



## FODDER CROPS

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TABLE II  
A GERMAN EXPERIMENT

<i>Time of Singling</i>	<i>Yield in Tons</i>
At the proper time . . . . .	15.0
One week later . . . . .	13.5
Two weeks later . . . . .	10.0
Three weeks later . . . . .	7.0

TABLE III  
SUGAR-BEET BY-PRODUCTS

	<i>Sugar-Beet Tops</i>	<i>Sugar-Beet Pulp</i>	<i>Mangolds</i>	<i>Swedes</i>
Crude protein . . . . .	17.41	10.43	8.35	10.01
Oil . . . . .	2.32	0.70	0.85	1.54
Fibre . . . . .	8.27	20.01	5.84	9.24
Carbohydrate . . . . .	51.37	64.86	79.12	73.82
Ash . . . . .	18.03	4.00	5.84	5.39
Earth . . . . .	2.10	...	...	...
Moisture . . . . .	83.9	84.8	89.3	88.5

## THE DISCUSSION

LORD BLEDISLOE, Chairman of the Conference, speaking in discussion, said that with reference to the matter of the early sowing of swedes mentioned by Mr Carr, his own recent experience showed that swedes sown very early in Gloucestershire suffered badly from mildew.

In the matter of varieties he was interested to observe that the Danish swede, Bangholm, had done so well both in total yield and in yield of dry matter in the trials at Aberdeen, Edinburgh and Glasgow.

Concerning marrow-stem kale he had found that it is an excellent food for pigs, and he considered that for this class of stock it is second only to lucerne. His own kale crop had stood the severe frosts of last winter without damage.

Mr CRAWFORD was anxious to know how the dressings of artificials which had been put forward compared with dung when measured

in the later crops. He had some fear that continued heavy dressings of artificials might lead to the occurrence of such troubles as acidity in the soil, which would more than counteract the good done by the manures themselves.

Mr HUNTER SMITH said that he had some curiosity as to how the yields mentioned in Mr Carr's paper had been measured. During the last year he had been examining the matter of the measurement of yields of root crops at the Oaklands Institute of the Hertfordshire County Council. An area of marrow-stem kale carrying what appeared to be a good crop was submitted to the inspection of farmers and land valuers.

The farmers estimated the yield as anything up to 40 tons per acre and the valuers placed it very much higher. One acre of the crop was harvested in eighty equal plots, each of which was carefully weighed. The weighings showed that the yields varied between 9 and 28 tons per acre, with an average of 21 tons and a probable error of 3 per cent. A similar experiment was made with some mangolds, which yielded on the average 20 tons to the acre, with a probable error of  $2\frac{1}{2}$  per cent. In this case the visiting farmers' estimate was 30 tons to the acre.

It was obvious from the great error of the estimates and from the wide spread between the extremes on the kale plots that any single measurement of the yields would be misleading. Using the kale and mangold crops in feeding experiments at Oaklands it had been found that weight per weight they varied in feeding value as 10 : 13 in favour of the marrow-stem kale.

Mr J. PORTER said that his own experience with a three years' ley agreed with that of Mr Carr, and that he had found it excellent for cleaning the land, for supplementing dung, and for improving the mechanical condition of the soil.

Concerning the choice of phosphatic manures for swedes, he had found that superphosphate tends to bring the crop earlier to the hoe than do mineral phosphates, and therefore helps forward maturity and makes it easier to get the land clear in time to plant corn. Where it is desired to fold sheep on the roots there is much to be said for the use of basic slag, which, in his opinion, tends to keep the tops green for a longer period. He thought that a mixture of slag and superphosphate is generally more effective than either one or other by itself. On sour light land on Herefordshire slag has been found to be superior to superphosphate both as regards the total yield of the crop and the quality of the roots.

Mr S. F. ARMSTRONG observed that in some parts of the Eastern counties the early cutting out of swedes is considered to be danger-

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ous on account of damage that may be done by turnip-fly when the young plants are thinned out and temporarily checked in growth.

With regard to the use of artificials, he thought that a good deal must depend upon the time of application, and he was anxious to hear of the results of any experiments bearing on this point.

Mr W. A. CARR in reply to Lord Bledisloe said (a) that in his experience in the North-east of Scotland and Cheshire dung was always put to swedes because it was available and was most easily disposed of in this manner. Of course the crop can be grown successfully without dung where supplies of it are difficult to obtain. (b) That the smoky atmosphere in the industrial districts round Manchester is actively harmful to the soil, which tends to become strongly acid under its influence.

In reply to Mr Crawford he said that in North-east Scotland most of the soil is notably deficient in lime, and practically no extra lime is added by the farmers. Despite this, very large doses of superphosphate and sulphate of ammonia are used there from year to year without the occurrence of any harmful results due to acidity or bad soil texture. Good clovers of both the red and wild white types are grown on land treated in this way.

In the matter of early singling he maintained his position, but agreed with Mr Armstrong that there is strong counter-opinion founded on the fact that the turnip-fly sometimes destroys a large proportion of the young plants and that late singling gives the farmer a greater number of survivors to choose from when the rough leaf stage is thoroughly established and the fly danger overpast.

