

vicious that no other policy than that based upon race-appreciation is either just or stable.

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THE AMERICAN SYSTEM OF AGRICULTURAL EDUCATION AND RESEARCH AND ITS ROLE IN HELPING TO WIN THE WAR¹

THE United States has, in its Federal Department of Agriculture and state (land-grant) colleges of agriculture, a system of agricultural research and education which was established more than 50 years ago and which reaches every part of the country and effectively deals with every phase of agriculture. It is worth noting that the national foundations of these two great agencies for the betterment of agriculture were laid in another period of great national stress.

The act of Congress creating the Federal Department of Agriculture was signed by Abraham Lincoln on May 15, 1862, while the Civil War was in progress. On July 2 of the same year he approved the so-called land-grant, or Morrill, act, giving the proceeds from the sale of certain allotments of the public land to each state and territory for "the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts . . . in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

The national system of agriculture, education and research thus established has been greatly developed by subsequent legislation, notably the acts providing for agricultural experiment stations in each state and for cooperative extension work in agriculture and home economics. Many other important and highly significant laws for the betterment of rural life have been placed on the statute

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books within the past few years, including especially the cotton-futures act, the United States grain-standards act, the Federal warehouse act, and the Federal aid road act. All these measures are administered by the Department of Agriculture and they are achieving, in marked degree, the purposes contemplated by their framers. The federal reserve act, the farm-loan act, and the federal vocational education act also constitute an important part of the legislative program for the improvement of rural conditions and the development of agriculture. Thus the nation was well prepared along agricultural lines to deal promptly and effectively with the emergency problems that have arisen since the United States entered the war. It is not extravagant to say that this nation had agencies working for the betterment of rural life and agriculture which, in point of personnel and effectiveness, exceed those of any other three nation in the world combined.

The land-grant colleges and experiment stations are without parallel. They are 67 in number, have a total valuation of endowment, plant, and equipment of \$195,000,000; an income of more than \$45,000,000, with 5,900 teachers; a resident student body of over 75,000, and a vast number receiving extension instruction. Their great ally, the Department of Agriculture, is unquestionably the greatest practical and scientific agricultural organization in the world. It has a staff of more than 20,000 people, many of them highly trained experts, and a budget of approximately \$65,000,000.

The graduate and collegiate instruction and the research work inaugurated by these agencies take rank with the best in the world. As the result, a large corps of leaders and specialists, capable of dealing efficiently not only with the vital question of agricultural production, but also with important war problems not directly connected with agriculture, has been trained. Through the educational work of the colleges a great impulse has been given to vocational training in agriculture and through the research work of the Federal Department and the experiment stations a great

body of new facts of value to agriculture has been accumulated, which the extension service carries directly to the farm and farm home.

The extension, or demonstration, method of teaching and inducing farm people to adopt improved practises is a distinctly American educational development. It was first used in a systematic way in 1903 by the late Dr. Seaman A. Knapp in his efforts to teach southern farmers how to meet the menace of the boll weevil. This method of giving practical instruction in agriculture and home economics to persons not attending or resident in colleges by means of demonstration, that is, by doing on the farm or in the home, or better, by having the farmer, or the housewife, or their children do the thing it is desired to teach, has been developed by the United States Department of Agriculture and the state colleges of agriculture during the past fifteen years. It was made a permanent and nationwide system and liberally endowed by the cooperative extension act of May 8, 1914, which provided that all such work should be coordinated and carried on cooperatively by the state colleges of agriculture and the Federal Department of Agriculture.

The department exercises administrative and general supervisory control of this work through its States Relations Service. It is administered in each state through a director of extension with headquarters at the state college of agriculture, in accordance with plans agreed upon by the Federal Department and the state colleges. The field work is done by (1) men county agents, (2) women county or home demonstration agents, (3) boys' and girls' clubs, and (4) a corps of specialists furnished by the Department and the state colleges. Through these agencies it reaches at first hand and in a very practical way the men, women and children of each rural community.

The cooperative extension act will ultimately (in 1922-23 and thereafter) provide \$4,580,000 annually for this work, to which the states must add \$4,100,000 annually in order to share in the benefits of the act. During the fiscal year 1917-18 there was available

for extension work from these sources \$3,680,000. Funds from other sources increased this amount to \$7,600,000. In addition, \$4,348,000 of the special appropriation made to the Department of Agriculture last year for the stimulation of agriculture was devoted to the expansion of the extension work as a war-emergency measure.

