing schools
21	Irrigation surveys made
1462	Acres in irrigation surveys
129	Water supply surveys made
6	Septic tank " "
20	Farm water power surveys
1421	Rural customers secured electric service from four cooperating companies
535	Farm customers secured electric service from four cooperating companies

Respectfully Submitted,

Chas. E. Seitz
Agricultural Engineer

PART II

APPENDIX

1. Memorandum of Agreement -- Land Development Project
2. McCormick Day Program
3. Circular -- Mechanical Refrigeration for Small Dairies
4. Mimeograph Material Used in Farm Water Supply Project
5. Mimeograph Material Used in Terracing Club Project
6. Letters in Reference to Farm Structures Project
7. Letters in Reference to Farm Water Supply Project

Memorandum of agreement made and entered into this first day of July, 1931 by and between the Department of Agricultural Economics and the Department of Agricultural Engineering of Virginia Polytechnic Institute, and the Bureau of Agricultural Engineering, United States Department of Agriculture.

NOW, THEREFORE THIS AGREEMENT WITNESSETH. For the purpose of studying the possibility of improving agricultural conditions on typical farms in Virginia by better crop rotations, by improved physical layout, and by means of better machinery and equipment, the parties to this agreement jointly undertake to perform the following:

(1) The Department of Agricultural Economics of the Virginia Polytechnic Institute agrees to assist in selecting about twenty typical farms in the state of Virginia, to obtain farm records for each of such farms, to continue to keep such costs and income records throughout the life of this investigation and to cooperate with the other parties to this agreement in developing plans for the improvement of these farms.

(2) The Department of Agricultural Engineering, Virginia Polytechnic Institute, agrees to assist in selecting the farms to be studied, to cooperate with the other parties in this agreement in making plans for the development of these farms and to make detailed estimates of, plans for, and supervise construction of such improvements as may be recommended when and if they are constructed by the farm owners.

(3) The Bureau of Agricultural Engineering of the United States Department of Agriculture agrees to make the necessary field surveys of the selected farms, to prepare and provide maps of the same, and to cooperate with the other parties to this agreement in the preparation of plans for the development of these farms.

(4) It is jointly and severally agreed by all parties to this agreement that each party shall bear all of the expenses of doing that part of the work which it has agreed to do. It is further agreed that the expenditures to be made by the Bureau of Agricultural Engineering under the terms of this agreement for the fiscal year beginning July 1, 1931 shall not exceed the sum of \$3,000.00.

(5) It is agreed by all parties that the publications of the results of this investigational work may be made by any party but only upon and with the consent of the other parties.

(6) This agreement is to be in full force and effect from July 1, 1931 until June 30, 1932.

APPROVED:

Director of Scientific Work

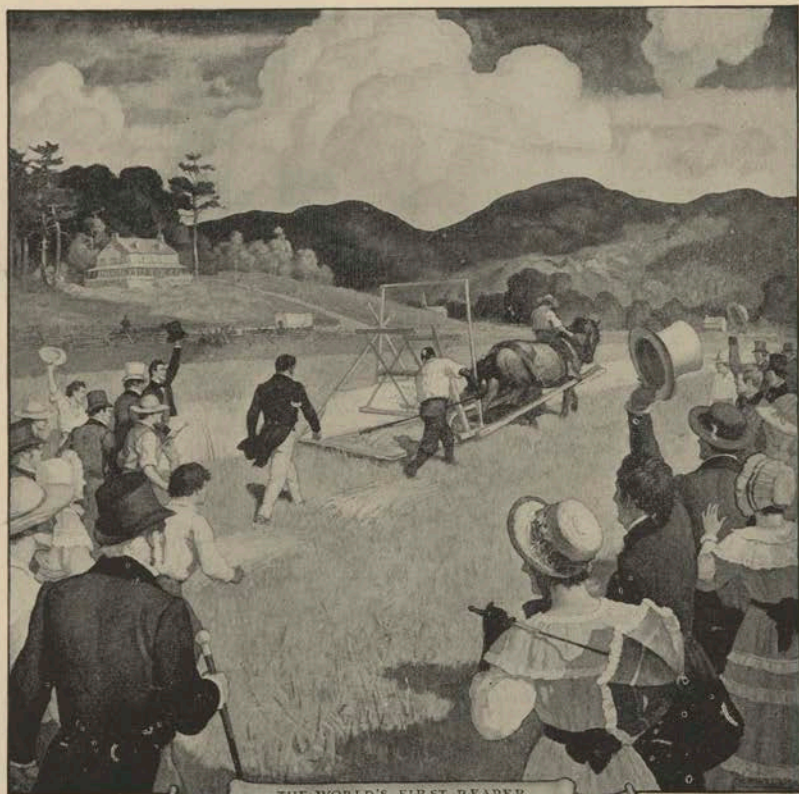
Head, Dept. of Agricultural Economics

Head, Dept. of Agr'l. Engineering

Chief, Bureau of Agr'l. Engineering

McCormick Day

Program



THE WORLD'S FIRST REAPER
Public Test of
Cyrus Hall McCormick's Invention
Steels Tavern, Virginia, July 1831.

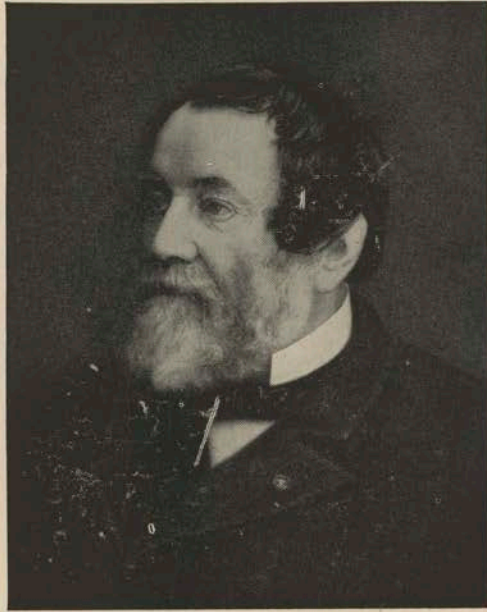
VIRGINIA POLYTECHNIC INSTITUTE
BLACKSBURG, VIRGINIA
JULY 29, 1931

THE Virginia Polytechnic Institute being the state college of agriculture, engineering, and business, of the native state of the inventor of the reaping machine and the state in which this wonderful and beneficent invention was achieved, it seems peculiarly appropriate to conduct here the special exercises of Cyrus Hall McCormick Day.

Virginia, through this agency, seeks to honor one of her immortals. Many of her distinguished sons of battlefield and hustings have been acclaimed, but little recognition has been accorded those of science and industry. Yet "peace hath her victories no less renowned than war," and surely he who feeds the multitude and lightens the labors of man is as worthy of public recognition as the soldier or the statesman.

This institution is grateful for the privilege of being permitted to share in the celebration of the centennial of this supremely significant result of mechanical genius applied to agriculture. It welcomes most cordially its guests, who have come from far and near, on this memorable occasion, to join in homage to the memory of this great and good man, whose claim for honor and distinction is based upon the inestimably valuable service which he has rendered to humankind.

JULIAN A. BURRUSS, President.



Cyrus Hall McCormick (1809-1884), inventor of the world's first successful reaper and founder of the harvesting machine industry. McCormick was only 22 years old when his invention was given its first public test in July, 1831, in a field near Steele's Tavern, Rockbridge County, Virginia

McCormick Day

IN honor of Cyrus Hall McCormick, one of Virginia's most distinguished sons, Virginia Polytechnic Institute, the State Agricultural and Mechanical College of the "Old Dominion," is sponsoring this celebration which marks the centennial of McCormick's invention of the reaping machine upon his father's farm in Rockbridge County, Virginia. This invention ushered in a new agricultural era, and at the same time had a profound effect upon the economic and social development of the United States. The reaper was the pioneer of mechanical agriculture, being the first of a long line of agricultural implements which have done so much to take the drudgery out of farming and to enable fewer farmers to feed a constantly increasing population. The reaper freed thousands from the toil of the fields, thus contributing directly and indirectly to the artistic, scientific, professional, political, industrial and social welfare of the world.

McCormick Day Events

- 12:30- 2:30 P.M. Luncheon for Invited Guests — College Dining Hall (upstairs)
- 1:00- 2:00 P.M. General Luncheon—College Dining Hall (downstairs)
- 2:00- 3:00 P.M. Band Concert — Main Campus, near Library
- 2:00- 3:00 P.M. Motion Picture — “Romance of the Reaper” — Lyric Theatre
- 3:00- 4:00 P.M. Official Opening of Exhibit of Working Models of McCormick Harvesting Machines — Memorial Hall Gymnasium
- 4:00- 6:00 P.M. Public Program of Addresses — Memorial Hall Gymnasium
- 6:30- 7:30 P.M. Barbecue — Main Campus, near Dining Hall (for everyone who registers and attends the public program)
- 7:00- 8:00 P.M. Motion Picture — “Romance of the Reaper” — Lyric Theatre
- 8:00- 8:30 P.M. Assembly Singing of Old Songs — Stadium
- 8:30-10:00 P.M. Pageant Portraying the Evolution of Grain Harvesting Methods and Equipment from the Earliest Historical Period to the Present Time — Stadium. In case of rain the Pageant will be presented in the Memorial Hall Gymnasium.

Limitations of space necessitate restricting the special luncheon to those who receive invitations and admission cards accompanying them. Luncheon for others will be available according to the custom followed during the Institute of Rural Affairs.

All other events of the day will be open to the public entirely free of charge.

The barbecue is offered to all who attend the public program of exercises. To facilitate arrangements it is requested that all register at the information booth. There is no charge connected with the registration nor the barbecue.

Detail Program for Public Addresses

(Memorial Hall—4:00-6:00 P. M.)

MUSIC

PRESIDING — Hon. James P. Woods, Member of the Board of Visitors of the Virginia Polytechnic Institute

ADDRESS — "*The Present Agricultural Situation*" — Mr. Alexander Legge, Recent Chairman of the Federal Farm Board

MUSIC

ADDRESS — "*Development in Farm Machinery Since 1831*" — Mr. Cyrus McCormick, Jr., Grandson of the Inventor of the Reaper

MUSIC

ADDRESS — "*Great Men and the Social Order*" — Dr. George E. Vincent, Recent President of the Rockefeller Foundation

ANNOUNCEMENTS

MUSIC

Sketches of Speakers

THE GOVERNOR

DR. JOHN GARLAND POLLARD, governor of Virginia, is a lawyer and educator.



School of Government and Citizenship at William and Mary College.

