

Fig. 7. A nation-wide map showing the location of dry soils. Dry soils = soils with a RZC below 80 mm for grass and barley production.

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Agricultural land-use in Denmark in the 1980s

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The regional agricultural land-use pattern on community level is shown for selected Danish crops. It appears that even within the four years from 1981 Danish agriculture has experienced a substantial development towards a more intensive use of winter crops and crops rich in protein. This implies also some regional change in the relative importance of the major crops, where f.i. barley has lost its former total dominant position in Jutland.

Keywords: Denmark, Agriculture, Regional pattern, Land-use.

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Since the mid 1950s Danish agriculture has gradually developed in the direction of specialization and decreasing diversity as described in detail in Jensen (1984). At the beginning of the 1980s the status was that of a highly mechanized agriculture with an outstanding specialization in production structure. The animal husbandry has been concentrated on fewer units with either cattle or pigs while the former dominance of mixed farming is dwindling. In plant production specialization is almost at its peak evaluated at a national level. Cereals, and especially spring barley, constitute a substantial part of the crop pattern as it appears from table 1. The largest percentage was reached in 1979, when spring barley covered 55 % of the total agricultural area in Denmark.

Main regional structures

However, national tendencies do not reveal some very important regional differences in the agricultural production structure. Most of the regional patterns in Danish agriculture can be related to the natural environment. Especially the marked difference between the young moraines in the eastern part of the country and the outwash plains in West-Jutland is mirrored in the production structure, but also other and more detailed characteristics of the natural environment have influenced the local production strategies (for a more comprehensive discussion of this matter see Jensen and Reenberg (1986) which gives a throughout presentation of the regional production pattern on municipality level for the years 1971 and 1981). The economic conditions in Danish agriculture are rather similar, however, for the different parts of the country, and therefore influence less the overall regional structure.

	1970	1980	1982	1985
Agricultural land 1000 ha	2941	2905	2887	2834
Cereals (barley)	1739 (1352)	1816 (1577)	1768 (1485)	1601 (1094)
Pulses	27	4	9	127
Roots	289	241	244	228
Seeds	73	150	198	267
Grass in rotation	500	414	397	357
Permanent grass	300	252	243	221

Table 1. Development of the main agricultural land-use classes since 1970.

Outstanding exceptions are crops as sugar-beets and potatoes, where the location of factories is an important factor influencing the land-use pattern.

Regional crop structures

In the maps figures 1 to 9 are demonstrated the relative importance and the regional variations for some of the important crops in 1985, supplemented by a few maps from 1981 to be used in the later discussion on some of the recent development trends. (All maps and diagrams are based on data from the agricultural statistics collected by Danmarks Statistik). As already mentioned barley (figures 1 and 2) still has a prominent position in Danish agriculture, covering 39 % of the agricultural area and more than $\frac{2}{3}$ of the area with cereals. Barley yields best on loamy soils, and before the fast increase in the barley acreage in the 1950s this crop was mainly grown on the morainic soils in eastern Denmark. However, fertilizers and irrigation help to make the sandy soils more suitable, although with a lower yield, and today the regional pattern has completely changed. The main barley growing regions are now found on the poorer soils in Jutland, leaving the more fertile soils on the Islands to f.e. wheat and rape.

Within the last few years, wheat has obtained a more important position and covered more than $\frac{1}{5}$ of the cereal acreage and 12 % of the agricultural land in 1985. This is due to the increasing interest in winter crops in general, and to some extent to the fact that wheat is replacing barley as pig feed and that wheat yields are comparatively high. Wheat (figures 3 and 4) is principally grown on good soils as found in the eastern part of the country, where also relatively mild summers favour wheat cultivation. The maximum wheat percentage (above 30 % of the cereal acreage) is found on the islands south of Zealand (where the wheat is grown in rotation with sugar beets), on Funen and in some parts of East-Jutland. Local maxima are