That the nation entered the war with well-organized and highly efficient agencies working for the betterment of agriculture is well illustrated by the part they have played in dealing with food problems during the present emergency. In April, 1917, the food situation of the nation was not satisfactory. The time for action was short. It was necessary that nothing be omitted to increase the supply of food, feed, live stock and clothing, and to grow strong in agriculture, while Europe, and especially the central powers, was growing weak. The machinery was ready. The farmers and their organizations were alert. The department and its great allies, the land-grant colleges, immediately proceeded to redirect their activities and to put forth all their energies in the most promising directions. In a conference of the agricultural leaders of the nation in St. Louis, called just before the United States entered the war, a program for further organization, legislation and action with reference to production, conservation and marketing was drawn up, the principal features of which have been enacted into law without substantial change or have been put into effect. This prompt and effective handling of the situation was made possible by reason of the fact that the American people, generations before, had wisely laid the foundations of many agricultural institutions and had with increasing liberality supported their agricultural agencies.

In due course the Congress enacted the food-control bill, conceived at this conference, now administered by the Food Administration, and the emergency food-production act, administered by the Department of Agriculture. With funds made available by the latter act, the department increased its activities along all essential lines and developed new ones. It

and the state colleges cooperating with it quickly took steps to expand the extension work, with a view to placing in each rural county one or more agents. Within a year the number of county and home demonstration agents, club leaders and specialists in various lines employed in the great extension system was more than doubled, thus putting into effect within a year a program of expansion which under ordinary conditions would have required many years to complete.

The number of men county agents has been increased from 1,434 to 2,435 within the year, the women home demonstration agents from 537 to 1,715, and similar increases were made in the personnel of the boys' and girls' club work. To-day there are employed in this great educational system over 6,000 county and home demonstration agents, club leaders, and specialists in various lines, and the extension work is organized in substantially every agriculturally important county in the country. These agents are not only aiding the farmers in agricultural problems, but they are also rendering valuable assistance to other branches of the government, such as the Treasury Department, the Food Administration, and the Red Cross, in the prosecution of their war activities.

The efforts and achievements of the millions of farm men and women of America have been noble and remarkable. The farmers have occupied the first-line trenches of the food army. They and the agencies assisting them, the Federal Department, the state colleges, and also the state departments of agriculture, were ready when a state of war was declared and had been for years. They were charged with the responsibility for maintaining and increasing production. How they have discharged their task the results of last year's production operations and of this year eloquently testify.

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SCIENTIFIC EVENTS

TRENCH FEVER AND LICE¹

IN October, 1917, the American Red Cross Society, in conjunction with representatives

¹ From *Nature*.

of the British Expeditionary Force, formed a committee to investigate trench fever. This body has carried out much very valuable work, but its full report has not yet been made.

About the same time a War Office Committee, under the chairmanship of Major-General Sir David Bruce, was formed in England, in order to advance the knowledge of trench fever with a view to its prevention, and the research in progress at Hampstead was merged in that of the committee, of which Major Byam became a member.

Up to the close of the year the work was confined to the study of clinical evidence, the examination of the blood and urine of patients, together with the feeding of lice on them during their febrile periods, followed by the subsequent microscopical examination of the insects with a view to the discovery of the infecting organism.

With the commencement of 1918, thanks to the financial assistance of the Lister Institute and the courageous and patriotic action of a number of volunteers, it became possible to widen the scope of the research, and very valuable results speedily followed. A confirmation was obtained of McNee's main results of direct inoculation from patient to patient by blood, and the problem of transmission by the louse was seriously attacked. The committee was fortunate in having at its disposal ample stocks of lice, free from suspicion of previous infection, which had been reared under the direct supervision of Mr. Bacot, entomologist to the Lister Institute.

The first experiments in which the insect vector was concerned consisted in two of the volunteers submitting themselves to the bites of several hundred lice daily, the insects having been previously fed on patients during febrile periods both before and during the month of experiment. The lice, therefore, had many opportunities of becoming infected, and the men received the bites of these lice three times each day for thirty days. Neither showed any of the symptoms of trench fever.

Next, following the analogies of relapsing and typhus fevers, two volunteers were inoculated from lice which had fed repeatedly on trench-fever patients. In both the inoculation