After being graduated from the University of Richmond and George Washington University, he practiced law in Richmond, served in the Virginia Constitutional Convention, was attorney general during 1913-1917, and dean of the Marshall - Wythe

GEORGE VINCENT

DR. GEORGE VINCENT, recent president of the Rockefeller Foundation, is internationally noted



as a speaker and educator. He was graduated from Yale University and obtained his Ph.D. degree from the University of Chicago. He has been actively engaged in Chautauqua work and has taught at the University of Chicago. From

1911-1917 he was president of the University of Minnesota.

ALEXANDER LEGGE

ALEXANDER LEGGE was the first chairman of the Federal Farm Board created in 1929. He began with the McCormick Harvesting Machine Co. in 1891. In 1913 he became general manager of the International Harvester Company, and president in 1922. During the world war he served as vice-chairman of the War Industries Board and as manager of the Allied Purchasing Commission.



CYRUS McCORMICK, JR.

CYRUS McCORMICK, JR., grandson of the inventor of the reaper, was born in Chicago in 1890. He was graduated from Princeton University and studied for two years at Oxford University. Since 1914 he has been connected with the International Harvester Company. He has been vice-president in charge of manufacturing since 1922. During the world war he served in the air service.



HARRY FLOOD BYRD

HARRY FLOOD BYRD, member of the V.P.I. Board of Visitors, was governor of Virginia from 1926-1930. He is one of the largest individual orchardists in the East, and is publisher of newspapers at Winchester and Harrisonburg, Virginia. He is actively interested in agricultural and commercial developments in the state. Between 1915 and 1923 he was a member of the Virginia Senate.



E. LEE TRINKLE

E. LEE TRINKLE, former governor of Virginia, was educated at Hampden-Sydney College, and the University of Virginia. Immediately upon his graduation he began the practice of law in Wytheville. He is vice-president of the Shenandoah Life Insurance Company. From 1914-1920 he was a member of the Virginia Senate. He served as governor of Virginia during the term of 1922-1926.



JULIAN A. BURRUSS

DR. JULIAN A. BURRUSS, president of the Virginia Polytechnic Institute, was graduated from V. P. I., and did graduate work at Richmond College, Harvard University, Columbia University, and the University of Chicago. Before becoming president of his Alma Mater in 1919, he served as the first president of the Harrisonburg State Teachers' College.



JAMES P. WOODS

JAMES P. WOODS, member of the V.P.I. Board of Visitors, is an attorney in Roanoke. He served as a Congressman from the Sixth Virginia District from 1919-1923. In 1898 he was mayor of Roanoke, his native city. He was graduated from Roanoke College, and studied law at the University of Virginia. He is also a member of other Virginia college boards.



The McCormick Reaper

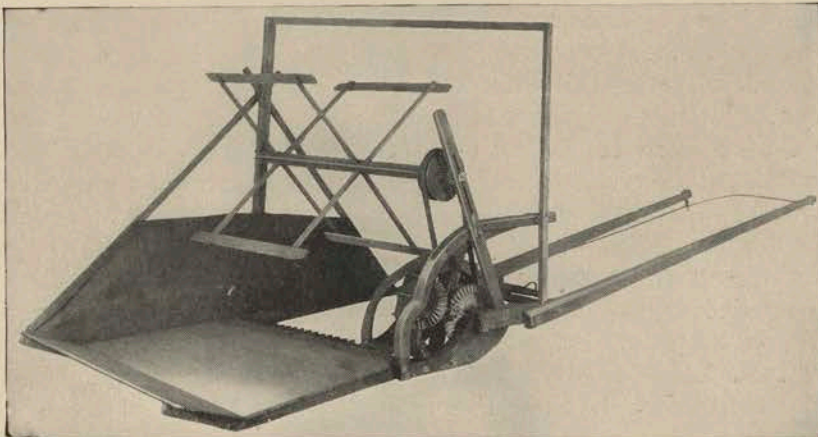
CYRUS HALL McCORMICK was born and raised on Walnut Grove Farm, the old McCormick homestead, near Steele's Tavern, Virginia. In 1831, when but 22 years old, he invented, built, and displayed at public trial the world's first successful reaper.

It is interesting to note that in this first machine, built one hundred years ago, McCormick combined in their true balance and proportion seven basic principles which are still essential in the construction and operation of grain-cutting machines. The seven principles are: the straight cutting knife with reciprocal motion, fingers or guards extending in front of the knife, the reel, the platform, the divider, the main wheel, and forward draft from one side.

Unlike other men gifted with rare inventive genius, Cyrus Hall McCormick devoted the remainder of his

long and busy life to perfecting his one great invention, the reaper. He devised a machine which, when put to work on the farms of the world, revolutionized existing agricultural conditions. Simultaneously he developed a manufacturing system whereby his reapers could be produced in large numbers. He then worked out a method of advertising by which he could tell many people in a short time about the advantages of his machine. And the final step, which made it possible for the reaper to become popular among all classes of farmers, was his introduction of a new and aggressive system of selling direct to the farmer on a long time credit basis.

During McCormick's lifetime he saw his first reaper gradually evolve into a self-rake machine, then into a hand-binding harvester, next into a wire binder, and finally into an automatic twine binder.



Replica of Cyrus Hall McCormick's reaper invented in 1831.

Exhibition of Model Machines

THE display of models in Memorial Hall is an unusual and interesting exhibit, educational and at the same time entertaining in character. It traces the various steps in the evolution of grain harvesting machines from the days of old Egypt with their slow, laborious hand methods to the modern labor-saving methods known and commonly used today. Each major step in the gradual development, which required nearly three thousand years, is clearly illustrated by a separate implement. There is an Egyptian sickle of the crude type used about 2000 B.C., an old Roman scythe, a Hainault scythe, and an early American cradle. Beginning with the First Practical Reaper invented by Cyrus Hall McCormick in 1831, subsequent development is shown with actual working miniatures, each constructed accurately to scale and operating in the smallest detail similarly to the larger machines which they represent.

Included in the display are working models of the following machines: the Gallic Stripper used by the Gauls as early as the first century A.D.; the original McCormick Reaper of 1831; McCormick Hand-Rake Reaping and Mowing Machine of 1857, both as a reaper and as a mower; McCormick "Old Reliable" Self-Rake Reaper of 1862; McCormick Prize Mower of 1869; McCormick Hand-Binding Harvester of the

Marsh type, as built in 1875; McCormick Wire Binder of 1877; McCormick New Iron Mower of 1879; McCormick Twine Binder of 1881; McCormick "Daisy" Reaper of 1882; McCormick "Bindlochine" of 1892; McCormick Push-Type Corn Binder, as an experimental machine of 1893; McCormick Vertical Corn Binder of 1894; McCormick New 4 Mower of 1896; and a McCormick Header of 1900.

A continuous travelling belt arrangement operates each of the models, showing the actual movements of these historic machines.

Another very interesting feature of this exhibit is a diorama depicting in miniature the first public trial of Cyrus Hall McCormick's reaper in a field near Steele's Tavern, Virginia, in July, 1831. This diorama, constructed by English artists, has never before been displayed in this country.

There is also a group of full-size old plows, including an all-wood plow, an early cast-iron plow, a prairie breaking plow, a Mexican bull plow, and several others. These implements carry us back to the old days of hand planting and hand cultivating as distinctly as do the harvesting machine models.

Completing the exhibit are charts, display panels, and photographs which trace vividly the evolution of agricultural machines from the earliest days to the present time.

(Exhibition of Models in charge of Miss Lucile O'Connor and Mr. Virgil P. Fagan)

History of the Barbecue

“BARBECUE, a large gathering of people, generally in the open air, for a social entertainment or a political rally, the leading feature of which is the roasting of animals whole to furnish the members of the party with food. The word is said to have been employed in Virginia prior to 1700, and the institution of the barbecue is of southern origin.”— The Encyclopedia Americana.

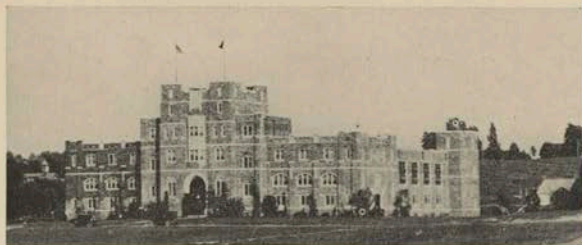
The McCormick Day barbecue is one of the old-fashioned kind, a real 1831 affair resurrected from an almost forgotten past and recreated as a twentieth century treat. Every effort has been made to make this part of the program as much as possible like a feast of our forefathers.

For many centuries barbecuing of whole carcasses of animals or parts of them has been done in various ways and in various countries. Perhaps the idea is a by-product of such an occasion as inspired Lamb's "Dissertation on Roast Pig." Be that as it may, the method of Colonial times, adopted for this barbecue,

calls for the cooking of whole carcasses in the open over pits of fire made of hickory and oak. Three fires are used with the steaming carcasses suspended above the glowing embers on sticks of hickory—a practice which gives the meat a distinct and delicious flavor, to say nothing of basting and dressing.

Other items on the menu are cabbage slaw, pickles, French bread, rolls, ice tea, and stew of the original Brunswick type. This dish like other old time delicacies has suffered from the changes of time. Though Brunswick stew is now made in a dozen different ways, the original concoction conceived in Brunswick County, Virginia, in the early part of the eighteenth century, was composed of rabbit and squirrel meat, tomatoes, potatoes, butter beans, corn, onions, and seasoning. Because the necessary meat is out of season, chicken has been substituted for the first two items. Otherwise, the Brunswick stew on this occasion will be as nearly like the original as it can possibly be made.

(Barbecue prepared by Mr. W. T. Baugh, of Petersburg, Va.)



War Memorial Hall

McCormick Day Harvest Pageant

PRESENTED AT
VIRGINIA POLYTECHNIC INSTITUTE

Story of Pageant by
HERBERT A. KELLAR and LUCILE O'CONNOR

Director of Pageant
N. FRED ESSIG

Produced by
DONALD MACDONALD III

Chicago Metropolitan Ballet numbers by
EDGAR I. SCHOOLEY

Orchestra under direction of
ALFRED BUTLER

McCormick Harvesting Machines in charge of
DAN SMITH, JOHN VOGT, and assistants

Motion Picture Production in charge of
E. F. MCGOVERN, VERNE BLAKELEY, and ROGER FENNIMORE

Historical Harvest Pageant

EPISODE I

(THE PERIOD OF THE SICKLE)

This episode occurs in the days of the Ancient Egyptians. A noble seated in his home and surrounded by his slaves, fan bearers and musicians is being entertained by one of his dancers. The angry shouting of a discontented mob outside is heard. He sends an attendant

to see what causes the disturbance. A disgruntled group of peasants carrying sickles rush upon the scene. Through their leader they protest that so large a portion of their grain is demanded by the tax gatherer. He explains his side of the situation and the greedy noble decides in the tax gatherer's favor. The noble then sends for his sol-

diers to disperse the agriculturists. After driving them from the scene the soldiers return and march before their master, bearing sheaves of wheat which they have wrested from the mob. The noble now sends for his dancers and the scene closes with a ballet Egyptienne.