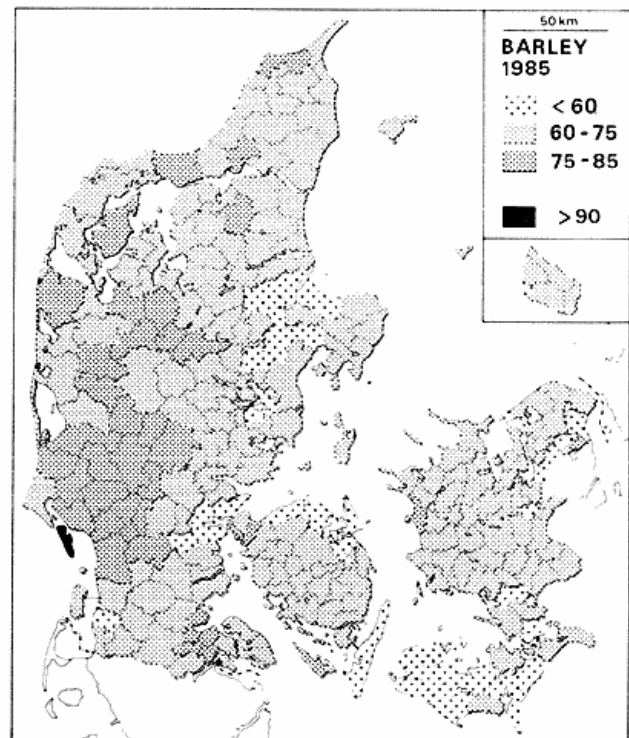


Fig. 1. Barley (winter and spring) in percentage of the area under cereals 1985. When compared with figure 2, notice that the 85-90 % level is no more represented.

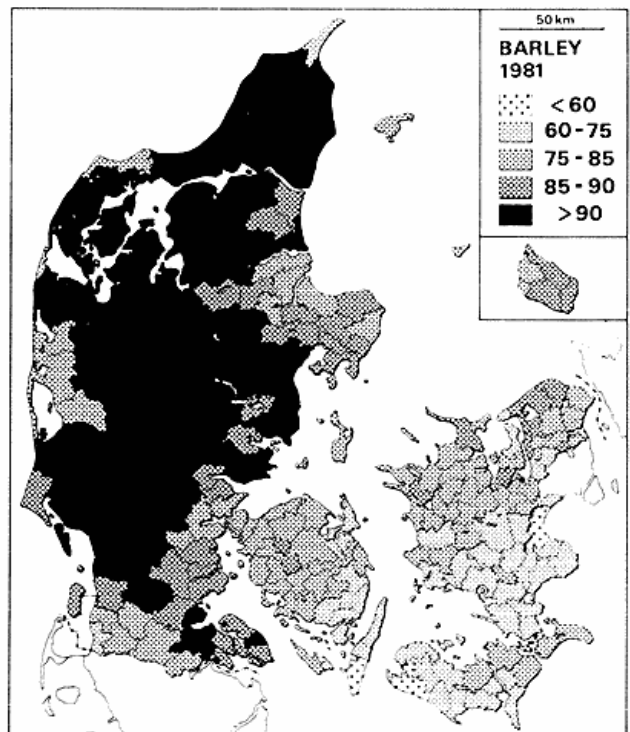


Fig. 2. Barley (winter and spring) in percentage of the area under cereals 1981.

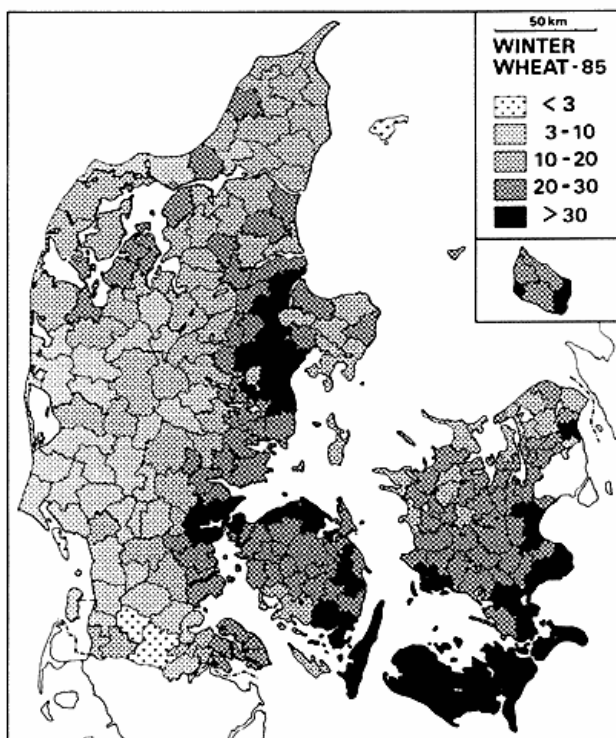


Fig. 3. Winter wheat in percentage of the area under cereals 1985.

