Scientific Management in Agriculture

The application of the principles of scientific management to agriculture has already been the subject of an article in this *Review*[1]. More recently, at the Thirteenth International Congress of Agriculture held in Rome in May 1927, the first really international discussion on the subject of agriculture itself took place[2]. As evidence of the spread of practical interest in the subject, an account is given below of the starting of the movement in England, together with some further details of experiments in Germany, the first country to consider the question, showing the principal effects in practice up to the present of the application of scientific management to agriculture.

The Application of Industrial Psychology to English Agriculture

The National Institute of Industrial Psychology has recently published a report on the first attempt made in England to apply the point of view and methods of industrial psychology to agriculture, thus adding a new country to the rapidly growing list of States which are interested in scientific management in relation to agriculture[3].

The result shown by many experiments in organising human labour, that mere rational observation of a process of labour is sufficient to render possible important improvements in output, was once more confirmed. In the county of Kent in England, two methods are employed in hop picking; one is distinctly superior to the other. According to the investigator, custom is stated to be the principal reason for the non-employment of the best system. Fruit picking is often badly arranged and collaboration with the pickers not sufficiently good to avoid waste of their time. In a packing shed all work was done on a level with the ground. On the suggestion of the investigator a bench was provided, with the result that the mean time for packing ten chips was reduced from 3 minutes 13 seconds to 2 minutes 31 seconds and much needless fatigue was saved. " 'I felt a different woman at the end of the week after the bench had been introduced', said a female packer[4]. "

The studies on the picking of bush fruit were done in a more detailed way and are therefore of special interest. The examination of individual differences of output between workers showed that these were fairly

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[1] Cf. *International Labour Review*, Vol. XV, No. 3, March 1927, pp. 379-413: "The Science of Farm Labour: Scientific Management and German Agriculture".

[2] For a report of the proceedings of the Fourth Section of the Thirteenth International Congress of Agriculture (Rome, 1927), dealing with the Scientific Organisation of Agriculture, cf. *Industrial and Labour Information*, Vol. XXIII, No. 4, July 1927, pp. 131-133.

[3] W. R. Dunlop: *An Investigation of Certain Processes and Conditions on Farms*. London, National Institute of Industrial Psychology. 71 pp.

[4] *Ibid.*, p. 34.

constant for different kinds of fruit. A very fast picker at one kind of fruit was usually very fast at other kinds of fruit also, and *vice versa*. The investigator wondered whether employers and pickers realised how wide individual differences in output were. In his opinion there must be some possibility of improving the slowest workers. Investigating the factors determining the speed of a worker, he found that fast picking was associated with constitutional energy, suitable fingers, and the responsibilities of mature age and economic pressure. Besides these personal qualifications, the methods of picking are of great importance. The methods of the pickers were observed. They varied considerably, but a study of the methods of the best pickers indicated that there was distinct scope for improvement even there. Mere instruction in black-currant picking of a slow and inefficient picker was sufficient to enable him to pick a bush in 10½ minutes, instead of the 14½ minutes hitherto taken. Again, in black-currant picking a few pickers sat down when the run of the fruit was good, but they used old boxes difficult to carry and not comfortable or suitable as regards height. The investigator constructed a box-stool, the three dimensions of which were different, thus allowing three different heights. Each pair of opposite sides consisted of one " slatted " side to rest on the ground and one covered with canvas to form the seat. The use of these stools definitely increased the output. " The most important result, however, was that pickers using the stools felt more comfortable and appreciated the saving in fatigue[1]. " It is very important in fruit-picking that the picker should be able to grade the fruit immediately and place the larger in one receptacle and the smaller in another. The investigator thinks it possible that greater skill could be obtained as a result of training young workers at home by means of artificial berries. Also the ability to decide when the receptacle has its proper weight — which even experienced pickers are often totally incapable of doing — is important. The investigator again proposes home training or the use of a small spring balance.

Careful attention was paid to the amount of unproductive time in strawberry picking. Productive time was considered to include the actual picking and grading of the fruit and the conveyance of the fruit to the nearest and most appropriate point for packing and despatch. It was found that in order to avoid unproductive labour, and so reduce productive time, it was important to have plants giving a good yield, a lay-out with the plants as close together as possible, and the packing sheds situated at the most convenient points in relation to the general lay-out of the beds.