EPISODE II

(THE PERIOD OF THE SCYTHE)

Here we see the interior of the Temple of Vesta. Vesta and her Vestals and Roman maidens are disclosed in the midst of their sacred rites.

A group of Roman peasants come to the Temple to beg Vesta to aid them. Many of them carry scythes, the chief agricultural implement of those early days. They explain that they are hungry. There has been no rain, the crops are a failure, and they have no grain to cut. Vesta sends for Ceres, Goddess of Grain, and implores her to relieve the distress of the people. Ceres refuses to do anything until the people find and return her lost daughter, Proserpine. The peasants agree and go in search of Proserpine, while Vesta and Ceres pray to Jupiter for aid. Their attendants do a religious dance. Soon the peasants accompanied by Roman soldiers return in triumph bringing the lost Proserpine who is joyously received by her mother. Ceres now grants the request of the people. The Roman ballet brings the scene to an end.

EPISODE III

(THE PERIOD OF THE CRADLE)

The action in this episode occurs about the year 1800 and depicts the days when the negroes worked upon the plantations. This was the era when the cradle was chiefly used in reaping the harvest. The scene depicts a group of colored people returning from a hard day's work in the field. Their happy attitude toward life is illustrated in their singing of spirituals, and other forms of amusement.

EPISODE IV

TABLEAU A

The tableau disclosed on the left shows the interior of the old blacksmith shop located on Walnut Grove Farm, the McCormick homestead, near Steele's Tavern, Virginia. The greatest problem in agricultural machinery was solved at last through the use of a knife with a reciprocating motion to cut the grain. This was one of the basic principles employed in the McCormick reaper which assured its success. The tableau shows Cyrus Hall McCormick working on his reaper, aided by Jo Anderson, a faithful and trusted negro laborer at Walnut Grove.

TABLEAU B

The tableau on the right shows young Cyrus Hall McCormick at work on his reaper outside the blacksmith shop on the old McCor-

mick homestead. Colonel James McDowell and Captain William Massie, neighbors and close friends of the McCormick family, are watching Cyrus. Colonel McDowell has confidence of his success, while Captain Massie is rather in doubt whether or not this "newfangled machine" will work.

TABLEAU C
THE FIRST McCORMICK REAPER
1831

Just a century ago, Cyrus Hall McCormick tried out his great invention, the World's First Successful Reaper; a machine that ushered in a new agriculture and eliminated much of the drudgery of manual labor farming. A new freedom for the farmer, which was to affect profoundly the destinies of our young Republic, was born on that July day. The tableau represents the first public trial of McCormick's invention. The McCormick family, Captain Massie, Colonel McDowell, and other friends, many of whom came with doubts as to the reaper's success, are among the spectators. After a triumphant trial, those present rush forward to congratulate the 22-year-old inventor. The scene closes with the group singing "Old Hundred."

EPISODE V
THE EVOLUTION OF GRAIN-HARVESTING MACHINES

This represents a scene in front of the McCormick building at the

Paris Exposition in 1900. A typical French family arrives and desires to enter the exhibition building. They wish to view the exhibit of harvesting machines showing their development from 1831 to 1900. The gendarme explains that the machines have been taken outside for a parade which is now approaching. As the gendarme talks, the implements come into sight. Each machine as it passes in review is dated by a scene appropriate to the period represented.

1. The first machine is a replica of the original McCormick Reaper of 1831. This implement which combined for the first time the seven principles essential to all practical reaping machines is shown in action with a boy riding the horse and a man walking alongside raking the grain from the platform.

A charming dance of the period by 32 young ladies from Radford State Teachers College closes this scene.

2. "McCormick Hand-Rake Reaper and Mower"—1857.

As this machine crosses the stage it will be noted that important improvements have been made, notable among which are seats for both the raker and the driver.

The Chicago Metropolitan Ballet dances a specialty dance of the period.

3. "McCormick 'Old Reliable' Self-Rake Reaper"—1862.

Material progress in saving of labor is accomplished with this im-

plement which substitutes an automatic self-delivery device for the man who formerly rode on the machine to rake the cut grain from the platform.

A song, "Old Fashioned Melody" by Verona Horen, and a dance by the ballet provides the finale to this scene.

4. "McCormick Harvester of the Marsh Type"—1875.

This machine marks another advance, a moving canvas elevating the grain over the main wheel and depositing it upon a platform where two or more men ride and bind it by hand.

The timely and amusing Polka brings this scene to a spirited end.

5. "McCormick Twine Binder of 1881" as exhibited at the Paris Exposition in 1900.

In this famous implement which led the field for forty years, an automatic twine binding device takes the place of the men who formerly rode on the machine and bound the grain by hand.

The scene closes with a group of girls in costumes singing the gay songs of the nineties.

EPISODE VI

TABLEAU A

"McCormick-Deering 10-20 Tractor and Tractor Binder"—1931.

This combination of tractor and binder possesses greater speed and more efficiency than binders drawn

by horses. The power take-off, a feature of the McCormick-Deering tractor, operates the cutting mechanism.

TABLEAU B

"McCormick-Deering Farmall Tractor and Tractor Binder"—1931.

The McCormick-Deering Farmall is the original all-crop, all-purpose tractor for row-crop and general farm use. In this instance the power is used to pull and operate a binder.

FINALE

The Finale introduces the Parade of the Nations. Every nation in the world where harvesting machines are used is represented by a character dressed in native costume and carrying his national flag. This march is followed by a dance, "The Bakers," by the ballet.

The Harvest Pageant comes to an end with the display of "A McCormick-Deering Combined Harvester-Thresher of 1931," framed in a huge loaf of bread, denoting the dependence of all nations upon modern harvesting machines for the production of "the staff of life." The "Combine," the last word in harvesting equipment, drawn and operated by a McCormick-Deering tractor, cuts and threshes the grain in a single operation, covering 25 to 65 acres a day, according to the size of machine used.

Cast of Characters

EPISODE I

EGYPTIAN SCENE

Pages: Helen Drinker, Dorothy Sharitz.

An Egyptian Noble: Wilbur O'Byrne.
The Tax Collector: T. B. Hutcherson.

Guards: Sydner H. Byrne, Elvin F. Henry, Harold Henry, A. L. Dean, George Leslie Gullette, James Massey, Roy A. Ballinger, Frank Teske, Gordon Ward, Fred C. Morris, V. C. Austin, Paul Swaffar, E. T. Hines, J. Hoge Woolwine, O. C. Burkhart, Myron Shear.

Mob Women: Nannie V. Sibold, Carrie J. Sibold, Kitty Fuqua, Mary B. Settle, Eula Blankenship, Nellie M. Trent, Minnie W. Lewark, Camella Horen Bennett.

Mob Men: Milton Cutherell, Ransom C. Talbot, V. R. Hillman, Morris Wingard, Frank Groseclose, A. T. Lewark, Clarence Elmore Trent, J. A. Addlestone.

Fan Girls: Anna Lee Moore, W. P. Sadler, Adah Mann Begg, Esther Finger Addlestone, Dorothy Hunt, Frances Eoff.

Lute Players: Helen Ricks, Ethel McKee O'Byrne, Kathleen Luster, Della Elizabeth Ricks, Katherine Price, Susie R. Ware.

Slaves.

Ballet Egyptienne.

EPISODE II

ROMAN SCENE

The Temple of Vesta

Vesta: Maude E. Wallace.

Ceres: Carrie Fain Newman.

Proserpine: Martha L. Seitz.

Vestals: Elizabeth Bresnahan, Mary Elizabeth O'Shaughnessy, Betty O'Byrne, Lois Jane Gardner, Sue Maclin Burr, Frances Eoff.

Roman Maidens: Esther Ford Macatee, Mary Ellen White, Margaret F. Dobyms, Cleo Robinson, Elsie Gray, Elisabeth McNeil, Kitty Fuqua, Olivia Brown.

Roman Soldiers: Roy A. Ballinger, Frank Groseclose, Gordon Ward, J. A. Addlestone, Elvin J. Henry, Harold Henry, E. V. Macatee, George Leslie Gullette, Frank Teske, Fred C. Morris, James Massey, Sydner Byrne, V. R. Hillman, V. C. Austin.

Mob Women: Caralie Slusser, Meda Manning, Martha Brown, Ena M. Hunt, Xerlan Swaffar, Camella Horen Bennett, Susan R. Cutherell, Colin Jeffries.

Mob Men: Myron Shear, Paul Swaffar, Wilbur O'Byrne, Morris Wingard, Ransom C. Talbot, Carter C. Osterbind, A. T. Lewark, Clarence Elmore Trent.

EPISODE III

A PLANTATION — 1800

Chorus from Virginia State College, Petersburg: Luther P. Jackson, Edward G. Trigg, Samuel R. Alphin, Harold D. Martin, Joseph N. Green, Finley R. Wood, A. W. Burleigh, Helen M. Estes, Gwendolyn A. Brown, M. Moore Powell, Ruth Robinson-Logan, Fannie H. Lee, Susie A. Shepperson, and Undine A. Smith.

Southern Stringed Orchestra.

Mammy: Elmira Brown.

Dancer: Henry Jones.

EPISODE IV

JULY, 1831

TABLEAU A

The interior of the old forge shop on the McCormick homestead near Steele's Tavern, Virginia.

Cyrus Hall McCormick: H. H. Gordon.

Jo Anderson, negro helper.

TABLEAU B

Outside the forge shop.

Cyrus Hall McCormick: Mel Jeffries.

Col. James McDowell: E. V. Macatee.

Capt. William Massie: F. Groseclose.

TABLEAU C

(From the painting by N. C. Wyeth)

The Triumph of the World's First Reaper

Cyrus Hall McCormick: Roy A. Ballinger; boy on the horse: Gordon Ward; others in tableau: Charlotte A. Burkhart, Esther Ford Macatee, Elisabeth Booth McNeil, V. R. Hillman, E. V. Macatee, F. F. Groseclose, Myron Shear, Sydner H. Byrne, George Leslie Gullette, Rudolph Michael, Fred C. Morris, Carter C. Osterbind, J. H. Woolwine, Elvin Henry, I. C. Yagel, Harold Henry, Meda Manning, Ransom C. Talbot.