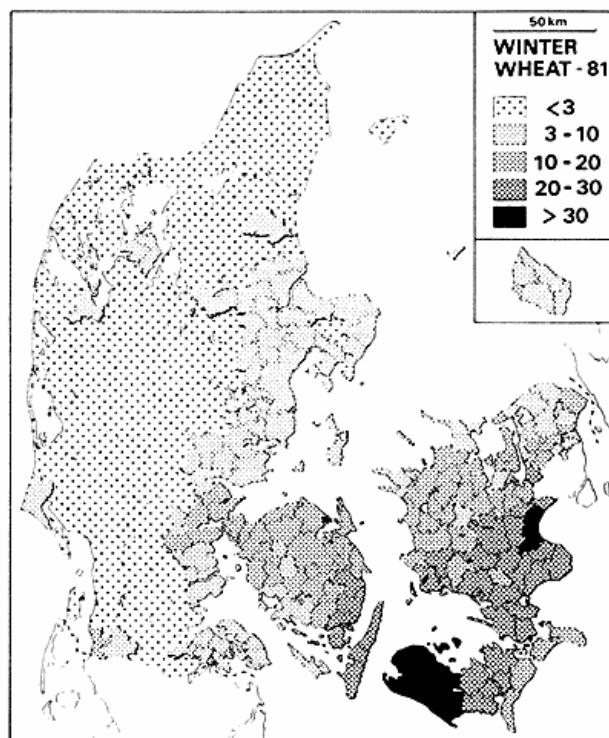


Fig. 4. Winter wheat in percentage of the area under cereals 1981.

located on the relative fertile soils on Salling and in the Skjernå-valley.

Field pea is a new crop in Danish agriculture. As appears from table 1 the pulses were of very limited importance up till the beginning of the 1980s – the slightly higher figure in 1970 mirrors a few-year period when horsebean cultivation was subsidized.

In 1978 EEC market schemes favoured crops rich in protein, which by 1985 increased the area under peas to 123,000 ha or more than 4 % of the agricultural area. The main part of the production is used for feed. Introducing peas in the crop rotation gives advantages as f.e. diminishing spread of diseases, nitrogen fixation and a decrease in the over-production of cereals.

Peas (figure 5) are not very sensitive to soil quality, which is reflected in the regional distribution. The highest percentages are found on the sandy soils in Jutland, where the comparative advantage of growing peas is the largest. The acreage is not expected to grow much beyond the present level, as pea yields are very sensitive to climate, and the risk consequently much greater than for cereals.

Sugar beets for sugar production are mainly grown on the fertile moraine soils, but exactly where has moreover been determined by the location of sugar factories because of the high transportation costs involved. The main sugar producing areas are found on the islands south of Zealand (figure 6). In this part of the country approxima-

tely 30 % of the agricultural area is cultivated with sugar beets, which is considered the maximum limit, if spread of diseases should be avoided.

The great importance of the distance factor can especially be studied in Western Zealand, where the acreage with sugar beet creates concentric zones around the factory located in Gørlev (close to the coast). The sugar factory in Assens (on Funen) has also a significant influence on the local land-use pattern.

Other root crops – mainly fodder sugar beet – are still covering 8 % (1985) of the agricultural land, but the acreage is decreasing partly because of the declining cattle stock and partly because root crops are gradually replaced by more labour extensive fodder crops as grass and maize.

The regional pattern of fodder sugar beets production (figure 7) should be seen in connection with that of grass outside rotation (figure 8) and cattle (figure 9).