The report states that raspberry-picking is a general annoyance to the pickers. The work is mentally fatiguing and needs great care. It is as a general rule not popular at the rate usually paid for this work, though the rates for picking vary with the kind of fruit. Apparently, however, the difference is not sufficient to overcome the special reluctance of the workers to undertake raspberry-picking, which is a hindrance to the good utilisation of labour.

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[1] *Ibid.*, p. 22.

Payment by Results in German Agriculture

In Germany, where efforts have already been made for some time to carry out in practice the idea of a more rational organisation of agricultural labour, it is the proposals for a closer relationship between wages and the task performed that have especially gained ground. In Silesia, in particular, the organisations of agricultural employers have eagerly promoted the idea of payment by results, and for this purpose have on various occasions published information on the results obtained in practice by their more advanced members.

From one of these publications[1] a typical case may be selected which at the same time shows the leading ideas in this system, the complicated nature of these problems, and the necessity of collaboration between all persons working in the field of scientific management in agriculture. The example deals with seed drilling with a three-metre machine with four horses, two drivers, and a woman under 17 years of age, during a working day of ten hours net. For an output up to 25 morgen[2] per day, or 2.5 morgen per hour, only the ordinary time wage was paid, but every excess over this minimum was remunerated according to the following scale of premiums:

For an output of between 2.5 morgen and 3.0 morgen per hour	15 pfennigs per hour
For an output of 3.0 to 3.5 morgen per hour	a further 30 pfennigs per hour
For each further tenth of a morgen	a further 10 pfennigs per hour.

The division of the premium among the members of the gang is not indicated.

The table below shows the effect of these premiums:

EFFECT OF PREMIUMS ON DAILY OUTPUT

Length of field	Output per day			Total premium paid
	On time wages	On premium wages		
	Amount	Amount	Percentage increase over time wages	
Metres	Morgen	Morgen		R.Mks.
700	25	47	88	16.50
700	25	46	84	15.50
700	25	42	68	11.50
400	25	44	76	13.50
400	25	41	64	10.50
400	25	40	60	9.50
400	25	38	52	7.50
250	25	35	40	4.50

[1] Land- und forstwirtschaftlicher Arbeitgeberverband für die Provinz Schlesien: *Zusammenstellung von Leistungslöhnen im Kreise Schweidnitz.* Schriftenreihe des betriebswirtschaftlichen Ausschusses beim land- und forstwirtschaftlichen Arbeitgeberverband für die Provinz Schlesien. Schweidnitz, L. Heege. 1927. 20 pp.

[2] 1 morgen = 0.631 acres = 25.53 ares.

It will be seen that in all fields the effect of a premium wage was great, but it varied widely from field to field. The table shows a rather high correlation between the length of the field and the output on premium wages. This is in agreement with the results obtained at the Pommritz Experimental Station in Saxony[1], that in draught work with horses the output per hour is greater the longer it is possible to drive without turning. In other words, the minimum output before any premium was paid was, in fact, more difficult to reach for the workers drilling on a field 250 metres long than for those on a field 700 metres long. The former workers were handicapped, which may have weakened the effect of the premium offered, more particularly because it was on a progressive scale. When, however, at some future date, the experiments at Pommritz and similar institutions have resulted in an easily applied formula allowing for the effect of the length of the field, it will be possible to fix the premium rates for work done on a system of payment by results in such a way as to secure fuller results from their application.

Co-operation in Japan[2]

Consumers' Co-operative Societies in Cities

The Central Union of Co-operative Societies (*Sangyo Kumiai Chuo-kai*) has recently published a report on the results of an investigation of the situation, at the end of 1925, of 129 consumers' co-operative societies established in cities throughout the country.

The growth of these societies is shown by the following table :

STATISTICS OF CONSUMERS' CO-OPERATIVE SOCIETIES IN CITIES, 1906-1925

Year	Societies		Shares issued		Total sales
	Number	Membership	Number	Value	
				Yen	Yen
1906	2	2,184	2,214	22,140	230,599
1911	19	9,629	11,805	126,505	1,243,599
1916	27	14,086	17,494	208,110	1,489,436
1921	85	59,142	127,178	2,072,914	10,384,184
1922	101	68,468	139,120	2,317,936	11,924,331
1923	111	102,675	185,482	2,645,104	14,426,220
1924	120	116,784	211,641	2,699,268	18,558,524
1925	129	119,946	220,222	2,849,456	21,372,081

These figures show that a rapid increase took place in the number of societies during the seven years from 1916 to 1922. This may be attrib-

[1] Cf. *International Labour Review, loc. cit.*

[2] Communication to the International Labour Office.