EPISODE V

THE WORLD'S FAIR IN PARIS—1900
(Outside the McCormick Building)

A French Family: The mother, Ena V. Hunt; the father, E. V. Macatee; the children, Nancy O'Byrne, Frank Groseclose, Jr., Charles E. Seitz, Jr., Eleanor Hutcheson, Bob Hutcheson, John Hutcheson, Lester Essig, Jr.

The Gendarme: Morris Wingard.

Students: A. L. Dean, Ransom C. Talbot.

Tourists: Anna Lee Moore, Ethel McKee O'Byrne.

1. "Original McCormick Reaper"—1831.

Dance of the period by girls from Radford State Teachers College.

Green: Eva Lyman, Ella Atkins, Margaret Sweeney, Elizabeth Fugate, Margot Haddock, Flora Carter, Merle Montgomery, Alma Mitchell.

Pink: Emily Jones, Lucy Kate Bradley, Blanche Teller, Gladys Peery, Elizabeth McWhorter, Alice Myers, Burnette Rogers, Loomie Giles.

Yellow: Blanche Sowder, Helen McConnell, Margaret Hargis, Ruth Gardner, India DeHart, Myrtle Taylor, Maude Fleshman, Sara Gillenwater.

Blue: Irene Brown, Thelma Mitchell, Ida Gish, Flora Collier, Emily Fugate, Bertha Shrader, Virginia Thomas, Ardath Smith.

2. "McCormick Hand-Rake Reaper and Mower"—1857.

The Chicago Metropolitan Ballet.

3. "McCormick 'Old Reliable' Self-Rake Reaper"—1862.

"Old Fashioned Melody"—Verona Horen and the Chicago Metropolitan Ballet.

4. "McCormick Harvester of the Marsh Type"—1875.

THE POLKA

Men: Carter C. Osterbind, James Massey, Harold Henry, Elvin F. Henry, Preston Newman, George Leslie Gullette, Gordon Ward, Rudolph Michael, Frank Teske, Chas. E. Seitz, I. C. Yagel, Hoge Woolwine, Susan Cutherell, Mary Ellen White, Margaret F. Dobyns, E. V. Macatee.

Women: Dorothy Hunt, Colin Junkin Jeffries, Betty O'Byrne, Frances Eoff, Susie R. Ware, Sue Maclin Burr, Lois Jane Gardner, Elizabeth Bresnahan, Martha L. Seitz, Ruth

Phillips Ellis, Ann Johnson, Caralie Slusser, Virginia Dobyns, Olivia Brown, Susan Cutherell, Cleo Robinson.

5. "McCormick Twine Binder of 1831"—as exhibited at the Paris Exposition—1900.

"THOSE GAY NINETIES"

Susie R. Ware, Adah Mann Begg, Camella Horen Bennett, Esther Ford Macatee, Carrie Fain Newman, Charlotta A. Burkhardt, Helen Ricks, Ethel McKee O'Byrne. Ann Johnson, Dorothy Hunt, Elizabeth Bresnahan, Esther Addlestone.

A Song: "My Hero," by Miss Verona Horen.

EPISODE VI

TABLEAU A

"McCormick-Deering 10-20 Tractor Binder"—1931.

TABLEAU B

"McCormick-Deering Farmall Tractor and Tractor Binder"—1931.

FINALE

"McCormick-Deering 10-20 Tractor and No. 20 Harvester Thresher"—1931.

PARADE OF THE NATIONS

Blacksburg People: United States, Wilbur O'Byrne; Canada, Paul Swaffar; Morocco, Gordon Ward; Great Britain, Milton Cutherell; Italy, James Massey; Spain, Elvin F. Henry; Costa Rica, Sydner H. Byrne; China, A. T. Lewark; Japan, Clarence Elmore Trent; Mexico, Myron Shear; Argentina, Fred C. Morris; Russia, Frank Groseclose; Turkey, O. C. Burkhardt; Egypt, George Leslie Gullette; Uruguay, V. R. Hillman; Paraguay, I. C. Yagel; British East Africa, Carrie J. Sibold; Portuguese East Africa, Nannie V. Sibold; Island of Mauritius, Nellie M. Trent; Canary Islands, Eula Blankenship; Australia, Charlotta A. Burkhardt; Belgium, Anna Lee Moore; Czechoslovakia, Katherine Price; Estonia, W. P. Sadler; Germany, Helen H. Ricks; Hungary, Carrie Fain Newman; Jugoslavia, Minnie W. Lewark; Siam, Mary Elizabeth O'Shaughnessy; Lithu-

ania, Ena M. Hunt; Roumania, Mary B. Settle; Switzerland, Ethel McKee O'Byrne; Salvador, Della Elizabeth Ricks; India, Anne Johnson; Burma, Dorothy Hunt; Guatamala, Meda Manning; Peru, Adah Mann Begg; New Zealand, Margaret F. Dobyns.

Radford State Teachers College Girls: Brazil, Gladys Peery; Tunisia, Elgie Lee Fannon; Porto Rico, Hope Denny; Latvia, Violet Bourne; Bolivia, Valla Russell; Greece, Clara Puff; Colombia, Frances Fannin; France, Iva Young; Portugal, Alice Turner; Austria, Helen Mustard; Bulgaria, Sadie Mitchell; Persia,

Freda Harmon; Syria, Stella Phlegar; Algeria, Stella Mattox; Venezuela, Alice M. Taylor; Chile, Annabel Thompson; Ecuador, Feryl Graham; Philippine Islands, Kathryn Morehead; Ireland, Elizabeth Nichols; Denmark, Ethel Strong; Sweden, Dallie Hilt; Albania, Ruth Peters; Finland, Mary Foran; Holland, Ruth Fannon; Norway, Hazel Fannon; Poland, Hazel Sykes; Palestine, Mary West.

Specialty Dance—The Chicago Metropolitan Ballet.

The V. P. I. Color Guard: John B. Maynard, Jr., S. S. Roop, K. R. Smith, L. G. McCoy.

Acknowledgments

Original McCormick Harvesting Machines by the McCormick Historical Association and the International Harvester Company of America.

Costumes exclusively by Lester, Ltd., Chicago.

To the National Broadcasting Company and station WDBJ, Roanoke, Virginia, for radio broadcasts.

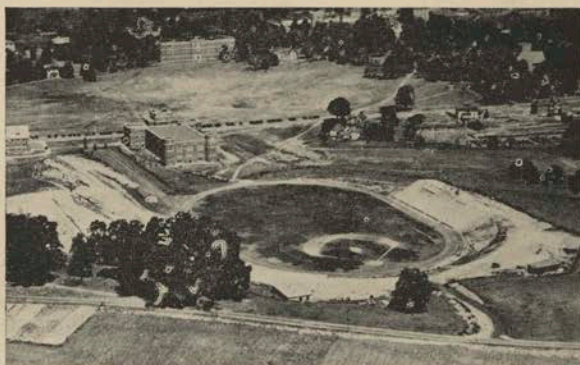
To Sanford B. White, A. C. Seyfarth, R. E. Kenny, Chas. E. Seitz, P. B. Potter, V. R. Hillman, J. W. Sjogren, Virgil P. Fagan, Miss Jose-

phine Groseclose, C. P. Miles, G. A. Johnson, Robert H. McNeil, and Rudolph Michael for their cooperation and assistance.

To the State Teachers College at East Radford for the participation of its faculty members and students.

To the Virginia State College at Petersburg for the music supplied by their representatives.

To the Norfolk and Western Railway for music supplied by its band under the direction of Mr. Dillworth.



Aerial view of stadium where pageant will be held

MECHANICAL REFRIGERATION FOR DAIRIES

BY

H. H. GORDON, *Assistant Agricultural Engineer*

AND

C. W. PEGRAM, *Assistant Dairy Specialist*

ONE of the most important operations on the dairy farm is the proper cooling and storage of milk. It is well known that bacterial growth in milk may be materially checked by prompt cooling to a temperature of 50° F. or lower, and that this cooling should be done within the first hour after milking by the most effective methods available. While ice may be used, mechanical refrigeration has been found not only more efficient but more economical as well.

Many of our larger markets now require cooling and delivery at 50° F. or below. Other markets are considering this requirement, and it is only a matter of time before it becomes an almost universal practice. The progressive dairyman is looking ahead to this time and preparing for it, if he has not already had to meet the problem.

The purpose of this circular is to help the dairyman with this cooling problem by a practical discussion of cooling and storing market milk. The technical side will not be taken up and only those points mentioned which are of importance in helping to select the plant suitable to conditions as they exist on the farm.

Selection

Needless to say the selection of proper equipment is vital to success in operation. If too small a machine is selected, or inadequate storage and accessories provided, results will never be satisfactory. On the other hand, if too large equipment is installed, operating costs and overhead will be excessive. Another point to consider is the probable expansion of operations in the near future. It may be desirable to install larger capacity than at first required in order to provide for this future expansion.



Double tubular cooler. Note that well water is used in upper half of cooler and refrigerated water in lower half. This method is economical and efficient

Before attempting to select or purchase cooling and refrigerating equipment the dairyman should have this information:

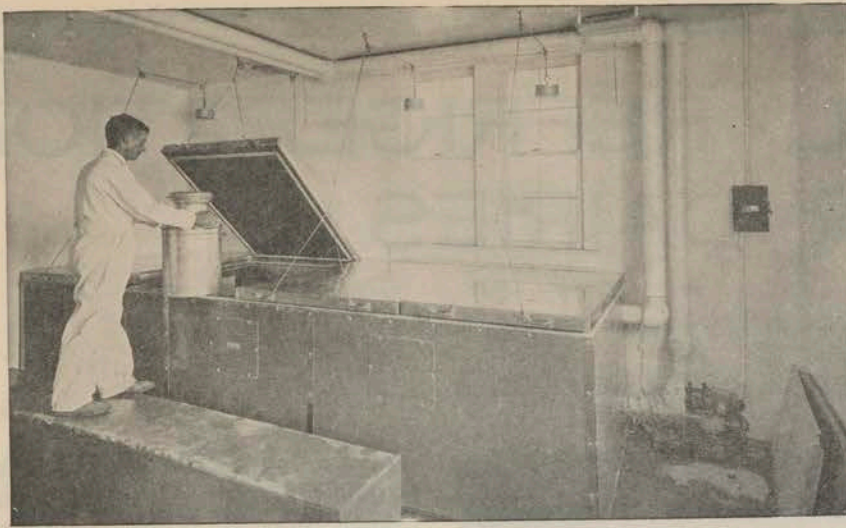
- (1) Maximum amount of milk to be cooled per day.
- (2) Temperature to which this milk must be cooled.
- (3) Amount of milk to be stored per day.
- (4) Temperature at which this milk must be stored and delivered.
- (5) Method of cooling and storage preferred.
- (6) Kind of box to be used.
- (7) Probable average milkroom temperature in summer.
- (8) Is ice to be manufactured, and if so, how much?
- (9) Temperature of available water for pre-cooling in summer.
- (10) Amount of expansion contemplated in near future, if any.

