NERAL GRASSLAND PROBLEMS THE NETHERLANDS AND NEIGHBOURING COUNTRIES

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Introduction

Along the coast of the North Sea from north-west France to the border of Denmark a low-lying area of 12 million acres is situated. More than 50 per cent of the land used for agriculture in this region is productive of permanent grassland. Ley farming is only of minor importance, in contrast to neighbouring countries, such as England and Denmark.

In this paper some problems of grassland farming in this area will be discussed.

Climate

The climate is of a mild maritime type with about 28in. rain per year evenly distributed over the year. The grazing period for dairy cows varies from 150 days in the north-east up to 200 days in Belgium. Winter is normally not very severe. Every 10 years, however, there are 1 to 3 winters when perennial ryegrass suffers severely from killing off, especially in the northern part. Rainfall is in most summers not sufficient for maximum grass growth, especially on the light sandy soils.

Soil

The soils are mainly deposits of the big rivers and of the North Sea. These deposits vary from gravelly coarse sands to heavy clay soils. As well as these soils large areas are covered by deposits from glacial times. The high water level has caused the formation of large areas of peat.

Grassland 'is mainly situated on heavy impermeable clay soils, clay and peat mixtures, and low-lying sandy soils which are high in organic matter.

Drainage and Water-supply

Much of the land used for agriculture has a high water-table. Table 1 gives the results of an unpublished survey of the Central Institute of Agricultural Research of grassland in the Netherlands. The figures show that in summer the mean water-table on 74 per cent of the land is less than 40in. below the surface and in winter it is less than 20in. on 7'7 per cent of the land..

Table l-Frequency of Different Water-tables on Grassland in the Netherlands in 1951

Water-table below surface in.	Winter per cent	Summer per cent
0-20	77	27
21-40	18	47
41-60	2	19
61-80	—	3
>80	3	4
Total	lb0	100

In Germany the water-table in general is still higher, in Belgium possibly a little lower. These figures show that the grasslands 'in this area mainly have a high water-table which makes the soil-unsuitable for field crops. In wet years insufficient drainage causes much damage. In July of 1956, for instance, it was necessary on many farms to take the cows into the barn while the pastures were under water or so wet that grazing was impossible. In the Netherlands and in Germany big projects for improved drainage are on the way. These projects, however, must be carefully planned, as deep drainage can cause a decrease-in production.

V. d Woerdt (1950) found that on peat the grassland production decreased by 23 per cent when the average water-table dropped below 24in. On sandy soils Kalisvaart (1949) found comparable results. In peat districts the water level in the ditches must therefore vary between 16 and 24in. below the land, and on sand between 16 and 40in. In summer the level is kept high and in winter low.

In sandy districts where it is impossible to have a high water level. in summer sprinkling is being used

more and more. Baars (1955, 1956) found in 1953-1955 that with 5-6in. of water there was an increase in grass production of 15-30 per cent.

Type of Farming

In the extensive low-lying areas the water level mostly is regulated by pumping stations. In- these regions two types of farming are found. On the young medium and light clay soils which are rich in lime and of high fertility arable farming is predominant. Most farms have only a very small amount of livestock and no grassland at all. On the old heavy clay soils and the mixtures of peat and clay, on the contrary, pure grassland farms have developed. On these soils arable farming is very difficult and unprofitable..

In 'the regions with varying altitudes mixed farming is found. In these areas drainage of the lower parts is generally so poor that permanent grass is the only possibility. This situation has caused a poor distribution on the farms, so that the land lies some distance from the farmhouses. In some regions in the Netherlands the mean distance of the fields to the farmhouse is more than a mile, while on- farms of the same size but with good parcelling this distance is only one quarter mile,

This situation makes it 'necessary on most farms to milk the cows in the field during the summer. For this reason reallotment is very important for the improvement of agriculture.

Fertilisation

The use of artificial fertilisers has increased agricultural production considerably during the past 60 years. In the Netherlands the use of fertilisers has developed on grassland as is shown in Table 2. The figures from 1950-52 are published by Postma (1955) ; the pre-war figures are estimated.

