News. 8.9.25.

SCIENCE IN AGRICULTURE

Output Increased by Millions

AMERICA LEADS BRITAIN AND GERMANY

Although essentially a wheat producing country Australia as a whole is far behind other lands in respect of agricultural education and research.

America leads the world, and Britain and Germany are also far in advance of the Commonwealth.

What is being done in those countries is briefly traced in the following article.

As the foremost student in Australia of agricultural developments in other countries, Dr. A. E. V. Richardson (Director of the Waite Agricultural Research Institute) is well qualified to express an opinion.

It is in the United States, he points out, that the most interesting developments in agricultural education have taken place during the past generation. The Land Grant College Act of 1862, approved by Abraham Lincoln, at a time

scientific bureaus, and a staff consisting of more than 8,000 scientific workers. It has built up an organisation for the prosecution of investigational work and the collection and dissemination of agricultural information, which is without parallel in any other country. In each of the 48 States of the Union an agricultural college of university standing and an agricultural station for experiments, usually an organic part of the college, have been established.

American Accomplishments

Agricultural experimental stations established in 1886 have been conducting systematic tests on the management of soils, growing of crops, and feeding of animals. They have demonstrated the practicability of largely increasing the existing crop yields by measures within the reach of men of average intelligence at a cost which can be recovered with large dividends in the form of increased production.

Babcock, of Wisconsin, has shown how the simple test for butter fat can be used to control losses in butter making, how the factory can pay for milk on the basis of quality, and how the test can be used to improve the dairy herds of the country.

Henry, of Wisconsin, has shown the nutritive values of all types of animal foodstuffs, and the necessity for feeding stock with balanced rations of protein to carbohydrates to maintain herds at high production. Armsby has worked out the net energy values of foodstuffs; Saunders has created for the prairie farmers of Canada and America the remarkably prolific Marquis wheat; and Spillman has demonstrated to the farmers of the semi-arid west and Pacific slopes the value of fallowing and the consequent changes in the soil.

The bureau of plant introduction has demonstrated the merits of Durum wheat for dry areas, the value of grain sorghums and cold resistant lucernes. The introduction of those three types of crops has added millions to the incomes of the farmers

Education and Research

The scientists of the Bureau of Animal Industry have enormously reduced the losses of animals due to pleuro-pneumonia, hog cholera, and anthrax, and cattle tick. In regard to hog cholera alone, the losses prior to 1906 were £14,000,000 a year.

Dr. Dorset, of the Bureau of Animal Industry, found that the disease was caused by a filtrable virus and was able to devise a satisfactory method of treatment. It is estimated that the discovery alone reduced the losses in pigs by £10,000,000 a year. Members of the bureau also discovered the cause of tick fever in cattle, and thereby made a valuable contribution to medical science. The discovery opened up a new field of medical research which has had an important bearing on malaria.

Dr. Burrill, of the Bureau of Plant Industry, was the first to discover the bacterial disease in plants when he showed that fire-blight in apples and pears was due to a bacterium. That led to the discovery of a host of bacterial diseases in vegetables, garden fruits, and cereals, and to practical methods of control.

The annual appropriation of agricultural education and research exceeds £12,000,000 a year. For the 15 years immediately preceding the war primary production in the United States increased by £90,000,000 annually.

The main features of the agricultural education system of the United States, Dr. Richardson points out, are:—

A group of agricultural colleges, mostly of university rank, manned by a staff of agricultural specialists, which provide a four-year course of instruction for students, and short courses for farmers who can afford a few weeks each year only.

A group of agricultural research stations, also well equipped and staffed, to investigate problems in every branch of farming.

A staff of extension workers, publicity men, and country agents, all highly trained men, whose duty it is to present in simple language the results of the work of the experiment stations.

A Federal Department of Agricultural working in close co-operation with the colleges and experiment stations.