In securing this information, it is important that hot weather conditions be figured, since this is not only the maximum load on the equipment, but also the critical period so far as quality of milk and operation of plant is concerned. A plant to take care of these maximum conditions without overloading is essential.

So far as type of equipment, kind of refrigerant, and special features are concerned, these are matters for the farmer to decide on presentation of facts by the salesman. The important thing is to buy equipment of the proper size for the job. That is the proper size compressor, proper size brine tank, and proper storage capacity. Other items to consider are (1) manufacturer's reputation, (2) which company can and will service their equipment best, and (3) be sure operating time will not exceed 15 hours per day or current consumption exceed 1.5 kilowatt hours per 10 gallon can of milk cooled 35° or 40 degrees Fahrenheit, (4) speed of compressor (excessive speeds mean short life).

The Wet System

There are in use in Virginia at present two types of cooling and storage systems. Where the market is largely wholesale, and storage and shipment is in 10 gallon cans, the most common method is the "wet" system, where the cans of milk are set in refrigerated water up to the neck of the can. With this system, the milk may first be run over a tubular cooler and cooled by (1) well water, (2) well water in upper half of cooler and refrigerated water in the lower half, (3) circulation of refrigerated water only through the cooler by means of a centrifugal circulating pump. The second method is the most common and most efficient, because pre-cooling water from well or spring is taken



"Wet" type storage of large capacity. Note step to aid in lifting cans in and out

advantage of to reduce the temperature of the milk from 95° to 65° or less, making the cooling system carry only the load from 65° to say 45°. This affects a considerable saving in current. The milk is cooled more promptly to the desired temperature by circulating the refrigerated water through the lower half of the cooler, and as a rule, morning's milk so treated need not be put in the storage at all.

In the smaller dairies the cans of milk may be set directly in the storage tank without pre-cooling. This method is very slow unless hastened by an agitator which will keep the water in the tank in circulation, making temperatures throughout the tank more uniform, and hastening the removal of heat from the milk. It is too slow as a rule for cooling morning milk for immediate shipment, and of course more expensive because pre-cooling water is not employed.

The advantages of the "wet" system are (1) low first cost and high efficiency, (2) easy to build, (3) constant supply of refrigerated water or stored refrigeration.

Disadvantages are (1) limited to can storage and provides no dry storage space, (2) hard to lift cans in and out, (3) likely to result in rusty cans and unsanitary conditions if neglected, (4) limited as to size and capacity, (5) water must be changed occasionally.

In "wet" storage three gallons of refrigerated water should be provided for each gallon of milk cooled. This means a box much larger than is necessary to hold the cans of milk only.

Dry Box System

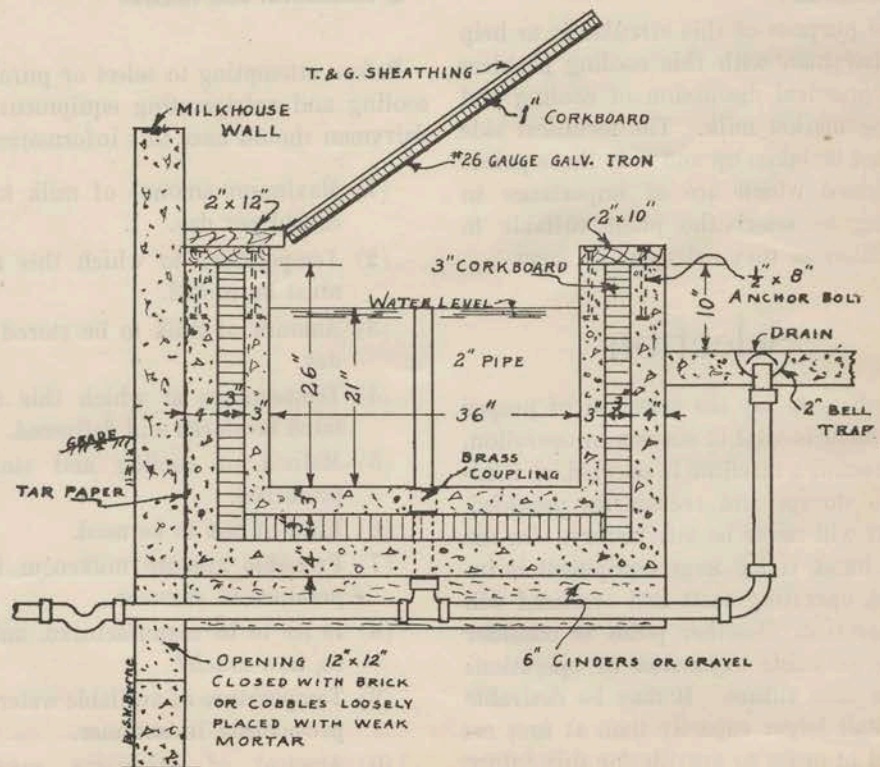
The other system in common use is the dry box which is most popular where bottled milk is produced. The smaller dry box systems are being used with one or more of the small "household type" compressors, using sulphur dioxide or methyl chloride for a refrigerant and developed originally for household use, but later adapted also to commercial and milk cooling work. The larger systems as a rule are operated by ammonia machines

of sufficient capacity to take care of the job, and frequently have additional ice making capacity; the ice being used to pack around the bottles in delivering.

The small sulphur dioxide type compressors have some distinct advantages where the load is not too great. Among these advantages are (1) low first cost, (2) low operating cost, (3) more readily serviced when in need of repair, (4) air cooled, (5) automatic in operation, requiring little attention, (6) where more than one compressor is used, if one should break down the other by continuous operation can be forced to carry the load until repairs are made, and in cool weather only one need be operated.

On larger installations where more than one compressor of the sulphur dioxide type would be required, the ammonia type is usually cheaper and has these advantages, (1) greater capacity and reserve, (2) ice may be made where needed, and (3) more sturdily built with probable longer life, (4) usually slower speed.

The advantages of the "dry" system as compared with the wet are (1) quick cooling, (2) dry cold storage is easily provided, (3) easier and cleaner handling of cans or crates, (4) where brine system is used, refrigeration is stored in brine, (5) can be used in any size and for cans or bottles, (6) can be used for storage of other farm products. The product from

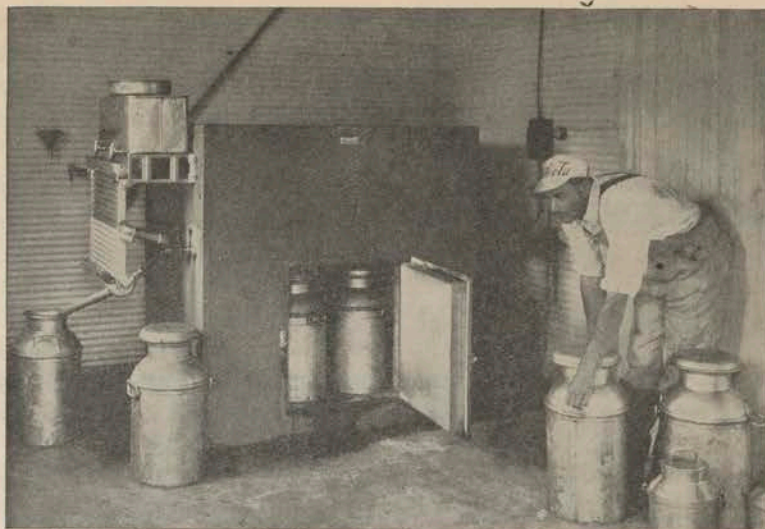


Cross section of insulated concrete storage tank of "wet" type

extremely large herds may be cared for with the large "dry" systems.

Disadvantages are, (1) high first cost, (2) takes up more space in small jobs, (3) operating costs usually higher for small jobs, (4) considerable water required for cooling large ammonia type compressors.

In the "dry" system there are two methods of cooling, namely with brine and by direct expansion. In the brine system the brine is cooled by the refrigerating machine and in turn cools the room, and also furnishes brine for circulation through the aerator. In the direct expansion system the machine operates at milking time and cools both room and milk directly. The brine system is more commonly used because it requires a smaller compressor, maintains a more uniform box temperature, and stores refrigeration in the brine tank. About 50 per cent greater capacity is required for direct expansion.

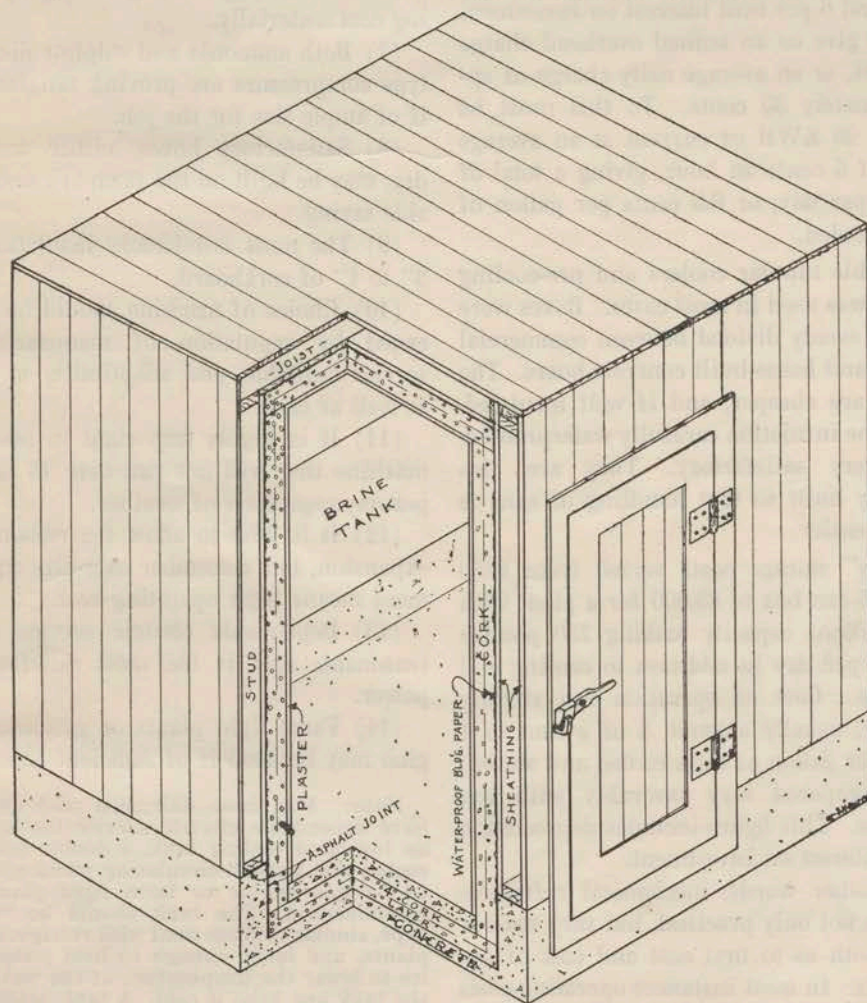


Non-walk-in type "dry" storage box. Can be used for bottled milk as well as cans

In "dry" storage where brine is used, $1\frac{1}{2}$ gallons of brine for each gallon of milk should be provided. The brine solution should be 20 to 25 per cent if sodium chloride is used or 15 to 20 per cent if calcium chloride is used for 10° brine.