Permanent grass is still of some importance in the Limfjord area with its littoral meadows, in Southwest-Jutland, and also in the central parts of Jutland, where poor soils and the many slopes favour grass, where these areas are not afforested. The existence of areas which can be used for grazing only might be part of the background for the present regional distribution of cattle.

From a more equal national distribution the cattle have "moved west" during the last half century. In the western part of Jutland the number of cattle has been increasing

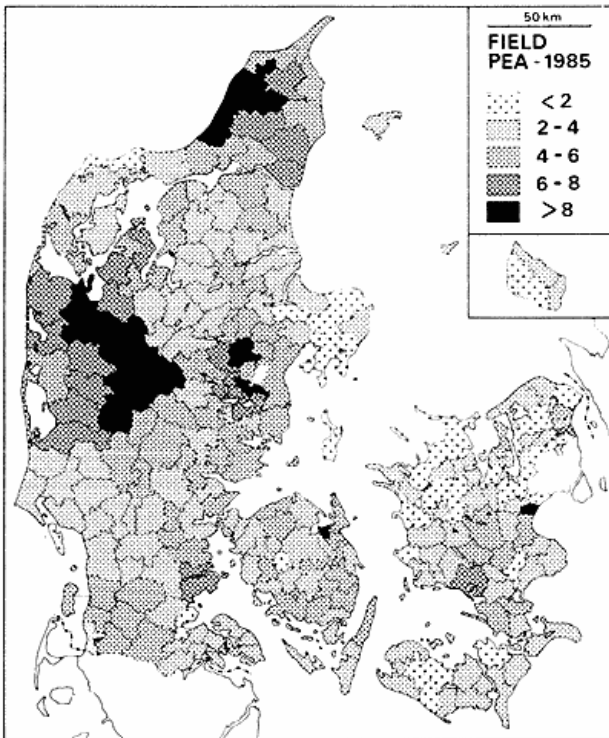


Fig. 5. Field peas in percentage of the agricultural area 1985.

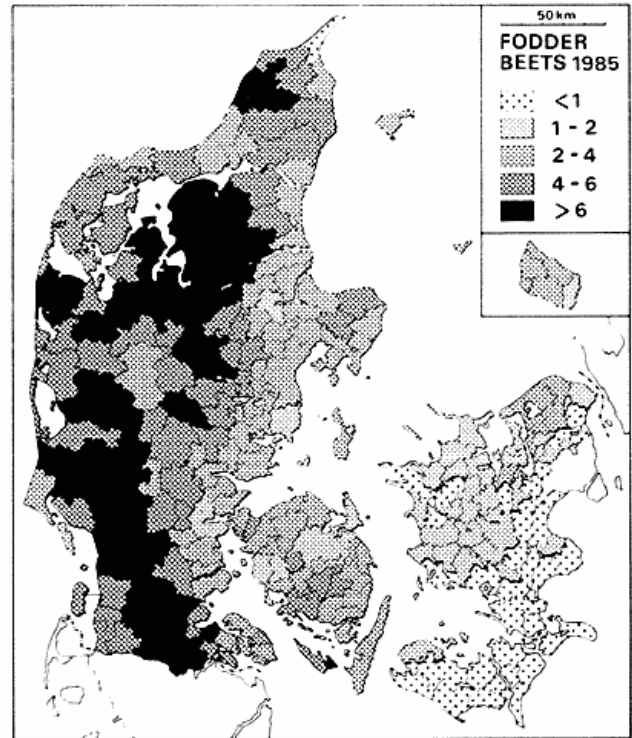


Fig. 7. Fodder beets in percentage of the agricultural area 1985.