Mr BOND said that in regard to the future of sugar-beet growing he feared there is some ground for apprehension. He understood that there is something like 1,000,000 tons of sugar at present lying in the docks and that it can be bought wholesale at very low rates. A Ministry of Agriculture publication has shown that the average cost of growing sugar-beet recently on some six hundred acres of land on many different farms was something like £23 per acre. Such great outlay can only be justified if a high price per ton for beet can be maintained.

He agreed with Mr Heigham in that there is practically no experimental evidence in support of the practice of subsoiling, but he had yet to be convinced that late horse-hoeing is not calculated to do more harm than good to the root plants.

His own experience confirmed the recommendation of a really firm seed bed for mangolds, and he had found that it is generally easier to obtain this on the ridge than on the flat.

Referring to the whole subject of home-grown fodder crops, he quoted a case where a crop of marrow-stem kale had obviated the

purchase of other feeding stuffs to eke out the late summer grass. Further, he had found that on a farm on which costing accounts were kept under the Derbyshire County Council scheme it had been possible to produce home-grown food at just half the price of the equivalent in purchased concentrates.

Mr STEWART considered that the system outlined in Mr Brown's paper is too expensive, too complex, and is unnecessary. With the aid of marrow-stem kale, mangolds and lucerne, a skilled farmer can make the most of his grass without recourse to a soiling system. The mixed straw of the ripened fodder crops is very coarse and hard, and its feeding value is therefore low. Mixed forage is extremely difficult to make into hay even in a good season, and the fully ripened crops are far more difficult to win than any pure cereal crop. He considered that it is generally more profitable to grow an ordinary corn crop for sale in the market.

Mr CARR had found that mixed fodder crops are of little use in Cheshire, as they nearly always go down long before they reach the green yield of 20 tons per acre claimed by Mr Brown. He found that for hay he can get better results with Italian rye-grass than with mixtures of peas and oats. He had not been very successful in obtaining the smother-effect with the mixed crops. After growing them for four successive years on the same light land the weeds were still strongly in evidence. This same piece of land was put down to grass along with another bit which had carried roots, and the grass seeding did better on the latter.

He was able to confirm Mr Brown's claim that the cereals in a mixed crop appear to be more vigorous than when grown alone. He thought that on the average they may be 6 in. higher, but unfortunately he had not been able to compare any grain yields of plants under the two conditions.

Mr EDEN said that on an East Anglian farm which was included in the Ministry's scheme for the costing of sugar-beet he had observed that where dung was used a cash loss had been made upon the crop. This fact appeared to have serious bearing upon the question of the economic manuring of the sugar-beet crop, and he was anxious to know if a similar state of things is found on many other farms.

Mr HEIGHAM replying to Mr Porter said that he had encountered the practice of soaking sugar-beet seed in water before sowing, both on the Continent and in this country. He could not say definitely that it is always advantageous, as in the event of very dry conditions following upon the quick germination of the wetted seed there is likely to be a heavy mortality among the young plants.

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Concerning the use of wheeled hoes in order to economise hand labour, he knew the Planet Junior type and had it in use on the Rothamsted farm, but he had not used it as yet on a sugar-beet crop.

Answering Mr Eden, he said that the loss on a crop following the use of farmyard manure generally depends very much on the cost of making the manure. This is a very complicated question in itself which cannot be dealt with extempore. Sugar-beet, like many other crops, can be grown quite well on land in good heart without the use of dung, but any system of arable farming without organic manure is not calculated to produce good results over a period of years.

Mr BROWN in reply to his various critics said that the whole reason for such a system of cropping as he had outlined is that ordinary four-course farming with its high proportion of expensively grown cereal crops does not pay under modern conditions. Corn taken after a three years' ley or two years of smother crop is far more cheaply produced per bushel and can be grown at a profit. Mixed corn is nearly always more productive than a pure cereal crop and reckoned as starch equivalent; it makes a very cheap food for most classes of stock.

It is true that mixed crops take long to dry in the field, but they are very resistant to bad conditions and can survive weathering which will ruin pure crops. Pea and oat hay if cut early and at its best is certainly difficult to make, but it is valuable enough to be worth some trouble.

He agreed with Mr Carr that in the wetter districts, and where forage crops tend to lodge early in their growth, Italian rye-grass may produce exceptionally good results.

Answering Mr Fishwick, he said that in order to obtain forage crops in August and September when the grass is failing, marrow-stem kale can be sown early in the spring and top-dressed with nitrogen. In order to ensure for it an even better start the crop can be sown in a seed bed in autumn and planted out in the spring. In dealing with autumn-sown kale considerable care is necessary in the selection of the strains, as these may differ widely in their liability to bolt and their winter hardiness.

With regard to the effect of smother crops in overcoming "twitch," he said in reply to Mr Porter that at Harper Adams College almost perfect smothering was obtained, but that it is not always so good in other places and in all seasons. He suggested that deep ploughing followed by a quick seeding of a smother crop is, on most soils, a good method of dealing with the weed. He maintained strongly that, sown on a clean field, a succession of mixed smother crops will serve to keep the land clean.