(A common rule is brine strong enough to float a potato.) Calcium chloride is less corrosive, and the tank will last longer where it is used. The brine tank should have as much exposed surface as possible. That is, it should be long, high, and narrow. It may be located overhead, or along a wall, but high enough to set cans beneath it, or it may be separate. Where it is separate it should be insulated with 3 inches or preferably 4 inches of cork.

In figuring storage space allow 13" x 15" for 10 gallon cans and 18" x 20" for crates of bottles. The crates may, of course, be stacked to a reasonable height.



"Cut-a-way" view of "dry" storage box showing method of construction. Plans for both "wet" and "dry" storage may be secured from the agricultural engineering department, V. P. I. extension service

Surface Cooling

Common practise in Virginia is to aerate the milk. A good rule to remember is that the aerator tubes should be six inches in length for each 10 gallons of milk to be cooled per hour. Too much emphasis cannot be placed on the use of a double section or two-way cooler, and the use of well or spring water for pre-cooling. It can readily be seen that a large saving may be effected by taking off 25 to 35 degrees with well water, thus reducing the load on the refrigerating machine nearly one-half. This pre-cooling water may be allowed to flow into a stock tank for drinking purposes, making the cost very slight for cooling. A flow of one gallon of pre-cooling water per minute for each 10 gallons of milk cooled per hour is about right. The same rule applies to the circulation of brine or refrigerated water through the lower half of the cooler, and the proper size circulat-

ing pump should be chosen. If too much refrigerated water is supplied, the milk may freeze on the aerator. For this reason, a valve or some throttling device should be provided on pump. Generally speaking, a 3/4-inch centrifugal pump and 1/4 h. p. motor will handle milk up to 400 gallons per day.

Insulation

"Wet" storage tanks should have three inches of corkboard insulation in walls and bottom and one inch in lid. "Dry" storage boxes should have four inches of corkboard in walls, floor, and ceiling. The insulation in all cases must be carefully and completely waterproofed by mopping and dipping in hot asphalt. Two thicknesses of corkboard should be used with all joints staggered and broken to prevent leakage through joints. Extra care should be taken where walls join floor and ceiling to prevent leaks at these joints. In the dry box two coats of cement plaster should be applied to give a smooth finish and prevent frost damage. The doors must be carefully built and insulated, and fit tightly against good gaskets. Floors should usually be two thicknesses of concrete with cork between.

The following table gives capacity of compressor required to cool a given quantity of milk per day. This is based on the fact that the refrigerating machine should have a capacity equal to 5 to 6 pounds of ice per gallon of milk cooled and stored.

Capacity of compressor in pounds of ice per 24 hours	Gallons of milk to be cooled per day
250	30 - 60
500	60 - 100
750	90 - 160
1000	120 - 200
2000	240 - 350

Note: Capacity depends on amount of milk stored and whether pre-cooling is used. For direct expansion add 50 per cent to compressor for cooling same quantity of milk.

During the last year a study of milk cooling by mechanical refrigeration has been made at the V. P. I. dairy barns in cooperation with the dairy department. Fifty representative dairy farms in various sections of the state were visited also in search of data. Farms visited ranged in production from 20 gallons of milk per day to 400 gallons, and while a majority were wholesale milk producers, a number of large retail producers were also in-

cluded in the study. Practically all of the more common types of refrigeration were observed in both wet and dry storage. (Only one direct expansion machine was observed.)

Results of this study indicate that the average cost of the "wet" storage, including compressor, box and coils, tubular cooler and circulating pump, runs from \$450 for the 4-can size to \$650 for the 10-can size. Current consumption where pre-cooling is done should not exceed .1 KWH per gallon of milk cooled and stored in a well insulated box. It would appear that 10 per cent is a safe allowance for depreciation. By taking local cost for current, adding 10 per cent for depreciation, and 6 per cent for interest on investment, the total cost of operation may be arrived at very closely. For example, take a 10-can job, where 200 gallons of milk are cooled, half of this amount being stored. The cost of such equipment would be \$650. Allowing 10 per cent depreciation and 6 per cent interest on investment would give us an annual overhead charge of \$104, or an average daily charge of approximately 30 cents. To this must be added 20 KWH of current at an average cost of 5 cents an hour, giving a total of \$1.30 per day, or 6.5 cents per gallon of milk cooled.

Double tubular coolers and pre-cooling water was used in most cases. Boxes were pretty evenly divided between commercial boxes and home-built concrete boxes. The latter are cheaper, and if well insulated, with the insulation carefully waterproofed, are very satisfactory. They are also usually built so that handling of cans is much easier.

"Dry" storage costs varied from \$850 for a 6-can box to \$3,000 for a plant with 300 gallons capacity making 750 pounds of ice per day in addition to cooling and storage. Cost of operation ran slightly higher, usually around .8 of a cent to 1 cent per gallon of milk cooled and stored; but compared very favorably with wet storage. This figure includes depreciation and interest on investment.

In other words, mechanical refrigeration is not only practical, but very reasonable both as to first cost and cost of operation. In most instances operating costs are only half those of ice, and the handling of the ice is eliminated. Almost universal satisfaction is expressed by owners of refrigeration, most of them saying, "The

question is not do I like it, but how could I do without it." Upkeep as well as operating costs appear to be low, and if not overloaded, all observations indicate that long life and satisfactory service can be expected.

Summary

- (1) Control of bacterial growth and quality of milk depend largely on proper cooling.
- (2) Market requirements are now such that adequate refrigeration is necessary.
- (3) Mechanical refrigeration best meets these requirements.
- (4) Installation cost and cost of operation are low as compared with ice.
- (5) Both "wet" and "dry" storage is being used, depending on containers used and owner's preference. Each type is satisfactory and has advantages and disadvantages.
- (6) Pre-cooling of milk lowers operating cost materially.
- (7) Both ammonia and sulphur dioxide type compressors are proving satisfactory if of ample size for the job.
- (8) Satisfactory boxes, either wet or dry, may be built on the farm at considerable saving.
- (9) The most satisfactory insulation is 3" to 4" of corkboard.
- (10) Choice of machine should be governed by reputation of manufacturer, service available, and adaptability to job; as well as cost.
- (11) It is highly important to select a machine that will not run over 15 hours per day regardless of weather.
- (12) It is wise to allow for reasonable expansion, but remember over-size equipment means high operating cost.
- (13) Dependable electric service at a reasonable cost is the most satisfactory power.
- (14) Farm light plants or gasoline engine may be used if of sufficient size.

Note: For those dairymen who do not have dependable electric service the use of an insulated cooling tank, a double tubular cooler, and a small circulating pump operated by gas engine or farm light plant, is recommended. The tank should be "wet" type, similar to those used with refrigeration plants, and large enough to hold plenty of ice to lower the temperature of the water in the tank and keep it cold. A tank holding 3 to 5 gallons of water per gallon of milk cooled is recommended. Ice water should be circulated through lower half of cooler by motor, or gas-engine-driven centrifugal pump of same type used in mechanical cooling.

MIMEOGRAPH MATERIAL USED IN WATER SUPPLY PROJECT

10,573

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF VIRGINIA

Virginia A. & M. College & Polytechnic Inst. & the U.S.D.A. Cooperating
EXTENSION SERVICE

Dear Friend:

J. A. Waller, Jr., Agricultural Engineer,
Extension Division, V. P. I., is in the county to make surveys,
recommendations and secure estimates in connection with the
farm home water supply campaign.

We expect to be in your community about _____
_____. We cannot state definitely the exact
day that we will visit you, but try to be at home on the above
date, the day before and the day after. As there are a large
number of surveys to make, it will be impossible to make a
second visit.

Trusting that we can be of some real service to
you, we are

Very sincerely yours,

_____, Farm Agent

_____, Home Agent

11,352

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Va. A. & M. Col.
& Poly. Inst. &
U. S. Dept. of Agri.
Cooperating

EXTENSION SERVICE

Dear Sir:

Because the long drouth has made so many of the usual sources of water supply inadequate, or exhausted them entirely, we made an effort to secure the services of a water supply specialist to assist farmers in suggesting proper recommendations.

For several days, beginning _____
an engineer from the Department of Agricultural Engineering, V.P.I.,
Extension Division, will be in the county for this purpose.

Farmers who have in mind making any change in connection with their present water system, or who are planning to install a new system, should make their requests before the above date.

The engineer will visit each farm where his services are requested, make a thorough survey of conditions and suggest what can be done. Since his time is limited, it is hoped that only those meaning business will make requests.

Yours very truly,

Blacksburg, Virginia

Date _____

_____:

It was a pleasure to be of some service to you in connection with your water supply problem.

Enclosed you will find a sheet, copy of which we mailed today to the company indicated, showing the data we took. It is in the nature of a letter to be sent to some pump or plumbing company in Virginia which makes a speciality of selling and installing this type of farm equipment. The enclosed sheet is for you to use in getting quotations from your local dealer or plumber to compare with the prices being mailed to you.

If you find that you need additional information, please write us as often as is necessary to thoroughly understand the installation.

Hoping that you can get this job completed promptly and that you will call on us through your county agent when in need of other agricultural engineering assistance, I am

Yours very truly,

J. A. Waller, Jr.
Specialist in Agricultural Engineering

JAW:P
Enc.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Va. A & M. Col.
& Poly. Inst. &
U. S. Dept. of Agri.
Cooperating

EXTENSION SERVICE

Dear Sir:

In _____ a farm home water survey was made for you in response to your request. I must make a report on this job and would like for you to write me right away as to just what has been done.

The Blacksburg office is calling for this report and it must reach them within the next week so please give me your prompt cooperation.

A card is enclosed for your reply--it requires no postage. If you have installed your system please state on the card the approximate cost and some details about the kind you put in, the advantages you are getting, the service it is giving, etc. If you have not made an installation please state what your plans are concerning it.