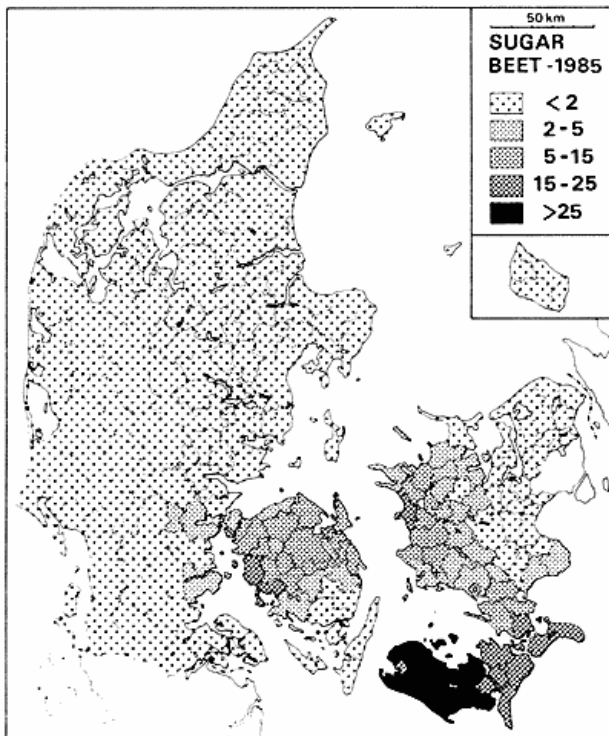


Fig. 6. Sugar beets for sugar production in percentage of the agricultural area 1985.

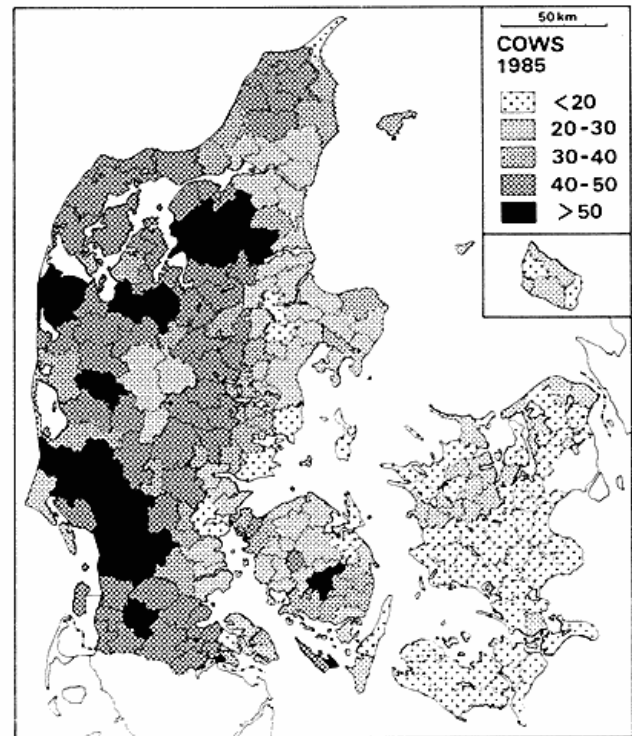


Fig. 8. Number of cows pr. 100 ha agricultural land 1985.

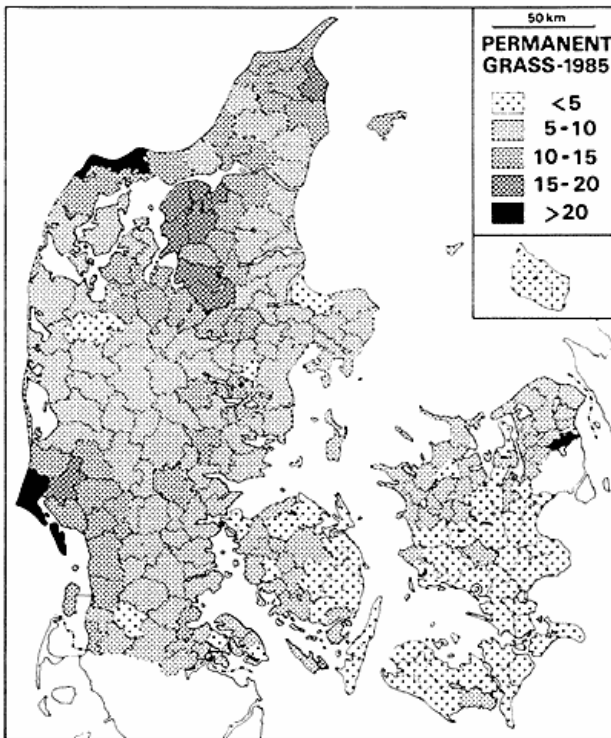


Fig. 9. Grass outside rotation (permanent grass) in percentage of agricultural land 1985.

up till 1980 so there is now a significant concentration of cattle in this part of the country.

