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## Report for 1930

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## Forage Mixture Crops

### Rothamsted Research

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### FORAGE MIXTURE CROPS

Forage mixture crops have the great advantage that they can be grazed in May or June, cut green in June or July, made into silage or hay in July, or left to ripen, cut in August and threshed, when the straw can be chaffed and the grain crushed. No other crop, not even grass, is so elastic in its uses. Being sown annually the early grazing, if it is used, is always clean; the land can never become "sheep sick."

The mixtures at present in use at Rothamsted are made up of:

	Bushels per acre.				
Wheat, Oats or Barley .. .. .					2
Peas or Vetches .. .. .					2
Beans .. .. .					1

Other proportions are being tested.

The vetches, wheat, winter oats and beans are sown in autumn. The peas have to be drilled in spring in an autumn sown oat or wheat and bean mixture; the barley and spring oat mixtures are entirely sown in spring.

In 1930, the first year of the trial, the barley mixtures did better than the oat mixtures in yield both of hay and of grain, though not of straw, but there was little difference between peas and vetches. The barley mixtures gave, without manure, good hay, containing 26½ cwt. of dry matter per acre when cut early, or 22 cwt. of grain and 24 cwt. of straw when left to ripen; the advantage of leaving the crop to finish its growth is considerable, but not quite as great as it looks, for after cutting the hay there still comes up an aftermath which gives clean fresh grazing, or the land can be summer fallowed for a winter crop.

The manuring of the fodder mixtures, however, is difficult, because it involves some entirely new principles. Any fertiliser that is added is likely to benefit one constituent more than the others, increasing its growth and also its power of competition with the others; the favoured plants tend to crowd out the rest exactly as has happened on the Park grass plots. This is well illustrated by the effect of sulphate of ammonia. Applied at the rates of 1 and of 2 cwt. per acre it greatly increased the growth, especially of the barley mixtures; with these the larger dressing gave a fine looking crop of 38 cwt. of hay or 24 cwt. grain and 32 cwt. straw. But analyses showed that the gain was entirely on the barley or the oats; not at all on the peas, vetches and beans; indeed these had been actually depressed by the manuring. This change affected the feeding value of the product. In place of a foodstuff having nearly the same protein value as good meadow hay, we obtained one of much lower value, though it was better than poor hay or straw. The results are given in Table VIII.

TABLE VIII.—Yield and composition of mixed crops grown for fodder and cut as hay.

Nitrogen added in manure, cwt. per acre.	0	0.2	0.4
Yield of dry matter, cwt. per acre—			
Oats—Vetches .. .. .	21.9	32.1	32.4
Oats—Peas .. .. .	26.0	31.3	34.1
Barley—Vetches .. .. .	27.3	30.7	37.6
Barley—Peas .. .. .	26.1	33.0	38.9
Mean .. .. .	25.3	31.8	35.8
Percentage composition of dry matter of all mixture—			
Protein .. .. .	11.7	9.6	8.6
Soluble carbohydrates .. .. .	46.2	48.8	49.1
Crude Fibre .. .. .	32.9	32.5	33.4
Oil .. .. .	2.4	2.6	2.5
Ash .. .. .	6.8	6.5	6.4
Percentage by weight of leguminous plants in hay .. .. .			
Leguminous plants, cwt. of dry matter per acre .. .. .	10.3	8.7	7.2
Cereals, cwt. of dry matter per acre ..	15.1	23.1	28.6
Nitrogen in crop cwt. per acre .. .. .	0.42	0.44	0.44

*Composition of Meadow Hay (T. B. Wood).*

	Very good	Good	Poor.
Protein .. .. .	16.1	11.3	8.8
Soluble carbohydrates .. .. .	48.2	47.9	44.6
Crude Fibre .. .. .	23.0	30.7	39.1
Oil .. .. .	3.6	2.9	1.8
Ash .. .. .	9.2	7.2	5.8

In yield of grain the barley mixtures responded somewhat to potassic fertilisers, but the oat mixtures did not, and there was little if any response to superphosphate. Different combinations of manures are being tested this season; there is clearly much to be learned about the manuring of these important crops.

A second forage mixture of rye, beans and vetches in Pastures Field cut as hay gave substantial increases, up to 20 cwt. per acre but not beyond, to sulphate of ammonia, and increases up to 10 cwt. per acre but not beyond, to potash. There were no increases, however, to phosphate. The yields were, in cwt. of hay per acre :

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Varying Nutrient.	Hay : cwt. per acre Doses of Nutrient.				
	0	1	2	3	4
Nitrogen ..	56	66	74	75	72
Phosphate ..	71	66	69	69	65
Potassium ..	59	69	68	61	64

SEEDS HAY

The "seeds ley" sown at Rothamsted is pure clover without admixture of grasses; the reason being that under our conditions of farming, the fritfly (*Oscinella (Oscinis) frit L.*) and other insects