Hoping that you will get this card back to me within the next day or two and that you will advise me whenever I can be of service to you, I am

Yours very truly,

County Agent.

ENC.

EXTENSION DIVISION
VIRGINIA POLYTECHNIC INSTITUTE
BLACKSBURG, VIRGINIA
DEPARTMENT OF AGRICULTURAL ENGINEERING
Farm Home Water Supply Engineering Service

Date _____

Gentlemen:

Please quote Mr. _____ whose
address is _____ on a hydraulic ram installation to operate under the
conditions stated below.

1. Normal flow of spring in gallons per minute _____
2. Vertical fall in feet from spring to ram location _____
(This is total fall and includes depth of ram pit)
3. _____ feet of additional fall can be secured in _____ feet of distance.
4. Depth in feet of pit in which ram will be placed. _____
5. Distance in feet from spring to ram location _____
6. Vertical lift in feet from ram to tank _____
(This is total elevation from ram in pit to top of tank on tower)
7. Distance in feet from ram location to tank _____
8. Distance in feet from tank to house _____
9. Type and size of tank recommended _____
10. Type and height of tower recommended _____
11. Number of gallons of water needed per day _____
12. Installed job is (is not) wanted. Owner will _____

(For double acting rams the following is included)

13. Normal flow of branch (drive water) in gallons per minute _____
14. Vertical fall in feet from dam to ram site _____
(This is total fall and includes height of dam and depth of ram pit)
15. _____ feet of additional fall can be secured in _____ feet of distance.
16. Height of dam in feet _____
17. Distance in feet from dam to ram site _____

Please send this prospect sufficient literature, including a ram catalog, to thoroughly inform him
on the subject. Explain in detail the use of a standpipe.

Hoping that you will handle this request in your usual prompt manner, I am,

Yours very truly,

J. A. WALLER, JR.,
Specialist in Agricultural Engineering

EXTENSION DIVISION
VIRGINIA POLYTECHNIC INSTITUTE
BLACKSBURG, VIRGINIA
DEPARTMENT OF AGRICULTURAL ENGINEERING
Farm Home Water Supply Engineering Service

Date _____

Gentlemen:

Please quote Mr. _____ whose address is _____ on a water pumping outfit which will operate satisfactorily under the conditions stated below. The type of job recommended is a _____

(Jobs where vertical lift is less than 22 feet)

1. Source of supply _____
2. Well has been tested to flow _____ gallons per minute.
3. Vertical distance in feet from water level to pump location _____
4. Horizontal distance in feet from water level to pump location _____
5. Gallons of water required per minute _____
6. Size tank desired _____ gallons.
7. Maximum pressure in pounds in pressure tank _____
8. Elevation in feet of bottom of elevated storage tank above pump _____
9. Power recommended _____ voltage _____ phase _____ cycle
Automatic control _____
10. To prevent freezing, pump will be placed in _____
Tank will be placed in _____
11. Installed job is (is not) wanted. Owner will _____

(For deep well jobs the following is included)

12. Type and depth of well _____
13. Distance in feet to low water level _____
14. Inside diameter of casing in feet _____
15. Frostproof cover over job so discharge can be above ground will (will not) be used. If not, figure on set length pump.
16. For this drilled well a pit will (will not) be used for set length.

(For windmill jobs the following is included)

17. Regarding obstructions within 500 feet radius _____
18. Height in feet of tower necessary to place wheel 15 feet above obstructions _____
19. Height in feet tank must be to give desired pressure _____
20. Type and size tank desired _____

Please send this prospect sufficient literature to thoroughly inform him on the subject. Hoping that you will handle this request in your usual prompt manner, I am,

Yours very truly,

JAMES A. WALLER, JR.,
Specialist in Agricultural Engineering

Mimes - Matched Used in Tenancing
Club Project

MIMROGRAPH MATERIAL USED IN TERRACING CLUB PROJECT

12,135

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Va. A. & M. College
& Poly. Inst. &
U. S. D. A. Cooperating

EXTENSION SERVICE

July 6, 1931

We are very anxious to have you present at your last terracing class meeting, date for which is given below. You will learn more at this meeting than you have at the other meetings as you will see terraces actually laid out and constructed. In fact you will be required to take part in everything that is done. With this meeting our course will be finished, except for a list of questions we want you to answer in writing. You cannot be of greater service to your county than helping to keep its best soil from washing away.

We want you to bring your father, brother or friend. They will learn something also.

A picture of the class will be taken and we want you in this picture. These pictures will be sent to Washington.

Since the weather is apt to be hot we will furnish ice cold lemonade to keep us cool.

The meeting in your county will be as follows:

Date: July _ _ _ _ , 1931

Time & Place: _ _ _ _ A. M. _ _ _ _ _ _ _ _ _ _

_ _ _ _ P. M. _ _ _ _ _ _ _ _ _ _

Expecting to see you on the above date and with best wishes,
we are,

_____ County Agent

_____ Agr'l. Instr.

Gas. A. Waller Terracing Specialist

11,733
Agr'l. Eng. Dept.,
V. P. I.,
Blacksburg, Va.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Va. A. & M. Col.
& Poly. Inst. &
U. S. Dept. of Agri.
Cooperating

EXTENSION SERVICE

LAYING OUT TERRACES
2nd Club Meeting

- A. 1. Outlets: Woods, road ditch, old gully, open ditch. Prevent end of terraces and outlets from washing by sowing heavy grass or by small rock retarding dams. Use two outlets for each terrace where practical.
2. Field Slopes: Take several slopes to determine average slope of field. From this slope the spacing of the terraces is determined. See 4 below.
3. Starting Point: Always start at highest point in field and work toward bottom. It is usually better to begin about half way between the ends of the terraces.
4. Spacing of Terraces: Establish first terrace from four to five feet, vertically, from highest point in field. Special local conditions may necessitate changes but in general terraces are spaced as follows:
- | | | | | | |
|-----------------|---------|---------------------------|----------|------|-------|
| For slopes from | 0 - 5 % | three vertical feet apart | | | |
| " | " | " | 5 -10 % | four | " " " |
| " | " | " | 10 -15 % | five | " " " |
5. Grades: A variable grade ranging from no grade to 6" per 100' is usually suggested. Seldom is more than 6" per 100' used in any portion of the terrace. Remember that the water in the terrace should be made to run slow enough to get the water off the land without carrying the soil with it. Also, more moisture will be absorbed by the soil.
6. Rod Holding: Rods reading in feet and inches are usually used, but often ones graduated to feet, tenths, and hundreds of feet are used. The farm rod has a target which is moved up when moving toward the outlet and down when working in the direction of the head of the terrace. The rod should always be held on average ground--not in a hole or on a clump of dirt. It should always be 25' from the last hole.
7. Marking Terrace Line: For short lines stakes are often used, but on field jobs it would take too many stakes. Therefore, a light grubbing hoe or a mattox is used to dig a small hole at each place the rod is held when the reading is correct. These marks are usually made 25' apart and the distances are usually paced.
- B. 1. Note Keeping: When the target is used the rodman establishes the grade and changes it as he sees fit. But when no target is used the instrument man writes down the reading at the starting point, decides what the grade should be and changes it as needed. The readings are set down and checked off when the place is marked.

Agr'l. Eng. Dept.
V. P. I.
Blacksburg, Va.

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Va. A. & M. Col.
& Poly. Inst. &
U. S. Dept. of Agri.
Cooperating

EXTENSION SERVICE

CONSTRUCTING TERRACES
3rd Club Meeting

- A. 1. Construct top terrace first. Plow up holes used to mark water channel throwing furrow down hill. Have no sharp angles--make easy curves.
2. Using the rod run another furrow exactly parallel to the first one and 10' below it. This is done by one man walking in the upper furrow holding the zero end of the rod and another man holding the rod at the 10' mark. The plowman plows up the lower man's tracks and should have a furrow as mentioned above.
3. When only a plow is used to throw up the ridge, this lower furrow is used as the ridge center and the plowing is continued around it, throwing the furrows toward this center, until the upper furrow or water channel is reached. Since it is 10' from the ridge center to the water channel, there will be 10' of plowed land below the ridge also making the total width of the terrace about 20'.
4. After the terrace has been allowed to settle, it can be plowed up again making the ridge still higher. It should be plowed as many times as necessary to make the ridge about 18 inches higher than the water channel when it is packed. It takes longer, but excellent terraces can be made using only a good plow.
5. It is advisable to use home-made drags or terracers, or commercial terracers drawn by tractors. When using a drag or terracer, plow only about three or four furrows to the center of the ridge before using the terracer. More than one round with the terracer may be necessary. Be sure to get the ridge high now as it will be more difficult later when working farther from it. If the ridge is well made, then proceed to plow, and then drag up each furrow until the water channel is reached. Since the plowing and dragging is done from both sides, the completed terrace will be about 20' wide. If reversible implements are used it is better to work entirely from the upper side.
6. In order for the upper side of the water channel to have a gradual slope, a few shallow furrows should be thrown into the water channel which may be carried over to the ridge. The lower side of the terrace should be graded smoothly with the field.

- B. 1. Cross gullies directly. Make terrace line high and wide enough so it will not break at times of heavy rain. Slip scrapers can be used to advantage. Brush, stakes, and fence dams are effective in checking gully washing.
- C. 1. Breaking the terraced land. Take the turning plow, or tractor plow, and begin on top and throw the terrace up as usual. When the last furrow on the upper side comes in the water channel above the terrace, turn to the left at the end and make a back furrow (throw two furrows together) six to eight feet above the water channel. Then plow around this back furrow until the water channel is reached. In this way the soil is plowed out of, and away from the water channel in both directions instead of filling it up. It also makes the water channel deeper and wider. The terrace is in better condition than if the land is broken in the usual way and an attempt made to throw up the terrace while the soil is loose. There is no loss of time in breaking the land, and it saves the labor of throwing up the terrace one time.
- D. 1. Planting row crops. Crop rows should run in contours parallel to terraces the first year or two until the terraces become firm. Afterwards, farm operations and crop rows may cross terraces.

In planting parallel to terraces, usually one or more short rows will be found between each pair of terraces. This is due to irregular slopes of land. It is advisable to begin rows parallel to the higher terraces. Continue uniform spacing of crop rows as farm operations proceed toward the next lower terrace until reaching the water channel. Let all short rows be parallel to the long ones. Each short row will end at some point on the water channel. One crop row should be placed on the upper side of the terrace between the crown and water furrow.