Development in the 1980s

Most of the changes in the regional production pattern in Danish agriculture in this decade can be considered a continuation of the specialization process briefly described above. However, some marked changes can be observed. The increasing awareness of the serious ecological drawbacks of spring crops, especially barley, has resulted in a rapid change towards winter crops. This means that a smaller part of the soil surface is left uncovered for a large part of the year and thereby exposed to wind erosion and leaching of nutrient ions. The relative importance of winter and spring crops is shown in figure 10. In 1985 32 % of the cereals were winter crops, winter wheat being the most important (21 %), rye number two (7 %) and winter barley the least important (4 %). In the early 1980s winter barley experienced a remarkable increase after the restrictions on cultivation due to diseases were almost abolished in 1982. As indicated in the figure the peak for winter barley was reached in 1984. Severe problems caused by winter frost in 1984/85 and again in 1985/86 have reduced the farmers' interest in this crop. Detailed reportings on the damages reveal that barley is much more sensitive to frost than wheat. The average national figures for 1984/85 show that 9 % of the wheat

fields had to be resown, against 75 % for winter barley. It should be added, that the regional differences are substantial, and that the greatest need for resowing is in Jutland.

Looking at the development in the first 5 years of the 1980s it is also worthwhile to stress that barley has lost its total predominant position in the crop pattern. In the major part of Jutland more than 90 % of the area with cereals were barley fields in 1981. Only four years later this figure has decreased to below 85 % (leaving no community in the 85-90 % class) in 1985. The country average change from 55 % to 39 % of the agricultural area has left considerable space for other crops. Comparing the regional pattern of barley in 1981 and 1985 (figures 1 and 2) with the regional pattern of wheat in the same years reveals that wheat is replacing barley even on the less fertile soils in Jutland. The relative increase of wheat is much larger in the counties in that part of the country as it appears in figure 11.

Peas have already been mentioned as a new and relative important element in the Danish crop pattern. Another crop of a fast increasing importance is industrial seed (mainly spring rape). The development in acreage appears from table 1 and figure 11, showing that the area has almost doubled in five years, now covering approximately 8 % of the total agricultural area. As for wheat the regional development trend is pointing towards a more equal re-

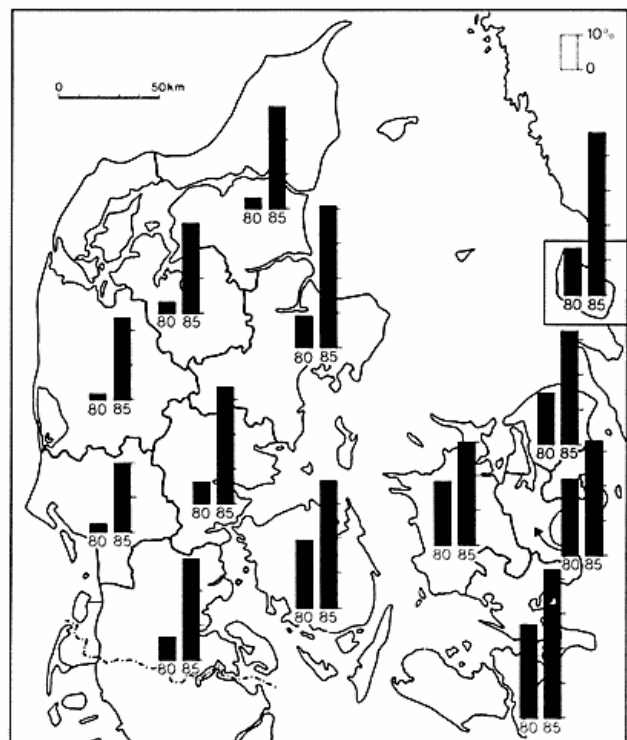


Fig. 10. Development of the acreage of cereals and seeds in Denmark. The shaded part of the diagram indicates the winter crops.