Britain and Germany

Dealing with developments in Britain, Dr. Richardson stated that to Sir John Rotham, the founder of Rothamsted, was due the credit of establishing in 1840 the most famous agricultural research station in the world. At that centre many of the original field experiments devised by Lawes had been maintained for more than 80 years. Those experiments had proved to be a storehouse of information on soil and crop problems, the effects of fertilisers and systems of crop-rotation on the fertility of the soil. The Rothamsted station had made great contributions to agricultural chemistry, plant and animal nutrition, and soil bacteriology.

Sir John Lawes left £100,000, and the farm area to maintain the research station in perpetuity. At present a staff of 50 highly trained investigators is at work on fundamental researches on soil and crop problems. Since the war the British Government has voted large sums of money and has appointed an agricultural development board to subsidise research work at the universities and experiment stations in Britain.

In Germany agricultural science has always received strong financial support from the Government and private individuals. During the 25 years prior to the war Germany increased her cereal yield from 433,000,000 bushels to 1,008,000,000 bushels, or 130 per cent.; potato yields from 24,000,000 to more than 50,000,000 tons; beet sugar from 1,000,000 to 2,100,000 tons; cattle by 131 per cent. from 8,740,000 to 20,180,000; and pigs from 5,800,000 to 22,100,000.

The remarkable increase was due to improved technical methods and the systematic organisation of the agricultural forces of the country.

Von Rumker, of Berlin, in 1913, referring to the agricultural advance made in Germaany from 1888 to 1913 said:—"The great progress that agriculture has achieved during the last quarter of a century is the result of the union of practice and science, and proves that money spent on research and education brings in a high rate of interest, and is compensated for by the increases in land tax and revenue from the State railways."

Germany realised the danger before the war of the country becoming over industrial, and set to work to devise an organisation for the purpose of leading, teaching, and financing her farmers, and encouraging in every possible way the application of science to industry.

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DESTRUCTIVE BLOWFLY PEST

Pastoralists Lose £5,000,000 Annually

PROFESSOR JOHNSTON SUGGESTS METHOD OF ATTACK

Australia is not the only country where certain species of blowflies have developed the habit of attacking living sheep, but it is probably correct to state that in no part of the world has the sheep blowfly problem become so important economically as in the Commonwealth, where the losses due to the destruction of sheep and lambs, the depreciation in value of the wool, the loss of wool, have been estimated to reach in some years the huge amount of £5,000,000.

This statement was made by Professor T. Harvey Johnston (of the Adelaide University) in an address today on "Control of the Sheep Blowfly," before farmers at the Agricultural Bureau Congress.

He said that the most promising lines of action were:—The systematic co-operation of sheepgrowers in destroying the chief breeding places of flies by burning or by thoroughly poisoning carcasses and offal lying about in the paddocks or near the homesteads, and the application to the breech of each sheep of a solution of arsenite of soda containing about 7 lb. of white arsenic (and a similar quantity of caustic soda) a hundred gallons of water, such solution to be applied in the form of a well-directed jet at a pressure of from 100 lb. to 200 lb. a square inch three, or perhaps four, times a year at appropriate intervals. In certain special cases dipping or showering with a weaker solution of arsenic might advantageously replace the jetting process.

It has been stated, he continued, that the losses from fly attack may represent on an average, as much as 5 per cent. of the flocks in Queensland, and may well be as great in New South Wales, where the sheep industry is more important. Even South Australia has its share of the problem, and also the remaining States.

LIVING SHEEP ATTACKED

Owing to some alteration in the balance of Nature, these insects which normally feed on and breed in carrion or other decomposing animal matter, have transferred their attention in part to living sheep. Some factors which are as yet not fully known have favored the fly to such an extent that it has become a serious menace to the pastoralist, especially during certain seasons. It is during autumn and spring (March to May or June and September to October) that infestation is more likely to take place. Hot, dry weather is unfavorable for blowflies, as also are very cold conditions—hence these insects are usually not conspicuous during midsummer or midwinter unless the latter be very mild. In summer a good fall of rain may produce conditions suitable for fly development, but it is the autumn rain which seems to be particularly favorable. With the advent of warmer, though still moist, conditions in spring a second season of fly abundance commonly occurs. It is known, Professor Johnston said, that crossbreds are much less liable to infestation than merinos, and that ewes, lambs, and weaners are more susceptible than others; also that wrinkled sheep are more likely to be attacked than plain-bodied animals. Crossbred wethers are the least affected. It is also known that sickly or worm-infested sheep are more prone to be struck. Crutching is commonly practised as a means of cleansing the breech region, and is of undoubted value, especially in the case of daggy sheep, but recent experiments in Queensland have shown that by applying to this portion of the animal a suitable arsenical solution at a great pressure, crutching may be no longer necessary, and consequently the cost of treatment may become lessened. The application of various poisonous chemicals, though perhaps temporarily of value, will not have any marked permanent effect on the blowfly population.