Table 2—The Use of Commercial Fertilisers on Grassland in the Netherlands

	(lb per acre)		
	N	P_2O_5	K_2O
1924-1926	1	31	18
1938-1940	22	36	2 7
1950-1952	5 3	4 4	45

The increase in the use of nitrogen is particularly remarkable and this still goes on. The estimate for 1956 is between 70 and 751b per acre. In Belgium

about the same amounts are used. In Germany the level is still considerably lower. While the use of nitrogen' can still be increased with hope of good returns, many people think that the average use of P and K should not be increased, as on many farms already more is used than is necessary for a good yield and for maintaining a good chemical fertility in the soil. Better distribution is here the main problem, as many fields get less and others more than is necessary. This is especially important as there are indications that excessive fertilisation with lime can cause manganese deficiency ; excessive potash, hypomagnesaemia ; and excessive phosphate, hypocupraemia.

Nitrogen fertilisation has increased the net production of grassland by about 500-600lb of starch equivalent per acre or feed for one dairy cow per 10 acres. The recovery of the N is about 40-60 per cent. Here we are still far from the technical possibilities as is illustrated in Table 3.

Table 3—Yields of Grassland Farms in Different Periods in the Netherlands

	Period	N lb/acre	cows per 10 acre	SE lb/acre	Milk gals/acre
Good average farm	1930	1	4.0	320	2250
Controlled average farms	1947-49	36	4.0	360	2800
Controlled average farms	1950-53	63	4.7	—	410
Nitrogen demonstration farms	1952-54	173	5.8	4000	580
Experimental farm	1952-54	315	8.0	4500	850

The differences between the results of the different groups of farms in this table are for the most part due to differences in nitrogen fertilisation. Rotational grazing and better management in general, however, have also caused a substantial increase.

These figures illustrate the great possibilities of increasing grassland production in these countries. In the Netherlands already some thousands of farmers are' using more than 200lb of nitrogen per acre per year. The use of large amounts of nitrogen has caused a change in the composition of the 'grass, partly because the amount of clover and herbs has diminished and partly because the grass is grazed at a younger stage. Possibly the occurrence of hypocupraemia and hypomagnesaemia has been increased by- these factors.

In the last years the increase in production has

slowed down. The' main cause is the rise of the cost of labour and shortage of labour in summer. In 1948 in the Netherlands about 67 gallons of milk paid. for the wages of a farm hand for a week, in 1955 90 gallons were necessary for the same amount of labour, and in the summer 1956 more than 100 gallons. I have no exact figures for Belgium and Germany, but the tendencies are the same there. Until recent years the tendency was an increase of production per acre and rather constant production per man. Now the tendency is in the first place an increase of production per man. This means mechanisation of the grassland farms. On the larger farms in the Netherlands with '20 and more cows the labour problem has halted the increase of production per acre ; on the small farms the increase is still going on.

Ley Farming

It is stated above that conditions on the largest part of the permanent grassland are not favourable for arable farming. Only 20-30 per cent of, this permanent grassland originates from seeding arable land or new cultivated land. A part of-this-seeded grassland is of poor quality with browntop and red fescue as important grasses. Insufficient water supply is the cause of the poor quality of pastures on sandy soils.

Regular ley farming with l-3 year leys is not well developed. Since the Second World War more attention has been paid to the propagation of ley farming. In the Netherlands Frankena stimulated the' establishment of experimental ley farms. Cleveringa (1954) found that the production of the leys on these dry soils was as good as on permanent grassland on soils with a better water supply. This is illustrated in Table 4. For comparison the figures of the nitrogen demonstration farms are also given.