12,257

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Va. A. & M. College
& Poly. Inst. &
U.S.D.A. Cooperating

EXTENSION SERVICE

August 4, 1931

Instructions:

1. Do not rewrite the questions. Just number them and then write your answer.
2. Be brief.
3. Write so it can be read.
4. Use pen or pencil on any good paper.
5. You may refer to any bulletins which have been given you.
6. All papers must be returned to James A. Waller, Jr., Department of Agricultural Engineering, V. P. I., Blacksburg, Virginia, by September 1, 1931.

- - - - -

1. (a) What is soil erosion? (b) What evidence have you that this is a serious problem in your section?
2. Name several ways farmers have of checking this erosion.
3. Give general description and dimensions of a terrace and state its purpose.
4. Describe briefly how terraces are laid out, step by step.
5. Give the various steps in building terraces.
6. What benefits do farmers get from terraces?
7. (a) What is meant by a variable grade? (b) What is about the maximum grade a terracer should have? (c) What determines the spacing between terraces?
8. (a) Why are outlets so important? (b) What places make good ones?
9. (a) How would you plow a field that is terraced? (b) How would you plant a row crop in a terraced field?
10. Do you feel qualified to lay out and build terraces for your neighbors?

12,257

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
State of Virginia

Va. A. & M. College
& Poly. Inst. &
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LETTERS IN REFERENCE TO FARM STRUCTURES PROJECT

RICHMOND COOPERATIVE MILK
PRODUCERS ASSOCIATION
309 Broadway Bank and Trust Bldg.
Richmond, Virginia

July 14, 1931.

Prof. C. E. Seitz,
Agricultural Engineering Dept.,
V. P. I., Blacksburg, Va.

Dear Professor Seitz:

I would like to take this opportunity of thanking you and your department for the splendid services rendered this Association by Mr. H. H. Gordon on his recent visit to Richmond, in which Mr. Gordon gave us excellent technical advice and assistance in preparing some more definite milk regulations, as proposals, to the Richmond Board of Health.

I hope that we will have an opportunity to use his services many times in the future.

With best wishes, I am

Yours very truly,

(Signed) F. A. Buchanan
Manager

B/C

DEPARTMENT OF PUBLIC WELFARE

BUREAU OF HEALTH

City of Richmond, Va.

May 25, 1931.

Mr. H. H. Gordon,
Extension Service,
Blacksburg, Va.

Dear Mr. Gordon:

This will acknowledge receipt of your recent communication with enclosures.

I want to thank you for the circular you sent me, which I think covers very well the subject of "Mechanical Refrigeration for Dairy Farms". As the circular is brief and to the point, it, in all probability, will do as much, if not more good than a very large bulletin.

Enclosed you will find the list of the dairies supplying the Richmond market, which you mailed to me. I have checked all those having mechanical refrigeration and certainly would appreciate it if you would mail the others a copy of the circular which you sent me. I also would like to have a half dozen copies of this circular for my own files.

With best personal wishes, I am

Very truly yours,

(Signed) T. J. Strauch
Chief Dairy Inspector

COMMONWEALTH REFRIGERATION CO.

Richmond, Virginia

June 26, 1931.

Mr. H. H. Gordon,
Agricultural Engineering Dept.,
Blacksburg, Virginia.

Dear Mr. Gordon:

I know you will be interested to know that we have had a final decision from the Richmond Health Department to the effect that they see no objection to our placing General Electric milk cooling equipment in the milk rooms, and have given us full approval on our equipment.

We feel most grateful to you for your very kind letter of June 10, and the efforts that you have put on this particular problem. We are quite confident that without your very fine support we could not have secured a reversal of their decision.

I certainly hope that if there are any problems connected with the work at the College in which we could in any way be helpful that you will not hesitate to call on us.

Very truly yours,

(Signed) R. S. Montgomery
President

RSM:O

DEPARTMENT OF AGRICULTURE
AND IMMIGRATION

Dairy and Food Division
Richmond, Virginia
June 1, 1931

Mr. H. H. Gordon
Agricultural Engineering Dept.
V. P. I.
Blacksburg, Va.

Dear Mr. Gordon:

On my arrival at the office I find your letter accompanied by copies of your Mechanical Refrigeration For Dairies, for which I am very grateful to you. I have read it over with a great deal of interest but have not made the study of it that I hope to make when I have more time. At present I have no criticism at all to offer and I wish to compliment you on your complete detailed information in regard to the different types of mechanical refrigeration. I am confident that we can use a number of these pamphlets in our work and will be glad to have some in the office if you feel that you have them to spare.

I am returning the list of dairymen, and I am sorry to say that we do not have others to report on at this time.

You ask for the names of city inspectors of towns having their own ordinances. I doubt that I can give you a complete list, however, I will give you what I can recall from mind:

Hampton, Mr. Cline.
Danville, Mr. Phillippe,
Petersburg, Mr. Carter,
Alexandria, Dr. Garvey,
Lynchburg, Chemault,
Staunton, Mr. Snead,
Charlottesville, Mr. Hebllett,
Waynesboro, Mr. McCarrick,
Bristol, Dr. Adair.

There are a few more whom I cannot recall at present, however, at a later date I will try to make you a more complete list.

Hoping to see you in the near future, and with personal regards, I am

Yours very truly,

(Signed) S. S. Smith
Assistant to the Director

FRIGIDAIRE CORPORATION

DAYTON, OHIO

June 9, 1931.

Virginia Agricultural & Mechanical College
& Poly. Inst. and U. S. Dept. of Agriculture,
Blacksburg, Virginia.

Attention: Mr. H. H. Gordon

Gentlemen:

We have at hand a copy of your write-up E-295
"Mechanical Refrigeration for Dairies", dated May 1931,
which we believe is so good that we would like to have
additional copies to be forwarded to certain members of
our organization.

We would appreciate, if you have a supply of this
write-up on hand, your quoting us a price on one hundred
copies.

Yours very truly,

FRIGIDAIRE CORPORATION

(Signed) W. W. Hall
Milk Cooling Department
Commercial Sales Division.

WWH/VD

R. F. TRANT, INC.

Distributor

FRIGIDAIRE

Norfolk, Virginia.
May 29, 1931.

Mr. H. H. Gordon,
Asst. Agr'l. Engineer,
Virginia Agricultural & Mechanical Inst.,
Blacksburg, Va.

Dear Mr. Gordon:

This will acknowledge your letter of May 28th,
enclosing copy of a circular on mechanical refrigeration for dairies.

We have gone over this circular very thoroughly and
feel that the information contained therein will be of a great deal
of assistance to the dairymen in selecting the proper refrigeration
equipment for cooling and storing their milk. In view of the source
of this information, we feel that it will be accepted by dairymen
and not only help the dairyman with his problems, but will also help
those firms who will supply this type of equipment.

We would be very much pleased if it would be possible
for us to secure fifty copies of this bulletin and if your supply is
such that you can do us this favor, we will be glad to remit to you
for whatever the cost may be.

In the event you have not already done so, we would
like to suggest that you send a copy of this bulletin to Mr. E. J.
Vandoren of the Frigidaire Corporation, Dayton, Ohio, who is in charge
of commercial Frigidaire sales, as we are sure this would be quite
interesting to him.

Yours very truly,

R. F. TRANT, INC. - DISTRIBUTOR

(Signed) H. W. Butt
Sales Promotional Manager

HWB/AS

LETTERS IN REFERENCE TO WATER SUPPLY PROJECT

STONELEIGH FARM

Purcellville, Va.

November 14, 1931.

Mr. J. A. Waller,
Agricultural Engineer,
Blacksburg, Virginia.

Dear Mr. Waller:

On May 24, 1930 you came to my farm with County Agent J. E. Lintner to assist me in planning a water system. As the year 1930 was (as you remember) a very dry one was afraid to put in any kind of system. Have recently completed a gravity system and want to say am highly pleased.

Piped water 1900 feet from mountain spring.
Used 500 ft. 1" pipe, 1400 ft. 3/4" pipe. Have lots of pressure.

Thought perhaps you would be interested and might get some credit on your work.

Thanking you for your services,

Yours very truly,

(Signed) S. Campbell Legard

Griffinsburg, Virginia,
October 18, 1931.

Mr. J. A. Waller, Jr.,
Agricultural Engineering Dept.,
V. P. I.,
Blacksburg, Virginia.

Dear Mr. Waller:

You were of great value to me when you were here. I replaced the pipe with $1\frac{1}{4}$ inch and as you remember I had a $\frac{3}{4}$ gallon per minute flow at the spring. I have $\frac{1}{2}$ gallon flow at the trough. If this will continue it will supply me with plenty of water.

Thanking you for your assistance,

Very truly yours,

(Signed) - C. R. Tinsley

THE EVENING STAR

Harry Flood Byrd, Publisher
Winchester, Virginia

October 8, 1931.

Mr. J. A. Waller, Jr.,
Agricultural Engineering Dept.,
Blacksburg, Virginia.

Dear Mr. Waller:

Answering your letter of October 5, I am glad to advise you that the work performed by you and your organization on the water system at Turkey Knob Orchard was very satisfactory and helpful to us.

With very best wishes, I am

Cordially yours,

(Signed) Harry F. Byrd

Chilhowie, Virginia,
July 31, 1931.

Dear Mr. Waller:

Your letter requesting information as to how I was progressing with my water line came some time ago but I have been so busy that I neglected to answer.

I followed your advice and used 3000 ft. of $1\frac{1}{4}$ inch pipe and 1000 ft. of 1 inch pipe. I am getting an excellent flow of water and good pressure. I am very much pleased with it and feel that you saved me from making a big mistake.

Thanking you for your assistance and advice and with best regards to Mrs. Waller and yourself, I remain

Very truly yours,

Paul D. McKee

(Signed)

Sunny Side, R. F. D. #2,
Amherst, Virginia,
August 21, 1931.

Dear Sir:

Received your letter of the nineteenth and we are glad to inform you that the ram is giving satisfaction. All of your suggestions were carried out and the results are satisfactory.

There is one more thing that my Dad would like to know about. He is thinking of putting electricity into the house. He is wondering what would be the best thing. It is too expensive to have the high line come down here. We will be glad of any information you can give us.

Thanking you for the service you rendered us,
I remain,

Yours truly,

(Signed) M. L. Williams

MRS. S. B. YATES
GENERAL MERCHANT AND FARMER
Floyd, Virginia

January 23, 1931

Mr. Waller,
Blacksburg, Va.

Dear Sir:

If you remember you have been at our place before
Mr. Yates died laying out a water power to make lights.

I am writing to tell you that I have my water wheel
installed. It seems to be giving perfect satisfaction. My
lights are grand. I just wanted to let you know that I had it
at work.

Yours truly,

(Signed) Mrs. Hettie Yates