The aim of such treatment is to kill any eggs or maggots which may be present on sheep, and to protect animals from fly attack by adding something to the wool which will act as a fly repellent, or at least will destroy any attractive influence which the wool, especially if soiled, may have for pregnant blowflies, causing them to deposit their eggs or young larvae in it.

The biological investigation of the problem would necessitate a knowledge of the conditions favorable for their breeding and a study of the various parasites, such as tiny wasps, which are known to attack and destroy blowflies during certain stages in their life history. In Nature there is a certain balance established between an organism and its environment.

The fly which is regarded as responsible for the damage is a fairly large, bluish-green insect, but several other kinds may also be partly to blame. In fact, it is possible that one or more species may initiate the attack and set up favorable conditions which permit others to invade the infected area and aggravate the injuries.

HOW TO DESTROY

The most important measure to be taken in connection with blowfly control is either the destruction by burning, deep burial, or the poisoning of the carcasses so as to render them unfit or unsuitable for fly-breeding. Arsenical solution placed into the body cavity of carcasses will go far to bring about this end. Even the mere turning over of the carrion and removing it a short distance will assist, since the lack of protection from strong sunlight and from birds and other enemies of the fly maggots or pupae, as well as the opportunity afforded for a more rapid drying of the material, render it less favorable for fly development. Thorough poisoning or burning are the only really satisfactory means of treating carrion. It must be emphasised that concerted action in this respect by all sheepowners of a district is necessary, as it is known that several species of blowflies are able to fly many miles (up to eight or even ten) within a few days, and consequently these insects may be bred in one locality and breed or feed in another. The most important line of attack against the blowfly is concerted action by systematic destruction of the normal breeding places throughout a district.

HEAVY TOLL FOR MEAT

Production for meat for home consumption and export levies a heavy toll on Australia's flocks and herds each year. During 1923-24, 10,395,712 sheep and lambs, 2,048,948 cattle, and 1,153,934 pigs were slaughtered.

The use of traps for flies has also been advocated, and a number of different types have been utilised. They are commonly baited with decomposing liver, but even though thousands may be caught in them in a few days, it is probably true that they are not of sufficient value as controlling agents to justify the cost of attending to them regularly.

The speaker added that insectivorous birds, and even lizards, probably played a part in destroying flies and their larvae, and should be protected and encouraged in the farming and pastoral districts.

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THE BLOWFLY PEST.

HOW TO PREVENT ITS RAVAGES.

The systematic co-operation of sheep-owners in destroying the chief breeding-places of flies and the use of a solution of arsenite of soda are advocated as the best means of combating the blowfly pest.

In a paper read before the annual congress of the Agricultural Bureau of South Australia on Tuesday, Professor T. Harvey Johnston, of the Adelaide University, gave some valuable advice on the control of the sheep blowfly. He said Australia was not the only country where certain species of blowflies had developed the habit of attacking living sheep, but it was probably quite correct to state that in no part of the world had the sheep blowfly problem become so important economically as in the Commonwealth, where the losses due to the destruction of sheep and lambs, the depreciation in value of the wool, the loss of wool, &c., had been estimated to reach in some years the huge amount of five millions sterling. It had been stated that the losses from fly attack might represent, on an average, as much as 5 per cent. of the flocks in Queensland, and might well be as great in New South Wales, where the sheep industry was more important. Even South Australia had its share of the problem, as also had the remaining States.