Table C-Production on Experimental Ley Farms and Nitrogen Demonstration Farms in 1952-54

	N lb/acre	cows per 10 acre	SE lb/acre	Milk. gals/acre
Experimental ley farms				
permanent grassland	112	5.7	3300	520
1-3 year leys	153		3900	
Nitrogen demonstration farms				
permanent grassland	173	5.8	4000	580

The production of the permanent grass on the ley farms was considerably lower, mainly due to poor sward, lower nitrogen fertilisation, and poor drainage in winter.

The purpose of these ley farms was also to demonstrate the good influence of a high amount of clover in leys. On these sandy soils the growth of clover, however, is very uncertain and too late in spring so that the farmers on these experimental farms have gone over to using large amounts of nitrogen. In fact the clover percentages are rather low there.

In these countries mainly mixtures of perennial ryegrass and white clover supplemented with varying amounts of meadow fescue and timothy are used for leys. In the Netherlands and Belgium since 1945 the early flowering perennial ryegrass from Ireland and Denmark has been largely replaced by improved strains of the late flowering type which was bred in these countries. Greater persistency, better winter hardiness, and greater palatability have caused change. Strains of white clover are bred, but seed production presents great difficulties in the rather wet climate. (Van Slycken, 1954 ; Scheygrond and Sonneveld, 1954.)

On dry soils experiments with cocksfoot mixtures gave good results, but the introduction in practice is but slow, while these mixtures require very good management, and the danger of grass tetany seems to be greater with cocksfoot. Mixtures with meadow fescue and timothy have been tested and valued on account of their good palatability, good summer production, and tolerance to clover. Establishment and early growth in spring, however, are not so good. Up to now mostly perennial ryegrass mixtures have been used.

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DISCUSSION

Q. (1) Do you consider that the soils of Holland are rich in minerals or trace elements?
(2) What is the position of animal health in regard to heavy use of nitrogen ?

A. (1) We have quite a big variation. Most of the alluvial clay soils are rich in potash, calcium and phosphate. Half of the country consists of podzolised sandy soils which are generally fairly poor and low in phosphate and calcium. After 50 years of application of commercial fertilisers, phosphate has become fairly high but potash is still low. On sandy soils we have low copper content with copper deficiency in crops and animals. In some parts we also have cobalt deficiency and magnesium deficiency.
(2) On experimental, farms we have had no trouble at all. In practice farmers do have troubles. The causes are evidently very complex.

Q. Is any advisory service available in Holland and how does it operate as regards soil requirements ?

A. We have an extensive advisory service in our country. We test hundreds of thousands of soil samples for their potash, phosphate and calcium content. But it is very difficult to change old practices such as persuading farmers to use fertilisers. It is equally, difficult to get a farmer to cease using fertiliser when his soil has reach a high phosphate content.

Q. Do you make any conscious- effort where 15cwt sulphate of ammonia is used to keep the clover in your pastures or do you give it up as lost?

A. Yes, we try to keep it in. We go in for grazing at short intervals. By this means we can 'keep the clover content in to a reasonable extent.

Q. How do you apply your 15cwt? Do you put on a small amount at a time or one big quantity at a time?

A. We never put on more than 2cwt per acre at a time when grazing, therefore we give six to seven applications during the year. Some farmers do apply 3cwt at a time for grazing. For hay and silage we sometimes apply 4cwt. We start putting on in March and finish in the second half of September.

Q. In Southland we have the problem of 90,000 acres of peat. You keep the water table up to 20 inches. Down there our main drains are five to six feet,. the others three feet six inches. Do you think we are going too deep with our draining system ?

A. I can only speak from our experience in Holland. We find we get into trouble with peat drains as deep as yours. The peat dries out too much. We have bigger ditches but they are shallower.

Q. Do we understand 15cwt nitrogen is the total application of artificial manures as well as urine?

A. It refers only to commercial artificial nitrogen. 'It does not include the nitrogen from urine from animals on the farm.

Comment: In North Holland where I come from we only sow 5cwt artificial nitrogen. Fifteen hundredweight has not been applied to pastures in the North of Holland as far as I know.

A. My experience of the high figure is only on the experimental farms. All farmers do not put on as much as this.