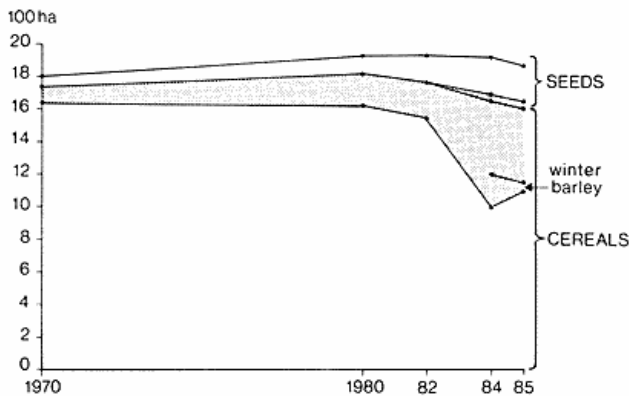


Fig. 11. The map shows the importance of winter cereals in the different counties in Denmark for the years 1980 and 1985. The height of the columns indicates the level of winter cereals measured as a percentage of the area with cereals.

gional distribution. From being closely connected to the more fertile soils in the eastern part of the country, rape is becoming more common also on the sandy soils (the lowest percentage of the agricultural land is found in West-Jutland, where it amounts to only about 4 % on a county level).

CONCLUDING REMARKS

Based on these few considerations on the development in the last few years and the present status of the regional production pattern in Danish agriculture it can be summarized:

- that the keywords to characterize the development are specialization and decreasing diversification,
- but in this decade there are also obvious trends towards a more complex crop pattern with emphasis on winter cereals and on fodder crops rich in protein, trends which have to be seen as an essential element of a strategy containing also ecological considerations.

ACKNOWLEDGMENTS

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Two types of Danish rural population change based on natural resources – a long-term perspective (1769-1981)

Henning Mørch

Mørch, Henning: Two types of Danish rural population change based on natural resources – a long-term perspective (1769-1981). *Geografisk Tidsskrift* 88:13-20. Copenhagen. 1988.

The development of the rural population in Denmark during the last 200 years is examined. Two main types of development are revealed. The types are to be attributed to differences in the basis and utilization of resources, and of industrialization and urbanization.

Keywords: Rural population, Denmark (Denmark).

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The subject of this paper is the development of the rural population in Denmark – a demonstration of growth curves for the population in some typical regions and rural municipalities. The material for the study is the census populations of municipalities (subdivision before 1970). Censuses have been performed in more than two hundred years – the first ones in 1769, 1787, 1801, 1834, 1840, and since then every fifth or tenth year. The populations of the selected municipalities are presented by semi-logarithmic graphs so that the slope of curves are proportional to the rate of population growth; thus the population curves – at different times or in different places – are directly comparable.

Quite many studies have been carried out on the general development of population in larger regions and of the urban development – and especially for shorter periods. An extensive study of the Danish urban development is Matthiessen (1985). Studies of the longer course of rural population development appear to be few. Aagesen (1961) treats the population geography of Denmark. Illeris (1965) gives an examination of the rural population development in two typical regions of the country and especially the role of the demographic components of growth – including a map of the time of maximum population in the municipalities. Until quite recently there has been a close relationship between rural population and resources (measured by type of area) in two characteristic types of landscapes (Mørch, 1980).

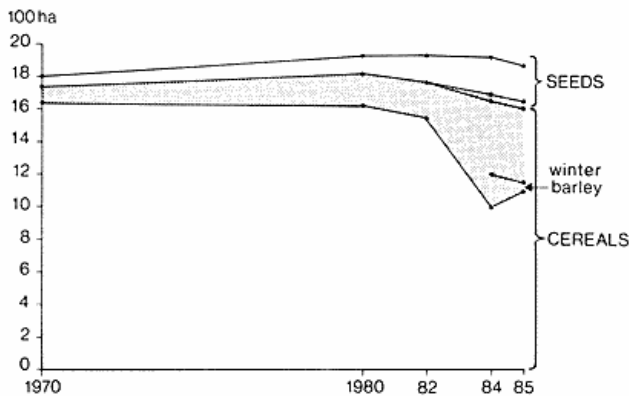


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